STATE OF DELAWARE

DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T201112201.01

FEDERAL AID PROJECT NO. NHS-K008(13)

CFDA NO. 20.205

SR 1, NE Front Street Grade Separated Intersection

Kent County

ADVERTISEMENT DATE: October 16, 2017

COMPLETION TIME: 670 Calendar Days

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

Bids will be received in the Bidder's Room at the Delaware Department of Transportation's Administration Building, 800 Bay Road, Dover, Delaware until 2:00 P.M. local time **November 21, 2017**

Contract No.T201112201.01
Federal Aid Project No. NHS-K008(13)

SR 1, NE Front Street Grade Separated Intersection
Kent County

GENERAL DESCRIPTION

LOCATION

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

DESCRIPTION

The improvements consist of furnishing all labor and materials for this contract. This project involves the construction of new roadway, pedestrian facilities, bridge structure, new and relocated utility facilities, existing roadway modifications, and other incidental construction in accordance with the location, notes, and details shown on the plans and as directed by the Engineer.

COMPLETION TIME

All work on this contract must be complete within 670 Calendar Days. The Contract Time includes an allowance for 101 Weather Days. It is the Department's intent to issue a Notice to Proceed such that work starts on or about February 19, 2018.

PROSPECTIVE BIDDERS NOTES:

1. BIDDERS MUST BE REGISTERED with DelDOT and request a cd of the official plans and specifications in order to submit a bid. Contact DelDOT at dot-ask@state.de.us, or (302) 760-2031. Bids will be received in the Bidder's Room at the Delaware Department of Transportation's Administration Building, 800 Bay Road, Dover, Delaware until 2:00 P.M. local time November 21, 2017 unless changed via addendum.
2. QUESTIONS regarding this project are to be e-mailed to dot-ask@state.de.us no less than six business days prior to the bid opening date in order to receive a response. Please include T201112201.01 in the subject line. Responses to inquiries are posted on-line at http://www.bids.delaware.gov.
3. THE BID PROPOSAL incorporates a cd containing **Expedite**, **version 5.9a** and its installation file. Bidders are to use the cd provided to enter their bid amounts into the Expedite file. The Expedite bid file must be printed and submitted in paper form along with the cd and other required documents prior to the Bid due date and time.
4. SURETY BOND - Each proposal must be accompanied by a deposit of either surety bond or security for a sum equal to at least 10% of the bid.
5. DRUG TESTING - Regulation 4104; The state Office of Management and Budget has developed regulations that require Contractors and Subcontractors to implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds pursuant to 29 **Del.C.** §6908(a)(6). **Refer to the full requirements by following the below link:** http://regulations.delaware.gov/register/september2015/final/19%20DE%20Reg%20207%2009-01-15.htm
   Please note a few of the requirements listed below;
   * At bid submission - submit with the bid a signed affidavit certifying that the Contractor has in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for their Employees that complies with this regulation;
   * Upon DBE participation submission - submit a separate signed affidavit from each DBE Subcontractor certifying they have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for their Employees that complies with this regulation;
   * Two business days prior to contract execution - The awarded Contractor shall provide to DelDOT copies of the Employee Drug Testing Program for the Contractor and each participating DBE firm;
   * Subcontractors - Contractors that employ Subcontractors on the job site may do so only after submitting a copy of the Subcontractor's Employee Drug Testing Program along with the standard required subcontractor information. A Subcontractor shall not commence work until **DelDOT** has approved the subcontractor in writing;
   * Testing Report Forms shall be submitted to DelDOT monthly (forms will be provided).
   * Penalties for non-compliance are specified in the regulation.

6. SUPPLEMENTAL SPECIFICATIONS to the August 2001 Standard Specifications were issued November 24, 2014 and apply to this project. They can be viewed here. The ***Specifications Note*** document is for the use by the bidders to reference the new numbers to the past numbers used for bidding purposes on previous Department contracts.
7. DBE PROGRAM REQUIREMENTS under 49CFR §26.53(b)(3)(i)(B) change effective January 1, 2017. **Submission of DBE participation information is now required from the lowest apparent bidder no later than five (5) calendar days after bid opening *(formerly 7 days)*.**
8. No RETAINAGE will be withheld on this contract.
9. EXTERNAL COMPLAINT PROCEDURE can be viewed on DelDOT's Website at; http://www.deldot.gov/information/business/, or you may request a copy by calling (302) 760-2555.
10. BREAKOUT SHEETS MUST be submitted either with your bid documents; or within seven (7) calendar days following the bid due date by the lowest apparent bidder. Refer to instructions adjacent to the Breakout Sheets in this document.
11. PROPOSSED TRAINEE PLANS - The number of trainees to be trained will be **2**, as listed in the Training Special Provisions within Contract General Notices. The program(s) must be submitted within 10 Calendar Days of notification of apparent low bidder status. Contract Award will not take place until acceptable On-the-Job (OJT) program plans are received by the Civil Rights Group of the Department.

    Failure of the apparent low bidder to present copies of an acceptable OJT Trainee Programs within ten (10) calendar days of notification of apparent low bidder status, shall create a rebuttable presumption that the bid is not responsive.
12. The Completion Date for all of the work in this Contract is identified elsewhere in the Contract documents. In addition, work is to be performed on facilities owned by the Kent County Department of Public Works under Item 753550-Installing Sanitary Sewer (Force Main), DIP, 18". Interruption of service for the existing force main is limited to the number of calendar days identified in the plans. This service interruption duration shall be identified as an Interim Completion Date Milestone in the Contractor's CPM. If the work is not completed such that the service is interrupted for longer than the identified number of calendar days, then for each and every Calendar Day charged beyond the identified Calendar Days, Liquidated Damages shall be assessed and deducted from monies due the Contractor per Section 108.08 in the amount of twenty-five percent (25%) of the value shown in Section 108.09 until such time as the described work is complete and accepted by the Engineer and the Kent County Department of Public Works and service is restored to the 18 inch sewer force main. These liquidated damages are in addition to and do not void or alter any liquidated damages that may be assessed if work for other Interim Completion Dates is not completed and accepted by the Engineer within the identified Interim Completion Date or if all of the work in the Contract is not completed and accepted by the Engineer within the identified Completion Date for the entire Contract.
13. **Appendix - B**

    This project incorporates Appendix-B TECHNICAL SPECIFICATIONS, which is a part of this contract. Appendix-B contains additional specifications required for this project.

CONSTRUCTION ITEMS UNITS OF MEASURE

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

*Not used for units of measurement for payment.

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GENERAL NOTICES

SPECIFICATIONS:

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

CLARIFICATIONS:

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

ATTESTING TO NON-COLLUSION:

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

QUANTITIES:

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

EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS:

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

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

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

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

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

   3. The contractor will ensure employees receive equal pay for equal work, without regard to sex. Employee pay differential is acceptable if pursuant to a seniority system, a merit system, a system which measures earnings by quantity or quality of production, or if the differential is based on any other factor other than sex.

TAX CLEARANCE:

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

LICENSE:

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

SUBCONTRACTOR LICENSE: 29 DEL. C. §6967:

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

DIFFERING SITE CONDITIONS,

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

Differing site conditions: During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract of 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 fourth the reasons and support for such adjustment.

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

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

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

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

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

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

(A) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction or

(B) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed.

CONFLICT WITH FEDERAL STATUTES OR REGULATIONS:

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

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

FEDERAL LABOR AND EMPLOYMENT REQUIREMENTS

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

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

CONVICT PRODUCED MATERIALS:

(a) Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal-aid highway construction project if such materials have been:

(1) Produced by convicts who are on parole, supervised release, or probation from a prison or

(2) Produced in a qualified prison facility and the cumulative annual production amount of such materials for use in Federal-aid highway construction does not exceed the amount of such materials produced in such facility for use in Federal-aid highway construction during the 12-month period ending July 1, 1987.

(b) Qualified prison facility means any prison facility in which convicts, during the 12-month period ending July 1, 1987, produced materials for use in Federal-aid highway construction projects.

TO REPORT BID RIGGING ACTIVITIES:

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

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

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

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

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

Goals for Minority Participation In Each Trade	Goals for Female Participation In Each Trade
12.3% (New Castle County) 14.5% (Kent & Sussex Counties)	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 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 Kent 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 **2**. In the event the contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year apprenticeship or training.

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

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

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

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

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

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

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

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

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

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

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

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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, Kirbati, 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 11 % 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 five (5) 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 five (5) 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.
8. In accordance with 49 CFR 26.53(f)(1), DelDOT requires that a prime contractor not terminate a DBE subcontractor without prior written consent from the DelDOT Civil Rights Office. This includes, but is not limited to, instances in which a prime contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

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GUIDANCE FOR GOOD FAITH EFFORT

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

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

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

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

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

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

Administrative reconsideration:

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

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

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

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

I. GENERAL

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

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

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

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

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

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

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

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

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

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

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

    a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

    b. The contractor will accept as its operating policy the following statement:
    "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

    a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

    b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

    c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

   a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

   b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

   c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

   a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
   b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

   c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

   d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

   a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

   b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

   a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

   b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

   c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

   d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

   a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

   b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

    a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

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

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

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

        (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

        (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

        (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

    b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

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

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

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

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

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

1. Minimum wages

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

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

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

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

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

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

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

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

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

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

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

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

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

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

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

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

b. Trainees (programs of the USDOL).

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

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

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

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

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

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

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

    a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

    b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

    c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

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

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price,

excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

   (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

   (2) the prime contractor remains responsible for the quality of the work of the leased employees;

   (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

   (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

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

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

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

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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

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

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

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

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

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

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

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

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

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

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

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

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

1. **Instructions for Certification – First Tier Participants:**

   a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

   b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

   c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

   d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

   e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

   f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

   g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

   h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

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

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

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

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction

(such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

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

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

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

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

   a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.
3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

* * * * *

CARGO PREFERENCE ACT (NEW)

Requirements in the Federal-aid Highway Program

(a) Agreement Clauses. "Use of United States-flag vessels:

(1) Pursuant to Pub. L. 664 (43 U.S.C. 1241(b)) at least 50 percent of any equipment, materials or commodities procured, contracted for or otherwise obtained with funds granted, guaranteed, loaned, or advanced by the U.S. Government under this agreement, and which may be transported by ocean vessel, shall be transported on privately owned United States-flag commercial vessels, if available.

(2) Within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (a)(1) of this section shall be furnished to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(b) Contractor and Subcontractor Clauses. "Use of United States-flag vessels: The contractor agrees—

(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.

NOTE:

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

* * * * *

BUY AMERICA (NEW)

Requirements in the Federal-aid Highway Program

By signing and submitting this proposal, the bidder certifies that:

In accordance with 23 U.S.C, 313 and 23 CFR 635.410, all iron and steel materials permanently incorporated into this project will be produced in the United States and that all manufacturing processes involving these materials will occur in the U.S, except that a minimal amount of foreign steel or iron materials may be used, provided the cost of the foreign materials does not exceed 0.1 percent of the total Contract cost or $2,500.00, whichever is greater. If such minimal amount of foreign steel is used, the Contractor shall maintain a record of the costs to ensure that the allowable limit is not exceeded. This documentation shall be presented to the Department upon request.

At the Department's request, I/we will provide manufacturer's/supplier's documentation verifying domestic origin as defined in the Specifications. All Materials accepted on the basis of such Certificate of Compliance may be sampled by the Department and tested at any time. Use of Material on the basis of Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating Material in the Project conforming to the requirements of the Contract. Any Material not conforming to such requirements will be subject to rejection whether in place or not. The Department reserves the right to refuse to permit the use of Material on the basis of Certificate of Compliance.

* * * * *

APPENDICES TO THE TITLE VI ASSURANCE

APPENDIX A

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

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

APPENDIX E

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

Pertinent Non-Discrimination Authorities:

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

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,(42 U.S.C. $ 460 I), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

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

Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. $ 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part27;

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

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

The Civil Rights Restoration Act of 1987,(PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of l964,The AgeDiscrimination Act of 1975and Section 504 of the Rehabilitation Act of l973,by expanding the defrnition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);

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

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

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

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

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

* * * * *

PREVAILING WAGES

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

REQUIREMENT BY DEPARTMENT OF LABOR FOR SWORN PAYROLL INFORMATION

Title 29 Del.C. §6960 stipulates;

> (b) Every contract based upon these specifications shall contain a stipulation that the employer shall pay all mechanics and laborers employed directly upon the site of the work, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the specifications, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics. The specifications shall further stipulate that the scale of wages to be paid shall be posted by the employer in a prominent and easily accessible place at the site of the work, and that there may be withheld from the employer so much of accrued payments as may be considered necessary by the Department of Labor to pay to laborers and mechanics employed by the employer the difference between the rates of wages required by the contract to be paid laborers and mechanics on the work and rates of wages received by such laborers and mechanics to be remitted to the Department of Labor for distribution upon resolution of any claims.
>
> (c) Every contract based upon these specifications shall contain a stipulation that sworn payroll information, as required by the Department of Labor, be furnished weekly. The Department of Labor shall keep and maintain the sworn payroll information for a period of 6 months from the last day of the work week covered by the payroll.

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

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

PREVAILING WAGE REQUIREMENTS

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

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

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

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

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

PREVAILING WAGES FOR **HIGHWAY CONSTRUCTION** EFFECTIVE MARCH 15, 2017

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
BRICKLAYERS	51.99	51.99	15.17
CARPENTERS	53.48	53.81	42.77
CEMENT FINISHERS	33.91	34.12	27.13
ELECTRICAL LINE WORKERS	23.52	45.39	22.22
ELECTRICIANS	66.85	66.85	66.85
IRON WORKERS	62.35	24.95	26.50
LABORERS	43.30	39.85	39.12
MILLWRIGHTS	16.84	16.34	14.11
PAINTERS	67.07	67.07	67.07
PILEDRIVERS	69.44	24.83	28.17
POWER EQUIPMENT OPERATORS	42.91	41.41	37.92
SHEET METAL WORKERS	23.79	21.23	18.23
TRUCK DRIVERS	35.73	29.51	35.95

CERTIFIED: 09/08/2017 BY: _____
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

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

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

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

PROJECT: T201112201.01 SR1 NE Front Street Grade Seperated Intersection , Kent County

GENERAL DECISION: DE170019 01/06/2017 DE19

Superseded General Decision Number: DE20160019

State: DELAWARE

Construction Type: HIGHWAY

COUNTY: Kent County in Delaware

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.20 for calendar year 2017 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.20 per hour (or the applicable wage rates listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2017. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/06/2017

SUDE2016-001 04/11/2016

	Rates	Fringes
Bricklayer	50.49	
Carpenter	52.81	
Cement Mason/Concrete Finisher	30.96	
ELECTRICIAN		
Electrician	65.10	
Line Workers	44.82	
Ironworker	24.64	
Laborer	39.35	
Millwright	16.14	
Painter	63.14	
Power Equipment Operator:		
Piledriver	24.52	
Power Equipment Operators	40.89	
Sheet Metal Worker	20.97	
Truck Driver	29.14	

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

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any soliticitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

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

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

Union Average Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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/Publications/manuals/standard_specifications/index.shtml

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

SPECIAL PROVISIONS

CONSTRUCTION ITEM NUMBERS

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

Standard Item Number:

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

Special Provisions Item Number:

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

Examples

Standard Item Number - 202000 Excavation and Embankment

202 Indicates Section Number

000 Indicates Sequential Number

Special Provision Item Number - 202500 Grading and Reshaping Roadway

202 Indicates Section Number

500 Indicates Sequential Number

NOTE:

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

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

401502 - ASPHALT CEMENT COST ADJUSTMENT

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

The Delaware Posted Asphalt Cement Price will be issued monthly by the Department and will be the industry posted price for Asphalt Cement, F.O.B. Philadelphia, Pennsylvania. The link for the posting is http://www.deldot.gov/information/business/bids/asphalt_cement_english.shtml.

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

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

Actual quantity of asphalt cement qualifying for any Asphalt Cement Cost Adjustment will be computed using the weight of eligible asphalt that is shown on the QA/QC pay sheets as a percentage for the delivered material.

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

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

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

The Asphalt cement cost adjustment will be calculated on grade PG 64-22 asphalt regardless of the actual grade of asphalt used. The Project Asphalt Cement Base Price per ton for the project will be the Delaware Posted Asphalt Cement Price in effect on the date of project advertisement.

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

NOTE:

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

5/05/15

302514 - MILLED HOT-MIX BASE COURSE

Description:

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

Materials:

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

Subgrade Preparation:

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

Placement:

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

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

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

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

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

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

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

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

To determine the control strip target density, a control strip with a minimum length of 300' (90 m) shall be constructed at the beginning of work on each pavement base. Each control strip is to remain in place and become a section of the completed roadway. A control strip shall have an area of at least 400 yd^2 (325 m^2). For small areas, the Contractor may request to have a test strip waived. This request shall be submitted to the Engineer for review.

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

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

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

Method of Measurement:

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

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

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

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

Basis of Payment:

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

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

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

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

10/31/05

401699 - QUALITY CONTROL/QUALITY ASSURANCE OF BITUMINOUS CONCRETE

.01 Description

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

.02 Bituminous Concrete Production – Quality Acceptance

(a) Material Production - Tests and Evaluations.

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

Supply and capture samples, as directed by the Engineer under the purview of the Engineer from delivery trucks before the trucks leave the production plant. Hand samples to the Engineer to be marked accordingly. The sample shall represent the material produced by the Contractor, and shall be of sufficient size to allow the Engineer to complete all required acceptance tests. The Engineer will direct the Contractor when to capture these samples, on a statistically random, unbiased basis, established before production begins each day based upon the anticipated production tonnage. The captured sample shall be from the Engineer specified delivery truck. The Contractor may visually inspect the specified delivery load during sampling and elect to reject the load. If the contractor elects to reject the specified delivery truck, each subsequent load will be inspected until a visually acceptable load is produced for acceptance testing. All visually rejected loads shall not be sent to a Department project.

The first sample of the production day will be randomly generated by the Engineer between loads 0 and 12 (0-250 tons). Subsequent samples will be randomly generated by the Engineer on 500-ton sub-lots for the production day. Samples not retrieved in accordance with the Contractor's QC plan will be deemed unacceptable and may be a basis for rejection of material produced. Parallel tests or dispute resolution tests will only be performed on material captured at the same time and location as the acceptance test sample. Parallel test samples or Dispute Resolution samples will be created by splitting a large sample or obtaining multiple samples that equally represent the material. The Engineer will perform all splitting and handling of material after it is obtained by the Contractor.

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

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

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

production. If the actual production is going to be 50 tons or greater over the anticipated sub lot production, a new sample location will be determined on a statistically random, unbiased basis based upon the new actual production. The Engineer will combine the evaluation and test results for all of the applicable sublots in order to evaluate each individual lot.

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

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

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

(b) Pavement Construction - Tests and Evaluations.

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

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

The exempt areas around manholes will be a maximum of 4 feet transversely on either side from the center of the manhole, and 20 feet longitudinally on either side from the center of the manhole. The exempt areas around driveway entrances shall be the entire width of the driveway, and 3 feet from the edge of the longitudinal joint next to the driveway. Areas of exemption that will be cored for informational purposes only include: areas where the mat thickness is less than three times the nominal maximum aggregate size as directed by the Engineer, violations of Section 401.08 in the Standard Specifications as directed by the Engineer, and areas shown to contain questionable subgrade properties as proven by substantial yielding under a fully legally loaded truck. Failure to obtain core samples in these areas will result in zero payment for compaction regardless of the exempt status. The Engineer will evaluate and accept the compaction work on a daily basis. Payment for the compaction will be calculated by using the material production lots as referenced in **.02 Acceptance Plan (a) Material Production - B Tests and Evaluation** and analyzing the compaction results over the individual days covered in the material production lot. The compaction results will be combined with the material results to obtain a payment for this item.

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

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

Testing locations will be a minimum of 1.0 feet from the newly placed longitudinal joint and 50 feet from a new transverse joint.

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

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

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

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

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

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

- AASHTO T166, Method C (Rapid Method) – Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface Dry Specimens
- AASHTO T209 - Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt
- ASTM D7227 - Standard Practice for Rapid Drying of Compacted Asphalt Specimens using Vacuum Drying Apparatus

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

.03 Payment and Pay Adjustment Factors.

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

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

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

(a) Material Production - Pay Adjustment.

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

Table 2 - Material Parameter Weight Factors

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

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

1. For each parameter, calculate the mean value and the standard deviation of the test values for the lot to the nearest 0.1 unit.
2. For each parameter, calculate the Upper Quality Index (QU):
   QU = ((JMF target) + (single test tolerance) - (mean value)) / (standard deviation).
3. For each parameter, calculate the Lower Quality Index (QL):
   QL = ((mean value) - (JMF target) + (single test tolerance)) / (standard deviation).
4. For each parameter, locate the values for the Upper Payment Limit (PU) and the Lower Payment Limit (PL) from Table 3 - Quality Level Analysis by the Standard Deviation Method. (Use the column for "n" representing the number of sublots in the lot. Use the closest value on the table when the exact value is not listed).
5. Calculate the PWL for each parameter from the values located in the previous step:
   PWL = PU + PL - 100.
6. Calculate each parameter's contribution to the payment adjustment by multiplying its PWL by the weight factor shown in Table 2 for that parameter.
7. Add the calculated adjustments of all the parameters together to determine the Composite PWL for the lot.
8. From Table 4, locate the value of the Pay Adjustment Factor corresponding to the calculated PWL. When all properties of a single test are within the single test tolerance of Table 2, Pay Adjustment factors shall be determined by Column B. When any property of a single test is outside of the Single Test Tolerance parameters defined in Table 2, the Material Pay Adjustment factor shall be determined by Column C.
9. For each lot, determine the final material price adjustment:

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

In lieu of being assessed a pay adjustment penalty, the Contractor may choose to remove and replace the material at no additional cost to the Department. When the PWL of any material parameter in Table 2 is below 60, the Engineer may require the removal and replacement of the material at no additional cost to the Department. Test results on removed material shall not be used in calculation of future PWL calculations for Mixture ID.

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

When a sample is outside of the allowable single test tolerance for any Materials criteria in Table 2, that sample will be isolated. For payment purposes, the test result of the out of acceptable tolerance sample will be combined with the two previous acceptable samples of the same JMF and analyzed per this specification. The material that is considered out of the acceptable tolerance will only include the material within the represented sub-lot (i.e., a maximum of 500 tons). If the previous acceptable test result is from the previous production day, only the material produced on the second production day will be considered out of tolerance. All future sub lots will not include the isolated test. The pay factors for the out of tolerance sample lot will be calculated using column C of table 4.

If, during production, a QA sample test result does not meet the acceptable tolerances and the Contractors QC sample duplicates the QA sample test result, the Contractor can make an appropriate change to the mixture (within the JMF boundaries), and request to have that sample further isolated. After the Contractor has made appropriate changes, the Contractor will visually inspect each produced load. The first visually acceptable load will be sampled and tested. If that sample test result shows compliance with the specifications, the material that is considered out of the acceptable tolerance will include the material from the previous acceptable test result to the third load after the initially sampled and tested sample. If the sample does not meet the specification requirements, the Engineer will no longer accept material. Production may resume when changes have been made and an acceptable sample and test result is obtained.

Table 3 – Quality Level Analysis by the Standard Deviation Method

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

Table 3 – Quality Level Analysis by the Standard Deviation Method

PU or PL	QU and QL for "n" Samples						
	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9
61	0.39	0.33	0.31	0.30	0.30	0.29	0.29
60	0.36	0.30	0.28	0.27	0.27	0.27	0.26
59	0.32	0.27	0.25	0.25	0.24	0.24	0.24

Table 4 - PWL Pay Adjustment Factors

PWL	Pay Adjustment Factor (%) Column B	Pay Adjustment Factor (%) Column C
100	+5	0
99	+4	-1
98	+3	-2
97	+2	-3
96	+1	-4
95	0	-5
94	-1	-6
93	-2	-7

92	-3	-8
91	-4	-9
PWL<91	PWL - 100	PWL - 100

(b) Pavement Construction - Pay Adjustments.

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

- Degree of compaction of the in-place material

Using the test values for the cores, the Engineer will use the following steps to determine the pavement construction pay adjustment for each lot of work.

1. Calculate the core bulk specific gravity values from the sublot tests values, to the nearest 0.001 unit. Obtain the Theoretical maximum Specific Gravity values from the corresponding laboratory sublot tests.
2. Calculate the Degree of Compaction:
   Degree of Compaction =
   ((Core Bulk Specific Gravity) / (Theoretical Maximum Specific Gravity)) x 100% recorded to the nearest 0.1%.
3. The average compaction for the sublots shall be averaged together for the compaction level of the lot. The lots compaction test level shall be averaged and recorded to the nearest whole percent.
4. Locate the value of the Payment Adjustment Factor corresponding to the calculated degree of compaction from Table 5 or Table 5a.
5. Determine the pavement construction price adjustment by using the following formula:
   Construction Pay adjustment = (Lot Quantity) x (Bid Price) x (Pay Adjustment Factor) x 30%.

Table 5: Compaction Price Adjustment Highway Locations

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

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

* or remove and replace it at Engineer's discretion

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

86.0	85.75 – 86.25	-25
85.5	85.26 – 85.74	-30
85.0	84.75 – 85.25	-40
84.5	84.26 – 84.74	-50
=< 84.0	=<84.25	-100*

* or remove and replace at Engineer's discretion

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

.04 Dispute Resolution.

Disputes or questions about any test result shall be brought to the attention of the Contractor and the Engineer within two operational days of reported test results. The following dispute resolution procedures will be used.

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

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

When disputes over production testing occur, the samples used for Dispute Resolution testing will be those samples the properly captured, labeled, and stored, as described in the second paragraph of the section of these specifications titled **.02 Acceptance Plan, (a) Material Production - Tests and Evaluations**. If no samples are available, the original testing results will be used for payment calculations.

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

If there is a discrepancy between the Engineer's acceptance test result and the Contractor's test result, the Contractor may ask for the Dispute Resolution sample to be tested. The Contractor may request up to two dispute resolution samples be tested per calendar year without charge. Any additional Dispute Resolution samples run at the Contractors request where the results substantiate the acceptance test result will be assessed a fee of $125. Any additional Dispute Resolution samples that substantiate the Contractors test result will not be assessed the fee.

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

Appendix A - Repairing Core Holes in Bituminous Asphalt Pavement

Description.

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

Materials and Equipment.

The following material shall be available to complete this work:

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

The following equipment shall be available to complete this work:

- Sponge or other absorbent material - Used to extract water from the hole.
- Compaction Hammer - mechanical (electrical, pneumatic, or gasoline driven) tamping device with a flat, circular tamping face smaller than 6 inches in diameter.

Construction Method.

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

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

Performance Requirements.

The Engineer will judge the patch on the following basis:

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

Basis of Payment.

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

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

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

1. Contact Materials & Research (M&R) personnel to determine if information about the area is already available. If M&R has already obtained cores in the location that is being investigated, the contractor may opt to use the laboratory information for the investigation and not core the area on their own.

2. If M&R does not have information concerning the section of the roadway, the contractor needs to contact M&R to arrange for verification of coring operations. Arrangements shall be made to allow for an individual from M&R to be on the site when the cores are obtained. Cores will be turned over to M&R for evaluation.

3. The Contractor is responsible for providing all traffic control and repairing core holes in accordance to 401699 Appendix A - Repairing Core Holes in Bituminous Asphalt Pavements.

4. Cores are to be taken throughout the entire project for the area in question. Cores will be spaced, from the start of the project in increments determined based on field and project specifics. Cores will be evenly distributed throughout the project location. The cores will be taken in the center of the lane in question.

5. Additional cores may be taken at other locations, if surface conditions indicate that there may be a substantial difference in the underlying section. The location of these cores should be documented and submitted to M&R.

6. Cores shall be full depth and include underlying materials. If there is a stone base included in the pavement section, at a minimum 1 core must have information concerning the thickness of the base. This is determined by augering to the subgrade surface.

7. The calculations used to determine the structural capacity of the roadway is as follows. If the contractor finds, upon starting the coring process, that the areas are of greater thickness than applicable to Table 5a, they may terminate the coring process on their own and retract the request.

Structural Number Calculations

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

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

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

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

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

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

Example:

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

Calculation:

For the Type B lift the calculation would be:

Existing HMA	2 * 0.32 =	0.64
GABC	7 * 0.14 =	0.98
		1.62

For the Type C lift the calculation would be:

Newly Placed B	2.25 * 0.4 =	0.90
Existing HMA	2 * 0.32 =	0.64
GABC	7* 0.14 =	0.98
		2.52

11/3/14

401752 – SAFETY EDGE FOR ROADWAY PAVEMENT

Description:

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

Construction Methods:

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

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

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

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

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

or

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

or an approved equal.

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

Method of Measurement:

Safety Edge will not be measured for payment.

Basis of Payment:

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

10/15/2013

401800 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 64-22 (CARBONATE STONE)
401801 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22 (CARBONATE STONE)
401804 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22 (CARBONATE STONE)
401807 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22 (CARBONATE STONE)

401809 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 115 GYRATIONS, PG 64-22
401810 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22
401813 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 70-22
401816 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 76-22

401818 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 115 GYRATIONS, PG 64-22
401819 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22
401821 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22, PATCHING
401822 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22, PATCHING
401823 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22, PATCHING
401824 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG-64-22, WEDGE
401825 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG-64-22, WEDGE

401827 -BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22, (NON-CARBONATE STONE)
401830 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)
401833 -BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)

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

.01 Description:

This specification shall govern the production and construction of bituminous concrete pavement. The following Subsections of the Standard Specifications shall be applicable: 401.01, 401.03 - 401.10, 401.12, and 401.13. All other subsections have been modified herein.

Payment for bituminous concrete shall be in accordance with item 401699. The Contractor shall read and thoroughly understand the requirements of the QA/QC specification as defined in item 401699. It is the responsibility of the Contractor to determine all costs associated with meeting these requirements and to include them in the per ton bids for the various Superpave bituminous concrete items. Payment adjustment factors will be calculated in accordance with the latest version of item 401699.

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

.02 Materials:

Use materials conforming to standard specifications 823.

Materials for bituminous concrete shall conform to the requirements of Subsections 823.01, 823.05-823.17, and 823.25 - 823.28 of the Standard Specifications and the following. If the Contractor proposes to use a combination of materials that are not covered by this Specification, the mix design shall be submitted and reviewed by the Engineer 30 calendar days prior to use.

a) **Asphalt Binder:**

Meet the requirements of Superpave performance-grade asphalt binder, as referenced in the Plans, according to M 320 [1], Table 1 and tested according to AASHTO R29 with the following test ranges:

TEST Procedure	AASHTO REFERENCE	SPECIFICATION LIMITS
Temperature, °C	M 320	Per Grade
Original DSR, G*/sin (δ)	T 315	1.00 - 2.20 kPa[1]
RTFO DSR, G*/sin (δ)	T 315	>/= 2.20 kPa
PAV DSR, G*/ sin (δ)	T 315	</=5000 kPa
BBR Creep Stiffness, S	T 313	</= 300.0 kPa
BBR m-value	T 313	>/=0.300

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

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

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

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

b) **Recycled Materials:**

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

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

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

c) **Shingles:**

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

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

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

d) Mineral Aggregate:

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

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

[1]Coarse Aggregate Angularity is tested according to ASTM D5821.
[2]Fine Aggregate Angularity is tested according to AASHTO TP-33.
[3]Clay Content is tested according to AASHTO T176.
[4]Flat 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 B ALaboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces.@ RAP shall be assigned a value of 5.0. The Contractor shall supply all polish values to the Engineer upon request.

e) **Mineral Filler:**

Conform to AASHTO M17.

f) **Warm Mix Additives:**

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

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

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

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

g) **Anti-stripping additives**

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

.03 Bituminous Concrete Production – Quality Control

(a) Process Control - Material Production Quality Control.

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

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

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

- Production Plant - make, type, capacity, and location.
- Production Plant Calibration - components and schedule; address documentation.
- Personnel - include name and telephone number for the following individuals:
- Person responsible for quality control.
- Qualified technician(s) responsible for performing the inspection, sampling, and testing.

- Person who has the authority to make corrective actions on behalf of the Contractor.
- Testing Laboratory - state the frequency of accuracy checks and calibrations of the equipment used for testing; address documentation.
- Load number of QC samples (1-10 if QA sample is not within trucks 1-10)
- Locations where samples will be obtained and the sampling techniques for each test
- Tests to be performed and their normal frequency; the following, at a minimum, shall be conducted:
  - Mixture Temperature: each of the first five trucks, and each load that is sampled for QC or acceptance testing.
  - Gradation analysis of aggregate (and RAP) stockpiles - one washed gradations per week for each aggregate stockpile; RAP: five gradations and asphalt cement contents for dedicated stockpiles where new material is not being added; one gradation and asphalt cement content test per week for stockpiles where material is continually being added to the stockpile.
  - Gradation analysis of non-payment sieves
  - Dust to effective asphalt calculation
  - Moisture content analysis of aggregates - daily.
  - Gradation analysis of the combined aggregate cold feed - one per year per mixture.
  - Bulk specific gravity and absorption of blended material - one per year per mixture.
  - Ignition Oven calibration - one per year per mixture.
  - Hot-Bins: one per year per mixture.
  - Others, as appropriate.
- Procedures for reporting the results of inspection and tests (include schedule).
- Procedures for dealing with non-compliant material or work.
- Presentation of control charts. The contractor shall plot the results of testing on individual control charts for each characteristic. The control charts shall be updated within on working day as test results for each sublot become available. The control charts shall be easily and readily accessible at the plant laboratory. The following parameters shall be plotted from the testing:
  - Asphalt cement content.
  - Volumetrics (air voids, voids in mineral aggregates [VMA])
  - Gradation values for the following sieves:
    - 4.75 mm (#4).
    - 2.36 mm (#8).
    - 0.075 mm (#200).
    - Operational guidelines (trigger points) to address times when the following actions would be considered:
      - Increased frequency of sampling and testing.
      - Plant control/settings/operations change.
      - JMF adjustment.
      - JMF change (See 401644 Section .04(a)(1)).
      - Change in the source of the component materials.
      - Calibration of material production equipment (asphalt pump, belt feeders, etc.).
      - Rejection of material.

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

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

- Using testing equipment that is knowingly out of calibration or is not working properly.
- Reporting false information such as test data, JMF information, or any info requested by DelDOT
- Failure to perform materials testing per their approved QC Plan
- Deviating from AASHTO or DelDOT testing procedures.
- Use of any material or the use of a JMF component in a proportion that exceeds the allowable tolerance as specified in section 04(a)(1) of this specification not listed in the JMF.
- Use of the wrong PG graded asphalt.
- Failure to take corrective action per action points in the Contractors approved QC plan.

The following steps will be taken for violations listed above:

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

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

(b) Material Production Test Equipment.

Establish, maintain, and operate a qualified testing laboratory at the production plant site of sufficient size and layout that will accommodate the testing operations of both the Contractor and the Engineer.

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

Maintain all the equipment used for handling, preparing, and testing materials in proper operating condition. For any laboratory equipment malfunction, the Contractor shall remedy the situation within one working day or the Engineer may suspend production. In the case of an equipment malfunction, the Engineer may elect to test the material at another qualified testing laboratory while waiting for repairs to equipment.

Maintain minimum calibration records for the referenced equipment:
- SUPERPAVE^{R} Gyratory Compactor: once every year; verified once every month by the Engineer.
- Ovens: once every three months, verified once every month.
- Vacuum Container and Gauge (Rice Bowls): once every three months, verified once every month.
- Balances and Scales: once every year, verified once every month.
- Thermometers: once a year; verified once every month.
- Gyratory Compactor molds and base plates: once every year
- Mechanical Shakers: once every year
- Sieve Verifications: once every year

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

(c) Material Production Test Methods

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

.04 Job Mix Formula (JMF)

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

a) Development of JMF

Gradation: Use the FHWA Superpave 0.45 Power Chart to define permissible gradations for the specified mixture. Type C shall be either a No.4 (4.75 mm), 3/8" (9.5 mm), or 1/2" (12.5 mm) Nominal Maximum Aggregate Size bituminous concrete. Unless otherwise noted in the Plans, the Type C shall meet the 3/8" (9.5 mm) Nominal Maximum Aggregate Size. Type B bituminous concrete shall be the 3/4" (19.0 mm) Nominal Maximum Aggregate Size and the Bituminous Concrete Base Course (BCBC) shall be the 1" (25.0 mm) Nominal Maximum Aggregate Size. Target values for percent passing each standard sieve for the design aggregate structure shall comply with the Superpave control points and should avoid the restricted zone. Percentages shall be based on the washed gradation of the aggregate according to AASHTO T11. In addition to the results of the material requirements specified above, the following material properties shall be provided by the contractor: bulk specific gravity Gsb, apparent specific gravity Gsa, 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 (%)
	$N_{INITIAL}$	N_{DESIGN}	N_{MAX}	25.0	19.0	9.5	12.5	4.75	
0.3 to < 3	≤ 90.5	-	-	-	-	-	-	-	65.0 - 78.0
3 to < 10	-	-	-	-	-	-	-	-	-
10 < 30	-	-	-	-	-	-	-	-	-
≤ 30	≤ 89.0	96.0	≤ 98.0	12.5	13.5	15.5	14.5	16.5	65.0 - 75.0[1]

Air voids (V_a) at N_{design} shall be 4.0% for all ESAL designs. Air voids (V_a) at N_{max} shall be a minimum of 2.0% for all ESAL designs. The dust to binder ratio for the mix having aggregate gradations above the Primary Control Sieve (PCS) Control Points shall be 0.6-1.2. For aggregate gradations below the PCS Control Points, the dust to binder ratio shall be 0.8-1.6. For the No. 4 (4.75 mm) mix, the dust to binder ratio shall be 0.9-2.0 whether above or below the PCS Control Points.

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

Gradation Control Points:

The combined aggregates shall conform to the gradation requirement specified in the following table when tested according to T-11 and T-27.
TABLE 1

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:

Volumeric Property	Superpave Criteria
Air Voids (V_a) at (%) N_m	2.0 (min)
Air Voids (V_a) at N_{design} (%)	6.0 (max)
Voids in Mineral Aggregate (VMA) at N_{design}	
25.0 mm Bituminous Concrete Base Course	-1.5

Volumeric Property	Superpave Criteria
19.0 mm Type B Hot-Mix	+2.0
12.5 mm Type C Hot-Mix	
9.5 mm Type C Hot-Mix	
4.5 mm Type C Hot-Mix	

The proposed JMF shall include the following:

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

1. Job mix formula (JMF) design of the component materials and target characteristic values for each mixture proposed for use. The component materials design shall include designating the source and the expected proportion (within 1 percent for the aggregate components and within 0.1 percent for the other components) of each component to be used in order to produce workable bituminous concrete meeting the specified properties. Recycled Asphalt Pavement (RAP) is one individual aggregate component regardless of fractionation size. Recycled Asphalt Shingles (RAS) is a separate component from RAP.

2. The JMF target characteristic values include the mixing temperature range, core temperature range for gyration, the percentage of the asphalt cement component (both total and virgin), and the percentages of the aggregate amounts retained on the sieves to be addressed by the JMF as shown in Table 1.

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

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

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

   % of G_{mm} at N_d, VMA at N_d, VFA at N_d, Fines to effective asphalt binder (P_{be}) ratio, and unit weight (kg/m²) at both N_d and N_m.

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

7. Test data with each JMF and tests performed by a Qualified Laboratory on representative materials, verifying the adequacy of the design. Refer to the specifications for each mix type in order to determine the design requirements. The JMF sieve percentage values shall conform to the ranges shown in Table 1.

   For any mixture that has a 20% or greater failure rate on any combined volumetric criteria, the JMF will not be approved for use on Department contracts.

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

.05 Approval of JMF

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

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

a) **Design Evaluation:**

The Engineer may elect to evaluate the proposed JMF and suitability of all materials through laboratory trial batches. All materials requested by the Engineer shall be provided at the contractor's expense to the Central Laboratory in Dover in a timely manner upon request. To verify the complete mixture design and evaluate the suitability of all materials, the following approximate quantities are required:

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

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

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

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

- A change in the source of any of the aggregate component materials
- A change in the proportion of any aggregate component by more than 5.0%
- A change in the aggregate components resulting in a change in percent passing any sieve as identified in Table 1 by more than 5% of the JMF target.
- A change in the target AC content by more than 0.20% from the JMF target to maintain other Volumetric properties of the approved JMF.
- For any mixture that has a 20% or greater failure rate on any combined volumetric criteria.

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

.06 Construction.

(a) Pavement Construction Test Equipment.

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

Weather Limitations.

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

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

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

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

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

Compaction:

(b) Pavement Construction - Process Control.

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

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

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

Repair all core holes in accordance with 401699 Appendix A.

Method of Measurement:

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

Basis of Payment:

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

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

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

12/7/2015

602520 - EPOXY PROTECTIVE COATING FOR CONCRETE

Description:

This work consists of preparing concrete surfaces and furnishing and applying an epoxy protective coating, in accordance with notes and details on the Plans, these specifications and directions from the Engineer.

Materials:

Scope. This Special Provision covers the material requirements of a two component, pigmented epoxy resin protective coating system used for the environmental protection of Portland cement concrete and other materials. This material should not be applied at temperatures above 95 F (35 C) or below 40 F (4 C).

General. The epoxy resin protective coating system shall be a two component, flexible, solvent-free, thermosetting system consisting of a modified epoxy resin, Component A, and a curing agent, Component B.

Material Requirements:

Characteristics of Component A. Component A shall be based on a high grade epoxy resin such as obtained from the condensation of Bisephenol A and Epichlorohydrin having the following characteristics:

Property	Specific Value Min.	Max.	Test Method
Viscosity, CPS @24±1 Degrees C.	9,000	12,000	Brookfield Model RV No. 5/20 RPM ASTM D445
Weight per liter @24±1 Degrees C., kg.	1.45	----	----
Percent filler and pigment	----	40.0	By Ignition

Pigment filler shall be light-fast, durable and resistant to alkali.

Characteristics of Component B. Component B shall have the following characteristics:

Property	Specific Value Min.	Max.	Test Method
Viscosity, CPS @ 24±1 Degrees C.	50	----	Brookfield Model RV No. 1/20 RPM ASTM D 445
Weight per liter @ 24±1 Degrees C, kg	0.8	----	----

Characteristics of the Mixture. The mixture of Components A & B shall have the following characteristics:

Property	Specific Value Min.	Max.	Test Method
Viscosity, CPS @24±1 Degrees C.	----	10,000	Brookfield Model RV No. 5/20 RPM ASTM D 445
Pot Life, minutes @ 24±1 Degrees C.	30	----	----
Initial Cure, hrs. @24±1 Degrees C.	----	6	Tack-free to Touch
Shore D Hardness, @24±1 Degrees C. after 7 days	70/1	----	ASTM D 2240
Color-Off White	37722	37722	Federal Std. No. 595 A

Color Fastness	no appreciable change		High Intensity Ultra Violet Altas Weatherometer Model DMC-HRC
Package stability of each in original unopened container, in months, between 27 degrees Celsius and 0 degrees Celsius	12	----	----

Packaging. All materials furnished must be shipped in strong, substantial containers. The containers shall be identified as "Part A -- contains epoxy resin," and "Part B -- contains curing agent," and shall be plainly marked with the following:

1. Delaware D.O.T. Specifications number.
2. Name of product.
3. Mixing proportions and instructions.
4. Name and address of the manufacturer.
5. Lot number and batch number.
6. Date of manufacture.
7. Quantity.
8. Date of expiration of acceptance.

Sampling. Material will be sampled and inspected at the place of manufacture or in warehouse lots as determined by the Department. Samples submitted to the Materials and Research Section will be taken as directed by the Department.

Tests.

Viscosity. - The viscosity of the mixture of components A & B shall be taken 20 minutes after the components are mixed within 15-20 seconds of the time the viscometer is started. This material shall then be used to fill the lid of a .09 gal (0.35 liter) ointment can approximately two-thirds full. This specimen shall be used to determine the tack-free time for initial cure requirement.

Initial Cure. The initial cure shall be considered that time at which a mixture of components A & B as prepared under viscosity above shall be tack-free to touch.

Pot Life. The pot life is determined as follows.

Samples of each resinous cement component are conditioned at 75 F (24±1 C). When the samples have reached 75 F (24±1 C), 2.1 oz. (60±0.4 g.) total of components A and B in the proportions recommended by the manufacturer are weighed into an unwaxed paper cup. The time is recorded and they are immediately mixed, stirring for three minutes with a wooden tongue depressor, taking care to periodically scrape the walls and bottom of the cup and the mixer. The sample is then poured into an .06 gal (0.24 liter) unwaxed paper cup, set on a bench top, and probed every two minutes with a small stick, starting twenty minutes from the time of mixing. The time at which a soft ball forms in the center of the container is recorded as the pot life. This specimen shall be retained and used for the determination of the Shore D hardness.

Shore D Hardness. The hardness test shall be performed on the specimen retained from Pot Life above.

Color Fastness. The test for color fastness of the cured epoxy shall be conducted as follows.

Cast two, 3 1/2 (89 mm) diameter buttons following the manufacturer's instructions for mixing the epoxy components. Allow each button to cure for 72±2 hours at laboratory temperature in a dark chamber away from sources of ultraviolet light. Designate one button as the color control button and retain it in the dark chamber. Subject the other button to 16 hours total exposure time (20 minute cycle) in the High Intensity Ultra Violet Weatherometer, Model DMC-HRC. Each cycle, continuously repeating, starts with 17 minutes of light followed by 3 minutes of light and water spray. Remove the test button and compare the color of the exposed area to Federal Standard 595A, color, and to the color of the control button. The color

of the test button shall not differ appreciably from the color of the control button and the color, defined by Federal Standard 595A.

Basis of Acceptance. This material will be considered for acceptance in stock lot quantities at manufacturer of supply locations in accordance with procedural directives of the Materials and Research Section. The expiration date of acceptance of this material shall be twelve months after the date of manufacture. Any unauthorized tampering or breaking of the seals on the containers between the time of sampling and delivery to the jobsite will be cause for rejection of the material.

Construction Methods:

Preparation of Surfaces. New concrete surfaces shall be thoroughly cleaned before epoxy application. All laitance, curing membranes, paint, oil, grease, silicone, dust, asphalt and other substance which might prevent bond between the epoxy and the concrete shall be removed. The surface preparation shall be accomplished by waterblasting with sand added, sand blasting, or shot blasting, followed by high pressure, oil-free, air blasting.

The epoxy protective coating shall be applied as soon as practicable after cleaning is completed. If, in the opinion of the Engineer, the concrete surface has become soiled, or otherwise contaminated, prior to epoxy application, the surface shall be recleaned in accordance with the requirements of this subsection at no additional cost to the Owner.

Mixing. The two parts of the epoxy protective coating are furnished in separate containers. Each part of the coating shall be thoroughly stirred in its own container prior to mixing in order to disperse any settlement which may have occurred. The two parts of the epoxy protective coating shall be proportioned in strict accordance with the instructions on their containers and then thoroughly blended together. A paddle attached to a 1/2 (12 mm) electric drill with a rated speed not to exceed 550 rpm is recommended for mixing. For batches for less than 1 gal (4 liters), thorough hand stirring may be satisfactory. No diluent, solvent, thinner or other foreign material shall be added to either the individual components or the mixed epoxy protective coating.

Application. Materials shall be applied only when the air temperature is at least 40 F (4 C) and rising, but less than 95 F (35 C) and the surface temperature of the area to be coated is at least 40 F (4 C). Surfaces must be dry before application. Epoxy placement may be allowed in suitably prepared, artificially heated enclosures. Artificial heat shall be applied at rates sufficient to ensure that the substance and air temperatures within the enclosure are, at all times, maintained between 40 F (4 C) and 95 F (35 C) inclusive. Artificial heat shall be supplied within the enclosure until the epoxy is cured to a tack-free condition, firm to hand pressure, and satisfactory to the Engineer.

The surface shall be coated in accordance with the manufacturer's recommendations. The finished coating shall be uniform in color and coverage.

Note: Under certain combinations of circumstances, the cured epoxy protective coating may develop an "oily" condition on the surface due to amine blush. This condition is not detrimental to the applied system.

Care shall be taken so that the entire surface of the concrete is covered and all pores filled. The Contractor shall use only one manufacturer's material on all surfaces visible from one location, in order to provide a uniform appearance.

Method of Measurement:

The quantity of epoxy protective coating will be measured as the actual number of square yards (square meters) of surface area covered with the epoxy protective coating, completed and accepted.

Basis of Payment:

The quantity of epoxy protective coating will be paid for at the Contract unit price per square yard (square meter). Price and payment will constitute full compensation for furnishing and placing all materials, and for all labor, equipment, tools, and incidentals, necessary to complete the work.

12/17/04

602549 - FORM LINERS

Description:

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

Materials:

Form liners shall be used which will result in the finish detail in the Plans and approved by the Engineer. Form liner pattern shall be Flagstone or similar, and the finish shall be multi-colored, unless otherwise specified in the Plans and approved by the Engineer. Samples shall be submitted by the Contractor for approval by the Engineer. Two manufacturers of form liners are HUNT VALLEY CONTRACTORS, INC., 11460 Cronridge Drive, Suite 132, Owings Mills, MD 21117, Telephone: 410-356-9677 and SYMONS CORPORATION, 200 King Manor Drive, King of Prussia, PA. 19406, Telephone: 215-277-2990); names of the manufacturers are provided here for information purposes only.

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

Construction Methods:

A test pour shall be made at the site with the proposed form liners before the form liners are approved. The test pour shall subsequently be removed from the site. Test pours shall be made until approved by the Engineer. The test pour shall be, at a minimum, the width of a standard approved form liner, the height of a form liner and any border treatments as shown on the Plans, and six inches (150 mm) in depth, or as approved by the Engineer. When using form liners, form designs for P.C.C. Masonry Abutments and Piers shall be sufficient to allow minimum 4-foot (1.2 m) on center "Snap-tie" or "Tyscrus" form supports, or approved equal. Wall form tie holes shall be placed in the high point of the mortar joints and the ties shall be so designed that all material in the device to a depth of at least 1 inch (25 mm) back of concrete face (bottom of joint) can be disengaged and removed without spalling and damaging the concrete.

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

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

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

Method of Measurement:

The quantity of form liners will be measured as the number of square feet (square meters) of form linear installed and accepted.

Measurements will be made on the surface of the completed structure.

Basis of Payment:

The quantity of form liners will be paid for at the Contract unit price per square foot (square meter). Price and payment will constitute full compensation for furnishing all materials and for equipment, tools, labor, and incidentals necessary to complete the work as specified above or in the Plans. The cost shall also include compensation for any additional concrete required to achieve the finish detailed in the Plans, additional concrete and steel reinforcing required for all test pours, additional form liners required for the test pour, and all equipment, tools, labor, and incidentals necessary to complete the work shall be included in the unit price bid.

5/22/17

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:

Sieve Size	Percent Passing
4 inches	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 10 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 100 ppm.

   J. Sulfates less than 200 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 the finished front precast panel wall surface area actually constructed based on the approved shop drawings complete in place and accepted. Surfaces of footings, unfinished rear surface of the wall panels, leveling pads, coping, or any wall surfaces covered by the coping are incidental to the item and shall not be measured for payment. Measurements shall be taken prior to placing any backfill material that may cover the finished front wall surface area as these precast panel surfaces are to be included in the measurement for payment.

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 and/or footing, 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.

4/5/13

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 then 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 layed 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.

NOTE

On a breakout sheet found in the Proposal, the Contractor shall submit a price for each Sign Support Structure with foundation, when more then one structure is required. The Lump Sum bid price for the item shall be the sum of the prices for each Sign Support Structure listed. The Department reserves the right to delete from the contract construction of one or more individual sign structure(s), and the Lump Sum price to be paid will be reduced in accordance with the Contractor's itemized price list for that individual sign structure. There shall be no extra compensation to the Contractor if such deletion is made.

605510 - PREFABRICATED EXPANSION JOINT SYSTEM 2"
605511 - PREFABRICATED EXPANSION JOINT SYSTEM 3"
605512 - PREFABRICATED EXPANSION JOINT SYSTEM 4"

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 or Grade 50 or Grade 50W, 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, 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:

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

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 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. 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.

11/9/15

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) Steel Pipes - 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 then ½". 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.

(b) 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.

Steel for structural angles, plates and bars 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 the standard specifications.

(c) Anchor Bolts, nuts and washers - 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.

(d) U-Bolts - ASTM A307.

(e) U-Bolt Nuts - ASTM A307.

(f) 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.

(g) Concrete – Standard Specification 812, Class B

(h) Reinforcing Steel - ASTM A615, Grade 60, epoxy coated.

(i) Galvanizing (Zinc Coating) - All structural steel that is not stainless shall be hot-dipped galvanized in accordance with ASTM A123. After fabrication and completion of any welded connections, 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.

(j) Casings for drilled shafts - 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.

Construction Methods:

(a) As shown on the plans and as follows:

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.

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.

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.

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.

(b) Drilled Shaft Foundations.

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. Constructing Using Casings

Construct drilled shafts using casings for this project. The Contractor may either place casings in a predrilled hole or advance casings through the ground by twisting, driving, or vibrating.

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.

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. The Contractor may elect to use Temporary or Permanent casings. The bid price shall include the cost of the selected casing method.

i. **Temporary Casings**. 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**. The Contractor may elect to use permanent casing. 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.

5. 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.

6. 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.

7. 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 of 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.

8. 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.

9. 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.

10. 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) 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.

The Contractor shall plan his work so that no more than one lane at a time will be closed during construction.

(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.

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).

After installing and adjusting all nuts, pour concrete grout pad and install rodent screen if shown on Contract Drawings.

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

(f) Compaction of any required backfill shall be in accordance with Section 202 of the Standard Specifications.

(g) 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, backfill, and backfilling in accordance with Section 207, temporary shoring, concrete, reinforcing steel, galvanized structural steel, casings, anchor bolts, bolts, washers, nuts, and all labor, materials, equipment and incidentals necessary to construct the sign structure and foundation.

NOTE:

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

The Department reserves the right to delete from the Contract one or more of the items listed and right to add or subtract from the quantity of each item. 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 if such additions and/or deletions are made.

5/20/13

605761 - STEEL SIGN STRUCTURES, TUBULAR ARCH, CANTILEVER
605762 - STEEL SIGN STRUCTURES, TUBULAR ARCH, OVERHEAD

Description:

Furnish, fabricate, and erect steel sign structures of the type indicated.

Materials:

A. Sign Structure Pipe. For sign structure pipe, meet one of the following:

1. ASTM A 53, Grade B, Type E or S

   - Provide Charpy V-notch testing (Zone 2) for pipe with wall thicknesses greater than or equal to ½ inch.

2. API 5L, Grade B, X42 or X52; PSL2 with the following characteristics:

   - No jointers permitted.

   - Do not use thermomechanical rolled or thermomechanical formed (grade suffix M) pipe on monopipe structures.

   - Process of manufacture: seamless, electric resistance welded, or longitudinal seam, submerged arc welded.

   - Provide Charpy V-notch testing (Zone 2) for pipe with wall thicknesses greater than or equal to ½ inch.

3. ASTM A 500, Grade B

   - Provide Charpy V-notch testing (Zone 2) for pipe with wall thicknesses greater than or equal to ½ inch.

4. ASTM A 106, Grade B

   - Provide Charpy V-notch testing (Zone 2) for pipe with wall thicknesses greater than or equal to ½ inch.

B. Steel Angles, Shapes, Plates and Backing Rings. For steel angles, shapes, plates and backing rings, meet AASHTO M 270, Grades 36 or 50S.

Ensure that all steel members greater than or equal to ½" thick meets the applicable AASHTO M 270 Charpy V-Notch Impact Test requirements for Zone 2 unless otherwise specified.

C. Galvanizing. Galvanize all steel in accordance with AASHTO M111. Unless otherwise specified on the Plans, all bolts, nuts, and washers shall be mechanically galvanized in accordance with AASHTO M 298. Coating thickness, adherence, and quality requirements, however, shall conform to Class C of AASHTO M 232. Fabricate steel sign structure into the largest practical prior to galvanizing. Submit splice locations to the Engineer for approval. Do not fabricate steel sign structure until such splice locations are approved.

D. Anchor Bolts, Nuts, and Washers.

1. Anchor Bolts. For anchor bolts, meet AASHTO M 314, Grade 55.

2. Nuts. For nuts, meet ASTM A 563, Grade DH.

3. Washers. For washers, meet ASTM F 436.

E. U-Bolts, Nuts and Washers.

1. U-Bolts. ASTM A 449, Type 1.

2. Nuts. For nuts, meet ASTM A 563, Grade DH.

3. Washers. For washers, meet ASTM F 436.

F. High Strength Fasteners.

1. High-Strength Bolts. ASTM A 325.

2. Nuts. For nuts, meet ASTM A 563, Grade DH.

3. Washers. For washers, meet ASTM F 436.

H. Galvanized Steel Screen. ½" by ½" mesh and 0.063" diameter galvanized steel wires.

Construction Methods:

A. General.

1. *Alternate Designs*. Obtain approval from the Engineer for alternate designs. Alternate designs shall be structurally equivalent. The Engineer can reject alternate designs for any reason, including aesthetics.

2. *Documentation*. Submit documentation in accordance with Section 105.04.

3. *Working Drawings*. Section 105.04, except identify on the shop drawings weld locations, type, size, process, and nondestructive testing. Field verify all dimensions, prior to submitting Fabrication Drawings.

B. *Fabrication*. Fabricate in accordance with Section 605 except as noted below:

1. *Welds*. Comply with AWS D1.1 Structural Welding Code as well as the additional requirements of AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals, Section 5.15, Welded Connections.

2. *Weld Testing*. If necessary, repair base connection welds one time. If more than one repair is necessary, obtain approval. Perform and evaluate all non-destructive testing according to cyclically loaded non-tubular tension criteria.

a. Perform the following minimum ultrasonic testing of Complete Joint Penetration (CJP) groove welds.

i. 25% of the length of CJP groove welds connecting each flange splice plate to the truss chords, each base plate to the tower columns, each connection plate to the chords or columns, each CJP weld on truss seat plates, and each CJP longitudinal seam weld on cantilever and center-mount sleeves. 100% of the length of CJP groove welds on monopipe structures.

- If a rejectable defect is found, then test 100% of the weld on that element.

ii. 100% of the groove weld length on at least 25% of the number of similar type connections of web members to the truss chords.

- If any rejectable defect is found, double the testing frequency until no rejectable defects are discovered.

b. Perform the following minimum magnetic particle inspection (MT) of fillet welds and Partial Joint Penetration (PJP) groove welds.

i. Intermediate member connections: MT 100% of the weldment length on at least 25% of the total number of connections on trusses and towers, respectively.

- If any rejectable defect is found, double the testing frequency until no rejectable defects are discovered.

ii. Welds on truss seat plates, base plates, cantilever and center-mount sleeves, and alternate press-break members and fillet welds connecting backing rings to base plates and flange splice plates: MT a minimum of 25% of the total length of each weld.

- If a rejectable defect is found, then test 100% of the weld on that element.

iii. Welds attaching handhole frames to columns: MT 100% of the length of each weld.

iv. All other connections: MT 100% of the weldments on at least 10% of the total number of connections.

- If any rejectable defect is found, double the testing frequency until no rejectable defects are discovered.

c. The Department's plant inspector will select weld locations and weldments to be tested.

d. Perform Ultrasonic Inspection of the groove weld prior to welding top of the backing ring. Perform 100% ultrasonic inspection (UT) of butt welds in rings 5/16" and thicker. Perform 100% MT on rings less than 5/16" thick.

3. *Backing Ring*. Fabricate backing ring as a continuous ring or butt welded with a full penetration weld.

4. *Bending*. Form columns for monopipe sign structures to the radii shown on the plans in accordance with the Tube and Pipe Association International Recommended Standards for Induction Bending of Pipe and Tube (TPA-IBS-98).

C. *Foundation*. Excavate and construct the foundations as shown in the Plans. Slope top of pedestal 4% from center to near edges for drainage.

1. *Drilled Shafts*. Item 618537.

2. Spread Footings. In accordance with Section 207, Section 209, Section 602, and Section 603.

3. *Anchor Bolts*.

a. Use steel templates provided by the fabricator to accurately set tower base anchor bolts to the correct elevation and alignment. Securely brace the bolts against displacement before concrete is placed.

b. Pretension anchor bolts according to the following procedure.

i. Verify that the nuts can be turned onto the bolts past the elevation corresponding to the bottom of each in-place leveling nut and be backed off by the effort of one person on a 12 inch long wrench or equivalent (i.e., without employing a pipe extension on the wrench handle).

ii. Clean and lubricate the exposed threads of all anchor bolts. Clean and lubricate the threads and bearing surfaces of all leveling nuts. Re-lubricate the exposed threads of the anchor bolts and the threads of the leveling nuts if more than 24 hours has elapsed since earlier lubrication, or if the anchor bolts and leveling nuts have become wet since they were first lubricated.

iii. Turn the leveling nuts onto the anchor bolts and align the nuts to the same elevation.

iv. Place structural washers on top of the leveling nuts (one washer corresponding to each anchor bolt).

v. Install the base plate atop the leveling nuts, place structural washers on top of the base plate (one washer corresponding to each anchor bolt), and turn the top nuts onto the anchor bolts.

vi. Tighten top nuts to a snug-tight condition in a star pattern. Snug-tight is defined as the maximum nut rotation resulting from the full effort of one person on a 12 inch long wrench or equivalent. A star tightening pattern is one in which the nuts on opposite or near-opposite sides of the bolt circle are successively tightened in a pattern resembling a star. (For example, for an 8-bolt circle with bolts sequentially numbered 1 to 8, tighten nuts in the following bolt order: 1, 5, 7, 3, 8, 4, 6, 2).

vii. Tighten leveling nuts to a snug-tight condition in a star pattern.

viii. Before final tightening of the top nuts, mark the reference position of each top nut in a snug-tight condition with a suitable marking on one flat with a correspondence reference mark on the base plate at each bolt. Then incrementally turn the top nuts using a star pattern until achieving the required nut rotation specified in Section 605, Table 605-C. Turn the nuts in at least two full tightening cycles (passes). After tightening, verify the nut rotation.

ix. Tighten top bolt of double nut assembly to snug-tight.

c. Verify base plate is in full contact with all flat washers.

d. Burr off threads of anchor bolts at face of nut after column is installed.

4. *Grout Pad*. Do not use grout between the base plate and concrete pedestal.

5. *Galvanized Steel Screen*. Seal base plate to foundation gap with a galvanized steel screen. Install galvanized steel screen to prevent entry of rodents while permitting drainage. Cover the entire gap with a wire screen, the bottom horizontal wire of which shall be in full contact with the surface of the concrete foundation and the top horizontal wire of which shall not extend beyond the top surface of the base plate. Vertical screen wires shall not extend beyond the top and bottom horizontal wires of the screen. Use one continuous section of screen with only one overlapping splice where the ends come together and overlap the layers 3 inches minimum. Attach the screen to the vertical side of the base plate with self-tapping stainless steel screws (No. 8, 1/2 inch long) with stainless steel washers (1/4 inch inside diameter). Drill pilot holes into the base plate to facilitate screw installation. Install screws on 9 inch centers maximum and at least one screw shall be installed through the overlapping splice to clamp the layers together. Also clamp the overlapping splice layers together just above the concrete foundation with an all stainless steel fastener assembly consisting of a machine screw (No. 8, 5/8 inch long), nut and two flat washers (1/4 inch inside diameter) and lock washer. Tightly clamp the screen layers between the flat washers.

Method of Measurement:

The quantity of Steel Sign Structures placed and accepted will not be measured.

Basis of Payment:

A. Price and payment for Steel Sign Structures constitutes full compensation for furnishing, fabricating, and installing all materials including galvanized structural steel, sign structure pipe, anchor bolts, bolts, washers, nuts and all incidentals required to complete the work.

B. Sign support W-beams and installation of sign support W-beams (including hardware) are incidental to this item.

C. Payment for the foundation will be made under separate contract items. Payment for the sign panels will be made under separate contract items.

D. Submit the breakout sheet included in the Proposal that lists all of the Steel Sign Structures under this item. Fill in a unit price for each Steel Sign Structure. The lump sum bid for the respective pay item will be the sum of the price for all Sign Structures listed on the breakout sheet. Attach the breakout sheet to the Bid Proposal.

8/20/15

614506 - INSTALLING WATER MAIN

Description:

This work consists of furnishing and related work to install a relocated portion of the City of Milford's water r system as shown on the City of Milford Sewer and Water Relocation Plans (sheets MS-1 through MS-15) in accordance with the locations, details, and notes on the Plans, and as directed by the Engineer as extra or additional work. The existing water service shall be abandoned or salvaged as specified on the Plans.

The City of Milford from hereafter shall be addressed as the Owner. The contractor is advised to obtain and be fully acquainted with the specifications of the Owner. The City of Milford's standards for water installations are available to view at http://www.cityofmilford.com/176/City-Standard-Construction-Specification. Cost to comply are considered incidental to Item 614506.

The work shall be performed in accordance with these Special Provisions, Delaware Standard Specifications, and the requirements of the Standards and Specifications of the City of Milford. In case of conflict between these Special Provisions, Delaware Standard Specifications, and the Standards and Specifications of the City of Milford, the Standards and Specifications of the City of Milford shall prevail.

A "Breakout Sheet" is included in the contract to establish unit prices for the items listed below. The total of the unit prices multiplied by the estimated quantities will establish the total Lump Sum price to be submitted with the bid. Each listed item will be measured as a unit price item in the field. The final Lump Sum payment for Item 614506 will be adjusted by change order, either plus or minus, to match the final totals of all unit price items established in the Breakout Sheet. Failure to complete and submit the Breakout Sheet with the bid will cause the bid to be considered unresponsive.

Breakout Item	Unit	Description
W-1	**(LF)**	Furnish & Install DR 18, C-900, PVC Water Main, Including Fittings, and Appurtenances
W-2	**(LF)**	Furnish & Install Class 50 Ductile Iron Water Main, Including Fittings, and Appurtenances
W-3	**(LF)**	Remove and Properly Dispose of Existing Water Main
W-4	**(LF)**	Furnish & Install Schedule 40 Steel Casing Pipe by Open Cut, Including Carrier Pipe, Casing Spacers, and End Seals
W-5	**(LF)**	Furnish & Install Schedule 40 Steel Casing Pipe by Jack & Bore, Including Carrier Pipe, Casing Spacers, and End Seals
W-6	**(EA)**	Furnish & Install Resilient Wedge Gate Valve, Including Valve Box
W-7	**(EA)**	Furnish & Install Hydrant Assembly, Including Hydrant Tee, Valve & Valve Box, and Ductile Iron Lead
W-8	**(EA)**	Furnish Hydrant Assembly, Including Hydrant Tee, Valve & Valve Box, Ductile Iron Lead, and Fittings as Necessary and Install by Cutting-In on Existing Water Main
W-9a	**(EA)**	Furnish & Install Tapping Saddle, Corporation Stop, and Tap Water Main
W-9b	**(EA)**	Furnish & Install Tapping Saddle, Corporation Stop, and Tap Water Main
W-10a	**(LF)**	Furnish & Install SDR 9 Water Service Pipe, Including Fittings
W-10b	**(LF)**	Furnish & Install SDR 9 Water Service Pipe, Including Fittings
W-11a	**(EA)**	Furnish & Install Water Meter Pit, Including Frame & Cover
W-11b	**(EA)**	Furnish & Install Water Meter Pit, Including Frame & Cover
W-12	**(EA)**	Remove Existing Fire Hydrant, Hydrant Lead, Valve, and Valve Box and Turn Hydrant, Valve, and Valve Box Over to City
W-13	**(EA)**	Remove Existing Valve and Valve Box, Install MJ Cap(s) on Main, and Turn Valve and Valve Box Over to City
W-14	**(EA)**	Open or Close (as indicated) Existing Valve, Remove Valve Box and Turn Over to City
W-15a	**(EA)**	Remove Existing Meter Pit and Frame & Cover and Turn Over to City

W-15b	**(EA)**	Remove Existing Meter Pit and Frame & Cover and Turn Over to City
W-16	**(EA)**	Furnish Resilient Wedge Gate Valve Cut-In Valve on Existing Water Main, Including Valve Box and Fittings as necessary, at Direction of the Engineer
W-17	**(CY)**	Abandon Existing Water Main by Filling With Flowable Fill, Including Installing MJ Caps or Plugs and Temporary Fill and Bleed Pipes Where Necessary

Materials:

All the materials including pipe, fittings, and all other accessories as listed under this Special Provisions, shall conform to the material and quality requirements of the Standards and Specifications of the City of Milford. The Owner shall have right to inspect and reject the materials, if his/her specifications requirements are not met.

Portland Cement Concrete required for the job shall be Class B, and shall conform to Section 812 of the Delaware Standard Specifications.

Backfill shall conform to the requirements of Borrow Type C as specified in Section 209 of the Delaware Standard Specifications.

Special Requirements:

The Contractor's attention is directed to the following special requirements.

The Owner shall have the sole right of determining at what times and in what order the Contractor shall undertake work, of making connections and modifications to the existing water system. Prior notice, a minimum of forty-eight (48) hours shall be given to the Owner and Engineer for inspection and supervision to be coordinated before work involving the water line relocations can begin. No work shall be started by the Contractor until he/she has received permission from both the Engineer and the Owner to proceed. The Contractor shall immediately notify both the Engineer and the Owner of all delays.

It is of prime importance that the Contractor, in the performance of his/her work, does not disrupt the operation of the existing water facilities in any manner or at any time, without the express prior approval of the Owner. The Contractor shall construct, disinfect, maintain and remove, following construction, such temporary water bypasses as may be required during construction to maintain water mains in service.

The Contractor will be permitted to close down specific sewer mains and services for a period of time not exceeding four (4) hours after obtaining approval from the Owner in order to make connections as shown on the Plans. The schedule for making connections will be so arranged that the sewer users will be out-of-service for a period of time not exceeding four (4) hours.

Before any shutdown, as specified above, the Contractor must give the utility Owner and local Fire Department forty-eight (48) hours notice, through written correspondence; and the Contractor must also furnish a minimum of forty-eight (48) hours notice in advance of the closing of any water valves which may interrupt customer water service.

Shutdowns shall not be permitted if tapping sleeves and valves are specified for making the connections.

Any and all emergency repairs required during the period of this Contract shall be the responsibility of the Contractor. The Owner will notify the Contractor by telecommunication and the Contractor shall be required to attend the repair immediately. In the event the Owner is unable to contact the Contractor for immediate emergency repair work in length of time as determined by the Owner, the Owner reserves the right to attend to any or all emergency repair work. All materials and work, or part thereof, which are unsatisfactory as to any or all requirements of the Owner or the Engineer, and/or as specified herein, shall be removed and replaced or repaired in an acceptable manner by the Contractor at his/her own expense. The Contractor shall guarantee that all workmanship, materials, and work performed under the Contract, shall be in strict accordance with the Contract Documents. This guarantee shall be for a period of two years from and after the date of acceptance of the work. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee.

A Maintenance Bond representing 15% of the total price bid for Item 614506 shall be furnished to the Owner upon successful completion of the item and shall be in effect for the duration of the guarantee and shown above. Costs to provide the warranty and furnish the Bond shall be included in the Lump Sum price bid for item 614506.

Construction Methods:

All work in connection with construction of water mains and water service connections shall conform to the applicable requirements of the Standard Specifications of the Owner of the utility, except as modified by the Plans and these Special Provisions. In case of conflict, the Specifications of the Owner of the utility shall prevail.

Excavation and Backfill - Excavation shall be performed in accordance with Section 208 - Excavation and Backfill for Pipe Trenches, except as amended herein. The bottom of the trench shall ensure that the pipe barrel has adequate bedding for the entire pipe length. The trenches for water mains shall be excavated to such depth as will provide pipe elevations as indicated on the Water Main Relocation Profiles. The trenches for service connections shall be excavated to the minimum standard depth or to such depth as required to connect to existing mains or service pipes

If work is stopped on any trench or excavation at the fault of the Contractor, the Engineer reserves the right to direct the Contractor to backfill the trench or excavation, at his/her own expense, and shall not again open said trench until he/she is ready to complete the work therein.

Where rock is encountered and blasting is required for trenching, all rock excavation work shall be performed in accordance with Subsection 107.08 of the Standard Specifications and as modified; and the trench shall be excavated an additional 150 mm below grade. After the excavation is completed, a minimum of 150 mm in depth of Borrow Type C shall be placed in the bottom of the trench, leveled off and thoroughly tamped. In absence of item for Rock Excavation under this Contract, a fixed price of $135 per cubic yard ($175.00 per cubic meter) shall be paid for rock excavation.

Final Location Drawings - Within thirty (30) days after completion of required work, the Contractor shall submit an accurate redline print or prints showing the horizontal and vertical location of mains, bends and other appurtenances to the Engineer and the Owner.

FURNISH & INSTALL DR 18, C-900, PVC WATER MAIN; OR, CLASS 50 DUCTILE IRON WATER MAIN, INCLUDING FITTINGS AND APPURTENANCES (Breakout Items W-1 & W-2)

A. The prices bid for this item shall include furnishing all labor, materials, and equipment necessary to install the appropriate size DR 18, C-900, PVC water main; or, Class 50 ductile iron water main and necessary fittings (not included as other bid items) and appurtenances as shown on the drawings or directed by the Engineer, including connection to existing mains, disinfection, and required pressure testing.

   The prices bid per linear foot for furnishing and installing water main shall also include, but not limited to, the following:

   a. furnishing and installing the specified pipe and fittings;
   b. installing concrete thrust blocking and joint restraints at bends and fittings;
   c. installing tracer wire and tracer wire boxes;
   d. erosion and sediment control as necessary;
   e. saw cutting and removal of existing pavement of the various types encountered;
   f. clearing & grubbing and removal & offsite disposal of stumps/roots;
   g. stripping and stockpiling of topsoil;
   h. removal and excavation of all materials encountered in trench excavation;
   I. hauling wet or excess excavated material to stockpile area for drying, re-hauling and use as trench refill materials;
   j. backfilling of trenches with suitable material from the excavation;
   k. disposal of excavated material not suitable for refill or in excess of the quantities required for refill;
   l. compaction and top-grading of backfilled material;
   m. installing any fittings not paid by unit price;

n. placing and removal of sheeting, shoring, and bracing;
o. obtaining permit for dewatering, dewatering, and disposal of water;
p. locating, supporting, protecting all utilities or structures and their restoration in case of injury or damage;
q. repair of existing utilities encountered and damaged during main installation;
r. temporary (cold patch) and permanent trench, driveway, and pavement restoration;
s. pipe pressure testing and disinfection;
t. connecting new water main to existing water main at locations indicated on the construction drawings;
u. topsoiling and seeding disturbed grass areas;
v. restoring drainage ditches and swales to their original grades, vegetate and install erosion control matting as required;
w. installing pipeline detection tape;
x. maintenance of traffic & traffic control;
y. all surveys required in accordance with these Specifications; and
z. all else necessary and incidental to the complete and acceptable installation.

B. Unless a specific item(s) is included in the proposal to cover same, the prices bid for installing water main shall also include and cover any temporary and permanent repair/replacement of paving, roadways, driveways, sidewalks, speed bumps, curbs and gutters, any required adjustments of existing storm drain inlets and the restoration of surfaces which are not in the traveled way.

REMOVE AND PROPERLY DISPOSE OF EXISTING WATERMAIN (Breakout Item W-3)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to remove existing water main where indicated on the plans or as directed, and properly disposing of the water main off-site.

The price bid per linear foot for removing and properly disposing of existing water main shall also include, but not limited to, the following:

a. erosion and sediment control as necessary;
b. saw cutting and removal of existing pavement of the various types encountered;
c. clearing & grubbing and removal & offsite disposal of stumps/roots;
d. stripping and stockpiling of topsoil;
e. removal and excavation of all materials encountered in trench excavation;
f. hauling wet or excess excavated material to stockpile area for drying, re-hauling and use as trench refill materials;
g. backfilling of trenches with suitable material from the excavation if new water main to replace existing is not installed in the same day;
h. disposal of excavated material not suitable for refill or in excess of the quantities required for refill;
i. placing and removal of sheeting, shoring, and bracing;
j. obtaining permit for dewatering, dewatering, and disposal of water;
k. locating, supporting, protecting all utilities or structures and their restoration in case of injury or damage;
l. repair of existing utilities encountered and damaged during main installation;
m. temporary (cold patch) and permanent trench, driveway, and pavement restoration if new water main to replace existing is not installed in same day;
n. maintenance of traffic & traffic control;
o. disposal of water main removed off-site in accordance with applicable municipal and/or State regulations;
p. all else necessary and incidental to the complete the work associated with this bid item.

FURNISH & INSTALL SCHEDULE 40 STEEL CASING PIPE BY OPEN CUT, INCLUDING CARRIER PIPE, CASING SPACERS, AND END SEALS (Breakout Item W-4)

A. The price bid for this item shall include all labor, materials, and equipment necessary to install schedule 40 standard wall steel casing pipe, including excavation, 360° welding of casing pipe joints, the installation of DR 18, C-900 PVC carrier pipe with casing spacers,

furnishing and installing casing pipe end seals, backfill, surface restoration, and all applicable work as listed in item W-1, A, above necessary to complete the installation.

FURNISH & INSTALL SCHEDULE 40 STEEL CASING PIPE BY JACK & BORE, INCLUDING CARRIER PIPE, CASING SPACERS, AND END SEALS (Breakout Item W-5)

A. The price bid for this item shall include all labor, materials, and equipment necessary to install, by jack and bore method, schedule 40 standard wall steel casing pipe, including excavation of bore and receiving pits, 360° welding of casing pipe joints, the installation of DR 18, C-900 PVC carrier pipe with casing spacers, furnishing and installing casing pipe end seals, backfill, surface restoration, and all applicable work as listed in item W-1, A, necessary to complete the installation.

FURNISH & INSTALL RESILIENT WEDGE GATE VALVE, INCLUDING VALVE BOX (Breakout Items W-6)

A. The price bid for furnishing and installing resilient wedge gate valves and valve boxes shall include all labor, materials, and equipment necessary to complete this bid item, including furnishing and installing concrete collars where specified, furnishing socket wrenches, and all other work and materials required for completion of this item, including all other applicable work as listed in item W-1, A, necessary to complete the installation.

FURNISH & INSTALL HYDRANT ASSEMBLY, INCLUDING HYDRANT TEE, VALVE & VALVE BOX, AND DUCTILE IRON LEAD (Breakout Item W-7)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install fire hydrants, including the tee, valve, ductile iron lead pipe, valve box, and hydrant. Hydrants shall be installed in the location as shown on the plans and per City of Milford standards. The installation shall include excavation; the installation of a concrete thrust block on the backside of the hydrant tee and the hydrant elbow; installation of gravel (57 stone) base beneath the hydrant; connection of the stainless steel threaded rod restraint, including strapping lugs where necessary; connection to water main; backfilling, compaction, and restoration; and any applicable item listed in item W-1, A, necessary to complete the installation.

FURNISH HYDRANT ASSEMBLY, INCLUDING HYDRANT TEE, VALVE & VALVE BOX, DUCTILE IRON LEAD, AND FITTINGS AS NECESSARY AND INSTALL BY CUTTING-IN ON EXISTING WATER MAIN (Breakout Item W-8)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install new hydrant assembly, including hydrant tee, valve & valve box, and ductile iron lead on existing water main. Work shall include isolating the existing water main under the direction of the City, excavation, dewatering the excavation after cutting the main, the installation of a concrete thrust block on the backside of the hydrant tee and the hydrant elbow; installation of gravel (57 stone) base beneath the hydrant; connection of the stainless steel threaded rod restraint, including strapping lugs where necessary; connection to the existing water main; backfilling, compaction, and restoration; and any applicable item listed in item W-1, A, necessary to complete the installation.

FURNISH & INSTALL TAPPING SADDLE, CORPORATION STOP, AND TAP WATER MAIN (Breakout Items W-9A & W-9b)

A. The prices bid for this item shall include furnishing all labor, materials, and equipment necessary to install the appropriate size water service tap on the water main, including furnishing and installing a tapping saddle, corporation stop, and tapping the water main and all applicable items listed in item W-1, A, necessary to complete this item.

FURNISH & INSTALL SDR 9 WATER SERVICE PIPE, INCLUDING FITTINGS (Breakout Items W-10a &W- 10b)

A. The prices bid for this item shall include furnishing all labor, materials, and equipment necessary to install new water services by open cut method; including connecting the services to the new corporation stop, to both sides of the new curb stop, to both sides of the new meter pit, and to the existing water service; including any fittings that may be required. Work associated with this bid item shall also include all necessary excavation from the meter pit to the water main, and from the new meter pit to the existing water service, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in item W-1, A, necessary to complete this item.

FURNISH & INSTALL WATER METER PIT, INCLUDING FRAME AND COVER (Breakout Items W-11a & W-11b)

A. The prices bid for this item shall include furnishing all labor, materials, and equipment necessary to install new meter pit assemblies. Work associated with this item shall include all necessary excavation, furnishing and installing new meter pit and frame and cover, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed areas, and all applicable items listed in item W-1, A, necessary to complete this item.

REMOVE EXISTING FIRE HYDRANT, HYDRANT LEAD, VALVE, AND VALVE BOX AND TURN HYDRANT, VALVE, AND VALVE BOX OVER TO CITY (Breakout Item W-12)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to remove existing fire hydrant, lead, valve, and valve box and to turn hydrant and valve box over to the City. Work associated with this item shall include all necessary excavation, the complete removal of all items, installing a mechanical joint plug on the hydrant tee, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed areas, properly disposing of items removed and not turned over to the City off-site, and all applicable items listed in item W-1, A, necessary to complete this item.

REMOVE EXISTING VALVE AND VALVE BOX, INSTALL MJ CAP(S) ON MAIN, AND TURN VALVE AND VALVE BOX OVER TO CITY (Breakout Item W-13)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to remove existing valve and valve box, turn valve over to the City, and to properly dispose of valve box off-site. Work shall also include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, mulching of disturbed areas, and all applicable items listed in item W-1, A, necessary to complete this item.

OPEN OR CLOSE (AS INDICATED) EXISTING VALVE, AND REMOVE VALVE BOX AND TURN OVER TO CITY (Breakout Item W-14)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to open or close (as indicated on the plans) existing valve and to remove and properly dispose of existing valve box off-site. Work shall also include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, mulching of disturbed areas, and all applicable items listed in item W-1 , A, necessary to complete this item.

REMOVE EXISTING METER PIT AND FRAME AND COVER AND TURN OVER TO CITY (Breakout Items W-15a & W-15b)

A. The prices bid for this item shall include furnishing all labor, materials, and equipment necessary to remove existing meter pit and frame and cover and properly disposing of all items off-site. Work shall also include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, mulching of disturbed areas, and all applicable items listed in item W-1, A, necessary to complete this item.

FURNISH RESILIENT WEDGE GATE VALVE AND CUT-IN VALVE ON EXISTING WATER MAIN, INCLUDING VALVE BOX AND FITTINGS AS NECESSARY, AT DIRECTION OF THE ENGINEER (Breakout Item W-16)

A. The prices bid for this item shall include furnishing all labor, materials, and equipment necessary to cut-in valve and install valve box on existing water main. Work shall also include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, mulching of disturbed areas, and all applicable items listed in item W-1 , A, necessary to complete this item.

ABANDON EXISTING WATER MAIN BY FILLING WITH FLOWABLE FILL, INCLUDING INSTALLING MJ CAPS OR PLUGS AND TEMPORARY FILL AND BLEED PIPES WHERE NECESSARY (Breakout Item W-17)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to abandon existing water main by filling with flowable fill. Work shall include excavation where necessary to install mechanical joint caps or plugs, install temporary fill pipes and bleed or vent pipes, and filling pipes with flowable fill. Also included are removing temporary fill and bleed or vent pipes after pipes have been filled, backfill and compaction of excavations, top soiling, seeding, mulching of disturbed areas, and all applicable items listed in item W-1, A, necessary to complete this item.

Measurement and Payment:

FURNISH & INSTALL DR 18, C-900, PVC WATER MAIN; OR, CLASS 50 DUCTILE IRON WATER MAIN, INCLUDING FITTINGS AND APPURTENANCES (Breakout Items W-1 & W-2)

A. Measurement for this bid item shall be made horizontally along the length of water main actually furnished and installed. No deduction will be made for the lengths of fittings or change in vertical elevation.

B. Payment for furnishing and installing PVC or ductile iron water main will be made based on the prices bid for the type of pipe and the actual linear feet of pipe installed.

REMOVE AND PROPERLY DISPOSE OF EXISTING WATERMAIN (Breakout Item W-3)

A. Measurement for this bid item shall be made horizontally along the length of water main actually removed and properly disposed of off-site. No deduction will be made for the lengths of fittings or change in vertical elevation.

B. Payment for removing existing water main and properly disposing of off-site shall be made at the appropriate unit price bid.

FURNISH & INSTALL SCHEDULE 40 STEEL CASING PIPE BY OPEN CUT, INCLUDING CARRIER PIPE, CASING SPACERS, AND END SEALS (Breakout Item W-4)

A. Measurement will be made for this item horizontally along the surface with no allowance for vertical deflection. (Pay limits of casing pipe are shown on the drawings unless directed otherwise by the engineer.)

B. Payment for installation of steel casing pipe by open cut, including carrier pipe, casing spacers, and end seals will be made on a linear foot basis at the unit price bid for the actual length of casing pipe installed.

FURNISH & INSTALL SCHEDULE 40 STEEL CASING PIPE BY JACK & BORE, INCLUDING CARRIER PIPE, CASING SPACERS, AND END SEALS (Breakout Item W-5)

A. Measurement will be made for this item horizontally along the surface with no allowance for vertical deflection. (Pay limits of casing pipe are shown on the drawings unless directed otherwise by the engineer.)

B. Payment for installation of steel casing pipe by jack & bore, including carrier pipe, casing spacers, and end seals will be made on a linear foot basis at the unit price bid for the actual length of casing pipe installed.

FURNISH & INSTALL RESILIENT WEDGE GATE VALVE, INCLUDING VALVE BOX (Breakout Items W-6)

A. No measurement will be made for this item. Note: Excavation and backfill for installation of valves will be paid for as a part of measurement and payment for water mains.

B. Payment for furnishing and installing gate valves and valve boxes will be made at the unit price bid for each valve and valve box actually furnished and installed.

FURNISH & INSTALL HYDRANT ASSEMBLY, INCLUDING HYDRANT TEE, VALVE & VALVE BOX, AND DUCTILE IRON LEAD (Breakout Item W-7)

A. No measurement will be made for this item.

B. Payment will be made at the appropriate unit price bid for each complete hydrant assembly actually furnished and installed.

FURNISH HYDRANT ASSEMBLY, INCLUDING HYDRANT TEE, VALVE & VALVE BOX, DUCTILE IRON LEAD, AND FITTINGS AS NECESSARY AND INSTALL BY CUTTING-IN ON EXISTING WATER MAIN (Breakout Item W-8)

A. No measurement will be made for this item.

B. Payment will be made at the appropriate unit price bid for each complete hydrant assembly actually furnished and installed on an existing water main.

FURNISH & INSTALL TAPPING SADDLE, CORPORATION STOP, AND TAP WATER MAIN (Breakout Items W-9A & W-9b)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the size and number of tapping saddles, corporation stops, and taps actually installed, complete.

FURNISH & INSTALL SDR 9 WATER SERVICE PIPE, INCLUDING FITTINGS (Breakout Items W-10a &W- 10b)

A. Measurement for this bid item shall be made horizontally along the length of service pipe actually installed.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the size and length of service pipe actually installed.

FURNISH & INSTALL WATER METER PIT, INCLUDING FRAME AND COVER (Breakout Items W-11a & W-11b)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the size and number of meter pits actually installed.

REMOVE EXISTING FIRE HYDRANT, HYDRANT LEAD, VALVE, AND VALVE BOX AND TURN HYDRANT, VALVE, AND VALVE BOX OVER TO CITY (Breakout Item W-12)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the unit price bid for the number of existing hydrant assemblies actually removed, including turning hydrants and valves over to the City.

REMOVE EXISTING VALVE AND VALVE BOX, INSTALL MJ CAP(S) ON MAIN, AND TURN VALVE AND VALVE BOX OVER TO CITY (Breakout Item W-13)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the unit price bid for the number of existing valve and valve boxes actually removed, including turning valves over to the City.

OPEN OR CLOSE (AS INDICATED) EXISTING VALVE, AND REMOVE VALVE BOX AND TURN OVER TO CITY (Breakout Item W-14)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the unit price bid for the number of existing valves turned off and valve boxes actually removed and properly disposed of off-site.

REMOVE EXISTING METER PIT AND FRAME AND COVER AND TURN OVER TO CITY (Breakout Items W-15a & W-15b)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the size and number of existing meter pits actually removed and properly disposed of off-site.

FURNISH RESILIENT WEDGE GATE VALVE AND CUT-IN VALVE ON EXISTING WATER MAIN, INCLUDING VALVE BOX AND FITTINGS AS NECESSARY, AT DIRECTION OF THE ENGINEER (Breakout Item W-16)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the unit price bid for the number of valves cut-in on existing water main, including installation of valve box, as directed by the engineer.

ABANDON EXISTING WATER MAIN BY FILLING WITH FLOWABLE FILL, INCLUDING INSTALLING MJ CAPS OR PLUGS AND TEMPORARY FILL AND BLEED PIPES WHERE NECESSARY (Breakout Item W-17)

A. Measurement for this item shall be made based on the volume of pipe filled with flowable fill. The volume shall be calculated by measuring horizontally along the ground surface above the pipe filled and multiplying the resulting length by the cross-sectional area of the pipe filled.

B. Payment shall be made based on the unit price bid for the volume of pipe actually filled.

Payment Clarification

A percentage of the total Lump Sum will be paid based on the work performed in each pay period. The percentage will be calculated by multiplying the total unit of each completed Breakout Item times the appropriate unit price; then adding the total dollars of completed work, divided by the total Lump Sum bid price for item 614506 – Installing Water Main. Final payment may result in less than 100% of the total Lump Sum based on the actual work performed. Should the Lump Sum total be exceeded, additional funds will be added by Change Order based on the best available estimate at the time. Failure to fully complete the Breakout Sheet for this Item will result in the bid being declared non-responsive.

9/01/2017

618537 - DRILLED SHAFT, 54"
618538 - DRILLED SHAFT, 60"
618539 - DRILLED SHAFT ROCK SOCKET, 48"

Description:

Furnish all materials, labor, tools, equipment, services and incidentals necessary to construct the drilled shafts in accordance with the Contract Documents and this Specification.

Materials:

Provide materials as specified in the following:

A. Steel Casing Pipe shall conform to ASTM A 252, Grade 2 as minimum for temporary or permanent application. Casing shall be metal, smooth, clean, watertight, and of ample strength to withstand both handling and driving stresses and the pressure of both concrete and the surrounding earth materials. Thickness of the casings shall not be less than 0.25-inches. The inside diameter of casing shall not be less than the specified size of the shaft. No extra compensation will be allowed for concrete required to fill an oversized casing or oversized excavation.

B. Reinforcing Steel shall conform to ASTM A615, Grade 60, and the requirements of Section 824 and Section 603 of the Specifications.

C. Welding Material as per Section 826.12.

D. Portland Cement Concrete, Class B, as per Section 812.

E. Slurry

1. Slurry shall be a stable suspension of mineral or polymer in potable water. The Contractor shall anticipate encountering leakage from storm and sanitary sewers, and other agents that may be deleterious to slurry and make provisions to prevent such materials from contaminating the slurry. The Contractor is responsible for and shall modify the slurry mix as required so as to maintain a stable suspension at all times.

2. Slurry shall be of such consistency that the tremie concrete will readily displace it.

3. Additives shall be used in the slurry if needed to maintain the necessary properties.

4. Fluid loss in an open excavation shall be limited to a drop in the slurry level of no greater than 1-inch per hour per 20-feet of excavation depth, and no more than 2-feet total in a 24-hour period.

5. Bentonite slurry shall be mineral slurry of powdered Wyoming or Dakota bentonite, with the following density, viscosity, and pH. Attapulgite mineral slurry may be used for sites with brackish or saline water, and shall conform to the range of values as shown in Table 1. Polymer slurry shall be a suspension of powdered polyacrylamide or vinyl polymer and shall conform to the range of values shown in Table 2.

6. Slurry Testing Density shall be measured by 68 degrees F by the mud density balance, test method FM 8-RP13B-1. Viscosity shall be measured by the Marsh Cone Method, test method FM 8-RP13B-3. The pH shall be measured by test method FM8-RP13B-4.

Table 1: Range of Values (at 68°F) for Bentonite Slurry			
Property (Units)	**At the Time of Slurry Introduction in the Drilled Shaft**	**Before Concrete Placement in the Drilled Shaft**	**Test Method**
Density	1025 to 1105 kg/m^3 63.55 to 68.51 lb/ft^3	1025 to 1200 kg/m^3 63.55 to 74.41 lb/ft^3	Density Balance
Viscosity	30 to 48 seconds/liter 849.5 to 1359.2 seconds/ft^3	30 to 48 seconds/liter 849.5 to 1359.2 seconds/ft^3	Marsh Cone
pH	7 to 11	7 to 11	pH paper or meter
Sand Content %	1 max	4 max	200 Sieve Retain

Notes for Table 1:

a. Increase density values by 1.86 lb/ft^3 (30 kg/m^3) in salt water.

b. At time of concreting, sand content shall not exceed 4% (by volume) at any point in the shaft excavation as determined by the American Petroleum Institute sand content test.

c. Mixing time shall be a minimum of 10-minutes for mineral slurry.

d. Storage time to allow hydration shall be a minimum of 6 hours for mineral slurry.

Table 2: Range of Values (at 68°F) for Bentonite Slurry			
Property (Units)	**At the Time of Slurry Introduction in the Drilled Shaft**	**Before Concrete Placement in the Drilled Shaft**	**Test Method**
Density	62 to 65 lb/ft3	62 to 65 lb/ft3	Density Balance
Viscosity	In accordance with Manufacturer recommendations.	In accordance with Manufacturer recommendations.	Marsh Cone
pH	In accordance with Manufacturer recommendations.	In accordance with Manufacturer recommendations.	pH paper or meter
Sand Content %	1 max	1 max	200 Sieve Retain

Notes for Table 2:

a. Increase density values by 1.86 lb/ft3 (30 kg/m3) in salt water.

b. If desanding is required, sand content shall not exceed 1% (by volume) at any point in the shaft excavation as determined by the American Petroleum Institute sand content test.

c. Maximum Viscosity by Marsh Cone method shall be in accordance with Manufacturer recommendations.

d. Mixing time shall be a minimum of 15-minutes for polymer slurry.

e. Storage time to allow hydration shall be a minimum of 2-hours for polymer slurry.

f. Access Tubes for Crosshole Sonic Log Testing Access tubes shall be Nominal Pipe Size 1-1/2 Schedule 40 black iron or black steel (not galvanized) pipe.

g. Grout as per ASTM C 1107.

Construction Methods:

A. Submittals, Approvals, and Meetings. At the time of bid, submit the qualifications of the Contractor (i.e., the drilled shaft specialty contractor) to verify the successful completion by the Contractor of at least three separate foundation projects within the last five years with drilled shafts of similar size (diameter and depth) and similar subsurface geotechnical conditions to those shown in the Plans. Include a brief description of each project and the owner's contact person's name and current phone number for each project listed.

1. *Experience and Personnel*. At least two weeks prior to the start of drilled shaft construction, submit a list identifying the on-site supervisors and drill rig operators assigned to the project to the Engineer for approval. In the list, include a detailed summary of each individual's experience in drilled shaft excavation operations, and placement of assembled reinforcing cages and concrete in drilled shafts.

    a. On-site supervisors must have a minimum of two years' experience in supervising construction of drilled shaft foundations of similar size (diameter and depth) and difficulty to those shown in the Plans, and similar geotechnical conditions to those described in the geotechnical report. The work experience must be direct supervisory responsibility for the on-site drilled shaft construction operations. Project management level positions indirectly supervising on-site drilled shaft construction operations are not acceptable for this experience requirement.

    b. Drill rig operators must have a minimum one year experience in construction of drilled shaft foundations.

    The Engineer will approve or reject the Contractor's qualifications and field personnel within ten working days after receipt of the submission. Do not start work on any drilled shaft until the Contractor's qualifications and field personnel are approved by the Engineer. The Engineer may suspend the drilled shaft construction if the Contractor substitutes field personnel without prior approval by the Engineer. The Contractor is fully liable for the additional costs resulting from the suspension of work, and no adjustments in contract time resulting from such suspension of work will be allowed.

2. *Drilled Shaft Installation Plan*. At least four weeks prior to the start of drilled shaft construction, submit a Drilled Shaft Installation Plan narrative for acceptance by the Engineer. In preparing the narrative, reference the available subsurface geotechnical data provided in the Contract boring logs and any geotechnical report(s) prepared for this project. In this narrative, provide at a minimum the following information:

    a. Description of overall construction operation sequence and the sequence of drilled shaft construction when in groups or lines.

    b. A list, description, and capacities of proposed equipment, including but not limited to cranes, drills, augers, bailing buckets, final cleaning equipment and drilling unit. As appropriate, describe why the equipment was selected, and describe equipment suitability to the anticipated site and subsurface conditions. Include a project history of the drilling equipment demonstrating the successful use of the equipment on shafts of equal or greater size in similar subsurface geotechnical conditions.

c. Details of drilled shaft excavation methods, including proposed drilling methods, methods for cleanout of the bottom of the excavation hole, and a disposal plan for excavated material and drilling slurry (if applicable). If appropriate, include a review of method suitability to the anticipated site and subsurface geotechnical conditions including boulders and obstruction removal techniques if such are indicated in the Contract subsurface geotechnical information or Contract Documents.

d. Details of the method(s) to be used to ensure drilled shaft hole stability (i.e., prevention of caving, bottom heave, etc. using temporary casing, slurry, or other means) during excavation and concrete placement. Include a review of method suitability to the anticipated site and subsurface geotechnical conditions.

e. Provide detailed procedures for mixing, using, maintaining, and disposing of the slurry. Also provide a detailed mix design (including all additives and their specific purpose in the slurry mix) and a discussion of its suitability to the anticipated subsurface geotechnical conditions for the proposed slurry.

   In the submittal, include a detailed plan for quality control of the selected slurry, including tests to be performed, test methods to be used, and minimum and/or maximum property requirements which must be met to ensure that the slurry functions as intended, considering the anticipated subsurface conditions and shaft construction methods, in accordance with the slurry manufacturer's recommendations and these Specifications. As a minimum, include the following tests in the slurry quality control plan:

Property	Test Method
Density	Mud Weight (Density), API 13B-1, Section 1
Viscosity	Marsh Funnel and Cup, API 13B-1, Section 2.2
pH	Glass Electrode, pH Meter, or pH Paper
Sand Content	Sand, API 13B-1, Section 5

f. Reinforcing steel working drawings, details of reinforcement placement including type and location of all splices, reinforcement cage support and centralization methods, type and location of all spacers, crosshole sonic logging tubes and other instrumentation, and procedures for lifting and setting the reinforcement cage.

g. When casings are proposed or required, provide the following:
   i. Casing dimensions and detailed procedures for permanent casing installation.
   ii. Temporary casing installation and removal.
   iii. Methods of advancing the casing, along with the means to be utilized for excavating the drilled shaft hole in accordance with Subsection 606.03 of this Specification.

h. When using temporary casing, details of the method to extract the temporary casing and maintaining shaft reinforcement in proper alignment and location, and maintaining the concrete slump to keep concrete workable during casing extraction.

i. Details of concrete placement, including proposed equipment and procedures for delivering concrete to the drilled shaft, placement of the concrete into the shaft including initial placement and the raising of the tremie or pump line during placement, size of tremie and pump lines, operational procedures for pumping, and a sample uniform yield form to be used by the Contractor for plotting the volume of concrete placed versus the depth of shaft for all shaft concrete placement.

j. The method to be used to form a horizontal construction joint during concrete placement.
k. When applicable, include a description of the material to be used to temporarily backfill a drilled shaft excavation hole during a stoppage of the excavation operation, as well as the method used to place and remove the material.
l. Details of procedures to prevent loss of slurry or concrete into waterways, sewers and other areas to be protected.
m. Describe the method and materials that will be used to fill or eliminate all voids below the top of shaft between the plan shaft diameter and excavated shaft diameter, or between the shaft casing and surrounding soil, if permanent casing is specified.
n. Details of any required load tests including equipment, instrumentation, procedures, calibration data for test equipment, calculations and drawings.
o. Details and procedures for protecting existing structures, utilities, roadways and other facilities during drilled shaft installation.
p. Other information required by the Plans or specified herein.

The Engineer will evaluate the Drilled Shaft Installation Plan for conformance with the Contract Plans and Specifications within ten working days after receipt of the submission. At the option of the Department, a Shaft Installation Plan Submittal Meeting may be scheduled following review of the Contractor's initial submittal of the Plan. Those attending the Shaft Installation Plan Submittal Meeting, if held, must include the following:

a. The superintendent, on-site supervisors, and other Contractor personnel involved in the preparation and execution of the Drilled Shaft Installation Plan.
b. The Project Engineer and Department's personnel involved with the structural, geotechnical, and construction review of the Drilled Shaft Installation Plan together with Department's personnel who will provide inspection and oversight during the drilled shaft construction phase of project.

Submit any significant updates or modifications to the Drilled Shaft Installation Plan whenever such updates or modifications are proposed to the Engineer. The Engineer will evaluate the new information for conformance with the Contract Plans and Specifications within ten working days after receipt of the submission.

3. *Slurry Technical Assistance*. If slurry is used to construct the drilled shafts, provide, or arrange for, technical assistance from the slurry manufacturer as specified in Subsection (D)(4)(a) of this Specification. Submit the following to the Engineer:

   a. The name and current phone number of the slurry manufacturer's technical representative assigned to the project.

   b. The name(s) of the Contractor's personnel assigned to the project and trained by the slurry manufacturer's technical representative in the proper use of the slurry. In the submittal, include a signed training certification letter from the slurry manufacturer for each individual, including the date of the training.

4. *Approvals*. Do not begin work until all the required submittals have been accepted in writing by the Engineer. All procedural acceptances given by the Engineer will be subject to trial in the field and will not relieve the Contractor of the responsibility to satisfactorily complete the work.

5. *Drilled Shaft Preconstruction Conference*. Hold a shaft preconstruction conference at least five working days prior to the Contractor beginning any shaft construction work at the site to discuss investigative boring information, construction procedures, personnel, and equipment to be used, and other elements of the accepted Shaft Installation Plan as specified in Subsection (A)(2) of this Specification. If slurry is used to construct the shafts, the frequency of scheduled site visits to the project site by the slurry manufacturer's representative will be discussed. Those attending must include:

   a. The superintendent, on site supervisors, and other key personnel identified by the Contractor as being in charge of excavating the shaft, placing the casing and slurry as applicable, placing the steel reinforcing bars, and placing the concrete. If slurry is used to

construct the shafts, the slurry manufacturer's representative and a Contractor's employee trained in the use of the slurry, as identified to the Engineer in accordance with Subsection (D)(4)(a) of this Specification, must also attend.

b. The Project Engineer, key inspection personnel, and appropriate representatives of the Department.

If the Contractor's key personnel change, or if the Contractor proposes a significant revision of the approved Drilled Shaft Installation Plan, an additional conference may be held at the request of the Engineer before any additional shaft construction operations are performed.

6. *Logs of Shaft Construction*. Prepare inspection logs documenting each shaft construction activity, including casing installation, excavation, shaft bottom inspection, reinforcement installation and concrete placement. Fully document the work performed with frequent reference to the date, time and casing/excavation elevation in the logs. In addition, prepare and submit the logs documenting any subsurface investigation borings or rock core holes performed for the Contract at drilled shaft foundation locations.

In the records for temporary and permanent casing, include at least the following information:

a. Identification number and location of the shaft.
b. Diameter and wall thickness of the casing.
c. Dimensions of any casing reinforcement.
d. Top and bottom elevations of the casing.
e. Method and equipment used for casing installation.
f. Any problems encountered during casing installation.
g. Name of the inspector.

In the shaft excavation log, include at least the following information:

a. Identification number, location and surface elevation of the shaft.
b. Description and approximate top and bottom elevation of each soil or rock material encountered.
c. Seepage or groundwater conditions.
d. Type and dimensions of tools and equipment used, and any changes to the tools and equipment.
e. Type of drilling fluid used, if any, and the results of slurry tests.
f. Any problems encountered.
g. Elevation of any changes in the shaft diameter.
h. Method used for bottom cleaning.
i. Final bottom elevation of the shaft.
j. Name of the inspector and the date, time and name of any changes in the inspector.

In the concrete placement records, include at least the following information:

a. Concrete mix used.
b. Time of start and end of concrete placement.
c. Volume and start/end time for each truck load placed.
d. Concrete test results.
e. Concrete surface elevation and corresponding tremie tip elevation periodically during concrete placement.
f. Concrete yield curve (volume versus concrete elevation, actual and theoretical).
g. Name of the inspector.

Submit the logs for each shaft construction activity to the Engineer within 24 hours of the completion of that activity. Submit a full set of shaft inspection logs for an individual drilled shaft to the Engineer within 48 hours of the completion of concrete placement at the shaft.

B. *Drilled Shaft Excavation*. Excavate the drilled shafts to the required depth as shown in the Plans or as directed by the Engineer. Once the excavation operation has been started, conduct the excavation in a continuous operation until the excavation of the shaft is completed,

except for pauses and stops as noted, using approved equipment capable of excavating through the type of material expected. Pauses during this excavation operation, except for casing splicing and removal of obstructions, will not be allowed. Provide temporary casing at the site in sufficient quantities to meet the needs of the anticipated construction method.

Pauses, defined as interruptions of the excavation operation, will be allowed only for casing splicing and removal of obstructions. Drilled shaft excavation operation interruptions not conforming to this definition are considered as stops.

If the drilled shaft excavation is not complete at the end of the shift or series of continuous shifts, the drilled shaft excavation operation may be stopped, provided the Contractor, before the end of the work day, protects the shaft as indicated in Subsection (C) of this Specification.

If slurry is present in the shaft excavation, conform to the requirements of Subsection (D)(4)(b) of this Specification regarding the maintenance of the minimum level of drilling slurry throughout the stoppage of the shaft excavation operation, and recondition the slurry to the required slurry properties in accordance with this Specification prior to recommencing shaft excavation operations.

The Contractor shall provide equipment certified to produce a minimum of 80 000 ft·lb and 20 000 lb of crowd (down pressure). For air rotary methods, the equipment shall be capable of 1000 cfm at 200 psi. Ensure the excavation and drilling equipment have adequate capacity, including power, torque and down thrust to excavate a hole of both the maximum diameter and to a depth of 20 feet, or 20 percent, beyond the maximum shaft length shown on the Plans, whichever is greater.

Blasting will only be permitted if specifically stated on the Plans or authorized in writing by the Engineer.

Perform sidewall overreaming when the time for shaft excavation exceeds 36 hours or as directed by the Engineer (measured from the beginning of excavation below the casing when casing is used) before the start of concrete placement. Also perform sidewall overreaming when the sidewall of the hole is determined by the Engineer to have softened due to the excavation methods, swelled due to delays in the start of concrete placement, or degraded because of slurry cake buildup. Overreaming thickness must be a minimum of 1/2-inch and a maximum of 3 inches. Overreaming may be accomplished with a grooving tool, overreaming bucket, or other equipment approved by the Engineer. If overreaming is required as a result of the excavation time exceeding the time limit specified herein, or as a result of excavation methods not in compliance with the approved Drilled Shaft Installation Plan, the Contractor will bear the costs associated with both sidewall overreaming and additional drilled shaft concrete related to overreaming.

For rock sockets specified and detailed on the plans, the Contractor shall provide a minimum penetration into rock as shown or as field adjusted by DelDOT. For the purposes of this special provision, "Rock" is defined as a continuous intact material in which the penetration rate with a rock auger is less than 2 inches per 5 minutes of drilling using a drill rig capable of applying at minimum 35,000 pounds of down pressure (Crowd) while turning the auger for diameters equal to or less than 48 inches in diameter and at least 50,000 pounds of down pressure (Crowd) for augers greater than 48 inches in diameter. Rock augers shall be equipped with carbide teeth in good condition while performing this test. This definition exclude discontinuous loose natural material such as boulders and man-made material such as boulders and man-made materials such as concrete, steel, timber, etc.

When drilled shafts are to be installed in conjunction with embankment construction, construct drilled shafts after placement of the embankment fill unless otherwise shown on the Contract Documents or approved by the Engineer. Do not cap the drilled shafts installed prior to the completion of the embankment fill until the fill has been placed to the bottom of cap level.

C. *Special Excavation*. Special excavation is excavation that requires special tools and/or procedures to accomplish hole advancement. Special excavation is paid for excavation, except obstructions, below the depth where conventional tools and the approved drilling equipment, operating at maximum power, torque and down thrust, cannot advance the hole. All excavation, except obstructions, performed below the depth where special excavation is authorized shall be considered special excavation regardless of the density or character of materials encountered.

D. *Drilled Shaft Excavation Protection*. Do not leave drilled shaft excavations open overnight unless cased full depth or otherwise protected against sidewall instability. An open excavation is defined as a drilled shaft that has not been filled with concrete, or temporarily backfilled with a material approved by the Engineer in accordance with Subsection (A)(2) of this Specification or protected in accordance with Subsection (D). The use of slurry to protect a drilled shaft during a drilling stoppage or overnight shutdown may be approved by the Engineer.

Casing of drilled shafts in stable rock formations during stoppages is not required, unless shown on the Plans or specified herein.

E. *Drilled Shaft Excavation Protection Methods*. The Contractor bears full responsibility for selection and execution of the method(s) of stabilizing and maintaining the drilled shaft excavation. Protect the walls and bottom of the drilled shaft excavation so that side wall caving and bottom heave is prevented from occurring, and so that the soil adjacent to the drilled shaft is not disturbed. The Contractor may excavate the drilled shaft without excavation protection provided the Contractor can demonstrate that the soil/rock is stable and above the water table and zones of seepage. Acceptable protection methods include the use of casing, drilling slurry, or both.

1. Temporary Casing Construction Method. In stable soils, conduct casing installation and removal operations and drilled shaft excavation operations such that the adjacent soil outside the casing and drilled shaft excavation for the full height of the drilled shaft is not disturbed. Disturbed soil is defined as soil whose geotechnical properties have been changed from those of the original in-situ soil, and whose altered condition adversely affects the performance of the drilled shaft foundation.

   If utilizing casing that is adequately sealed into competent soils such that water cannot enter the excavation, the Contractor may, with the Engineer's approval, continue excavation in soils below the water table provided the water level within the casing do not rise or exhibit flow. As the temporary casing is withdrawn, a sufficient head of fluid concrete must be maintained to ensure that water or slurry outside the temporary casing will not breach the column of freshly placed concrete.

   Extract the casing at a slow, uniform rate with the pull in line with the shaft axis. Avoid excessive rotation of the casing to limit deformation of the reinforcing steel cage.

   Remove all temporary casings from the excavation as concrete placement is completed, unless permission has been received from the Engineer to leave specified temporary casings in place.

2. *Permanent Casing Construction Method*. When permanent casing is specified, excavation will conform to the specified outside diameter of the drilled shaft. After the casing has been filled with concrete, fill all void space occurring between the casing and drilled shaft excavation with a material which approximates the geotechnical properties of the in-situ soils, in accordance with the Drilled Shaft Installation Plan specified in Subsection (A)(2) of this Specification and as approved by the Engineer.

   When the shaft extends above ground or through a body of water, the portion exposed above ground or through a body of water may be formed with removable casing except when the permanent casing is specified. Strip the removable casing from the shaft in a manner that will not damage the concrete. Casings can be removed when the concrete has attained sufficient strength provided:

a. Curing of the concrete is continued for a 72-hour period.
b. The shaft concrete is not exposed to salt water or moving water for 7 days.
c. The concrete reaches a compressive strength of at least 2500 psi, as determined from concrete cylinder breaks.

Use of removable casing is permitted only if specified on the Plans or approved by the Engineer. Use removable casing in accordance with the equipment and procedures shown in the approved Drilled Shaft Installation Plan, and comply with all other requirements specified herein.

3. *Alternative Casing Methods*. When approved by the Engineer, installation of casing using rotating, oscillating, or vibrating methods will be permitted. Use this alternative casing method in accordance with the equipment and procedures shown in the approved Drilled Shaft Installation Plan, and comply with all other requirements specified herein.

   Equip drilled shaft casing with cutting teeth or a cutting shoe and install by rotating, oscillating, or vibrating the casing.

4. *Slurry*. Use slurry in accordance with this Specification to maintain a stable excavation during excavation and concrete placement operations once water begins to enter the drilled shaft excavation and remain present.

   Use slurry to maintain stability during drilled shaft excavation and concrete placement operations in the event that water begins to enter the drilled shaft excavation at a rate of greater than twelve inches per hour, or if the Contactor is not able to restrict the amount of water in the drilled shaft to less than three inches prior to concrete placement, or to equilibrate water pressure on the sides and base of the drilled shaft excavation when groundwater is encountered or anticipated based on the available subsurface data.

   a. *Slurry Technical Assistance*. If slurry is used, the manufacturer's representative, as identified to the Engineer in accordance with Subsection (A)(3) of this Specification, must:
   i. Provide technical assistance for the use of the slurry.
   ii. Be present at the site prior to introduction of the slurry into a drilled hole.
   iii. Remain at the site during the construction and completion of a minimum of one drilled shaft to adjust the slurry mix to the specific site conditions.

   After the manufacturer's representative is no longer present at the site, the Contractor's employee trained in the use of the slurry, as identified to the Engineer in accordance with Subsection (A)(3) of this Specification, must be present at the site throughout the remainder of shaft slurry operations for this project to perform the duties specified above.

   b. *Minimum Level of Slurry in the Excavation*. When slurry is used to maintain a stable excavation, maintain the slurry level in the excavation to obtain hydrostatic equilibrium throughout the construction operation at a height required to provide and maintain a stable hole, but not less than 5 feet above the water table or surface of surrounding water body if at an offshore location.

   Provide casing, or other means, as necessary to meet these requirements.

   Maintain the slurry level above all unstable zones a sufficient distance to prevent bottom heave, caving or sloughing of those zones.

   Throughout all stops in drilled shaft excavation operations, monitor and maintain the slurry level in the excavation the greater of the following elevations:

   i. No lower than the water level elevation outside the drilled shaft.
   ii. Elevation as required to provide and maintain a stable hole.

c. *Cleaning Slurry*. Clean, re-circulate, de-sand, or replace the slurry, as needed, in order to maintain the required slurry properties. Sand content will only be required to be within specified limits immediately prior to concrete placement.

F. *Obstructions*. When obstructions are encountered, notify the Engineer promptly. An obstruction is defined as a specific object (including, but not limited to, boulders, logs, and man-made objects) encountered during the drilled shaft excavation operation which prevents or hinders the advance of the drilled shaft excavation. When efforts to advance past the obstruction to the design drilled shaft tip elevation result in the rate of advance of the drilled shaft drilling equipment being significantly reduced relative to the rate of advance for the portion of the drilled shaft excavation in the geological unit that contains the obstruction, then remove, bypass or break up the obstruction under force account. Blasting will not be permitted unless approved in writing by the Engineer.

Drilling tools that are lost in the excavation will not be considered obstructions, and will be promptly removed by the Contractor. All costs due to lost tool removal will be borne by the Contractor including, but not limited to, costs associated with the repair of hole degradation due to removal operations or an excessive time that the hole remains open.

G. *Protection of Existing Structures*. Control operations to prevent damage to existing structures, utilities, roadways and other facilities. Include preventive measures, but which are not limited to, selecting construction methods and procedures that will prevent excessive caving of the drilled shaft excavation and monitoring and controlling the vibrations from the driving of casing or sheeting, drilling of the shaft, or from blasting, if permitted by the Engineer.

H. *Slurry Sampling and Testing*. Mix and thoroughly hydrate mineral slurry and polymer slurry in slurry tanks, lined ponds, or storage areas. Draw sample sets from the slurry storage facility and test the samples for conformance with the appropriate specified material properties before beginning slurry placement in the drilled hole. Conform the slurry to the quality control plan included in the Drilled Shaft Installation Plan in accordance with Subsection (A)(2) of this Specification and as approved by the Engineer. A sample set must be composed of samples taken at mid-height and within two feet of the bottom of the storage area.

Sample and test all slurry in the presence of the Engineer, unless otherwise approved by the Engineer. Record the date, time, names of the persons sampling and testing the slurry, and the results of the tests. Submit a copy of the recorded slurry test results to the Engineer at the completion of each drilled shaft, and during construction of each drilled shaft when requested by the Engineer.

Take and test sample sets of all slurry, composed of samples taken at mid-height and within two feet of the bottom of the drilled shaft, during drilling as necessary to verify the control of the properties of the slurry. As a minimum, take and test the sample sets of polymer slurry at least once every four hours after beginning its use during each shift.

Take and test sample sets of all slurry, as specified, immediately prior to placing concrete.

Demonstrate to the satisfaction of the Engineer that stable conditions are being maintained. If the Engineer determines that stable conditions are not being maintained, immediately take action to stabilize the shaft. Submit a revised Drilled Shaft Installation Plan which addresses the problem and prevents future instability. Do not continue with drilled shaft construction until the damage which has already occurred is repaired in accordance with the Specifications, and until receiving the Engineer's approval of the revised Drilled Shaft Installation Plan.

I. *Drilled Shaft Excavation Inspection*. Use appropriate means such as a cleanout bucket, air lift or hydraulic pump to clean the bottom of the excavation of all drilled shafts. The base of the drilled shaft excavation cannot be covered with more than three inches of sediment or loose or disturbed material just prior to placing concrete in soil shafts or more than one-half inch for 50 percent of the shaft area in rock sockets.

The excavated drilled shaft will be inspected and approved by the Engineer prior to proceeding with construction. Sound the bottom of the excavated drilled shaft with an airlift pipe, a tape with a heavy weight attached to the end of the tape, a borehole camera with visual sediment depth measurement gauge, or other means acceptable to the Engineer to determine that the drilled shaft bottom meets the requirements in the Contract.

J. *Assembly and Placement of Reinforcing Steel*. Prior to and during fabrication of the steel reinforcing cage, support the reinforcing bars off the ground surface, and protect the reinforcing bars from contamination with mud and other deleterious materials.

Rigidly brace the reinforcing cage to retain its configuration during handling and construction. Individual or loose bars will not be permitted. Tie all (100%) intersections of vertical and horizontal bars. Show bracing and any extra reinforcing steel required for fabrication of the cage on the working drawings.

Carefully position and securely fasten the reinforcement to provide the minimum clearances specified or shown on the Plans, and to ensure that no displacement of the reinforcing steel cage occurs during placement of the concrete.

Splicing of the reinforcement cage during placement of the cage in the shaft excavation will not be permitted unless otherwise shown on the Plans or approved by the Engineer.

Bundle vertical bars when necessary to maximize clear space between vertical reinforcement bars. Use rolled hoops or bundled spirals when necessary to maximize clear space between horizontal reinforcement.

If the reinforcing cage is spliced during placement of the cage into the drilled shaft excavation, the splice details and location of the splices must be in accordance with the Plans and the approved Drilled Shaft Installation Plan. In addition, perform the work within the time limits specified in Subsection (A).

Securely hold the steel reinforcing cage in position throughout the concrete placement operation. Tie and support the reinforcing steel in the drilled shaft so that the location of the reinforcing steel will remain within allowable tolerance. Use concrete spacers or other approved non-corrosive spacing devices at sufficient intervals (near the bottom, the top and at intervals not exceeding 10 feet vertically) to ensure concentric spacing for the entire cage length. The number of spacers required at each level will be one spacer for each foot of excavation diameter, with a minimum of four spacers at each level. The spacers must be of adequate dimension to ensure an annular space between the outside of the reinforcing cage and the side of the excavation along the entire length of the drilled shaft as shown in the Plans. Provide acceptable feet made of plastic, or concrete (bottom supports) to ensure that the bottom of the cage is maintained at the proper distance above the base of the excavation unless the cage is suspended from a fixed base during the concrete pour.

Remove bracing steel which constricts the interior of the reinforcing cage after lifting the cage if freefall concrete or wet tremie methods of concrete placement are to be used.

Check the elevation of the top of the steel cage before and after the concrete is placed. If the upward displacement of the rebar cage exceeds 2 inches, or if the downward displacement exceeds 6 inches, the drilled shaft will be considered defective. Make corrections to the satisfaction of the Engineer. Do not construct additional drilled shafts until the rebar cage support has been modified in a manner satisfactory to the Engineer.

K. *Concrete Placement*, Curing and Protection. Commence the Concrete placement as soon as possible after completion of drilled shaft excavation by the Contractor and inspection by the Engineer. Immediately prior to commencing concrete placement, the drilled shaft excavation and the properties of the slurry (if used) must conform to Subsection 606.02 of this Specification. Continue the concrete placement in one operation to the top of the drilled shaft, or as shown in the Plans.

If water is not present (a dry shaft), deposit the concrete through the center of the reinforcement cage by a method which prevents segregation of aggregates. Place the concrete such that the free-fall is vertical down the center of the drilled shaft without hitting the sides, the steel reinforcing bars, or the steel reinforcing bar cage bracing.

If water exists in amounts greater than three inches in depth or enters at a rate of more than twelve inches per hour then fill the drilled shaft excavation with slurry to at least the level specified in Subsection (D)(4)(b) and concrete placed by tremie methods.

Do not exceed the time limit for concrete placement as defined in the approved Drilled Shaft Installation Plan and demonstrated by a successful technique shaft or test shaft. Commence the concrete placement time at the mixing of the concrete and extend through to the completion of placement of the concrete in the drilled shaft excavation, including removal of any temporary casing. For wet placement methods, the placement time starts at the batching of the initial load of concrete to be placed in the shaft. Prior to concrete placement, provide test results of both a trial mix and a slump loss test conducted by an approved testing laboratory using approved methods to demonstrate that the concrete meets this defined placement time limit. Maintain the concrete mix with a slump of 4 inches or greater over the defined placement time limit as demonstrated by trial mix and slump loss tests. Conduct the trial mix and slump loss tests at ambient temperatures appropriate for site conditions. Ambient air temperature at the time of concrete placement is not permitted to be greater than the ambient temperature at the time of the concrete trial tests and slump loss tests.

Do not use admixtures such as water reducers, plasticizers, and retarders in the concrete mix unless permitted in the Contract Documents and detailed in the approved Drilled Shaft Installation Plan. Adjust all admixtures, when approved for use, for the conditions encountered on the job so the concrete remains in a workable plastic state throughout the defined placement time limit.

Throughout the underwater concrete placement operation, the discharge end of the tube must remain submerged in the concrete at least five feet and the tube must always contain enough concrete to prevent water from entering. The concrete placement must be continuous until the work is completed, resulting in a seamless, uniform shaft. If the concrete placement operation is interrupted, the Engineer may require the Contractor to prove by core drilling or other tests that the drilled shaft contains no voids or horizontal joints. If testing reveals voids or joints, repair them or replace the drilled shaft at no expense to the Department. Responsibility for coring and testing costs, and calculation of time extension, will be in accordance with Subsection (M) of this Specification.
Before placing any fresh concrete against concrete deposited in water or slurry (construction joint), remove all scum, laitance, loose gravel and sediment on the surface of the concrete deposited in water or slurry, and chip off any high spots on the surface of the existing concrete that would prevent any steel reinforcing bar cage from being placed in the position required by the Plans.

Complete a concrete yield plot for each wet shaft poured by tremie methods. This yield plot will be submitted to the Department within twenty four (24) hours of completion of the concrete pour.

It is recommended that the Contractor use concreting volume curves during concrete placement.

Do not perform casing installation or drilled shaft excavation operations within a clear distance of three diameters of a newly poured drilled shaft within twenty (24) hours of the placement of concrete and only when the concrete has reached a minimum compressive strength of 1800 psi.

L. *Tremies*. When placing concrete underwater, use a concrete pump or gravity tremie. A tremie must have a hopper at the top that empties into a watertight tube at least eight inches in diameter. If a pump is used, a watertight tube must be used with a minimum diameter of four inches. The discharge end of the tube on the tremie or concrete pump line must include a device to seal out water while the tube is first filled with concrete. In lieu of a seal at the

discharge end of the pipe, the Contractor may opt to place a "Pig" or "Rabbit" in the hopper prior to concrete placement which moves through the tremie when pushed by the concrete, forcing water or slurry from the tremie pipe.

Do not use hopper and tubes that contain aluminum parts that will have contact with the concrete. The inside and outside surfaces of the tubes must be clean and smooth to allow both flow of concrete and the unimpeded withdrawal of the tube during concrete placement.

M. *Drilled Shaft Construction Tolerances*. Construct the drilled shafts so that the center of the poured shaft at the top of the drilled shaft or mudline, whichever is lower, is within the following horizontal tolerances:

Drilled Shaft Diameter	Tolerance
Greater than 2'-0" and less than 5'-0"	4"
5 '- 0" or larger	6"

Drilled shafts in soil must be within 1.5 percent of plumb. Drilled shafts in rock must be within 2.0 percent of plumb. Plumbness will be measured from the top of poured drilled shaft elevation or mudline, whichever is lower.

During drilling or excavation of the drilled shaft, make frequent checks on the plumbness, alignment, and dimensions of the drilled shaft. Any deviation exceeding the allowable tolerances will be corrected with a procedure approved by the Engineer.

Do not allow the drilled shaft steel reinforcing bars to be higher than six inches above or three inches below the plan elevation.

The reinforcing cage must be concentric with the drilled shaft excavation within a tolerance of 1-1/2 inches.

The top elevation of the completed drilled shaft must have a tolerance of plus one inch or minus three inches.

Do not allow the diameter of the drilled shaft to be less than the diameter shown on the Plans.

Ensure that tolerances for casings are in accordance with American Pipe Institute tolerances applicable to regular steel pipe.

Drilled shaft excavations and completed drilled shafts not constructed within the required tolerances will be considered defective. The Contractor is responsible for correcting all defective drilled shafts to the satisfaction of the Engineer. Materials and work necessary, including engineering analysis and redesign, to complete corrections for out-of-tolerance drilled shafts will be furnished without either cost to the Department or an extension of the completion date of the project. Redesign drawings and computations submitted will be signed by a registered Professional Engineer licensed in the State of Delaware.

N. *Integrity Testing*. Crosshole sonic log (CSL) testing must be performed on all drilled shafts. Accommodate the crosshole sonic log testing by furnishing and installing access tubes.

Install access tubes for crosshole sonic log testing in all drilled shafts, except as otherwise noted herein, to permit access for the crosshole sonic log test probes. If, in the opinion of the Engineer, the condition of the drilled shaft excavation permits drilled shaft construction in the dry, the Engineer may specify that the testing be omitted.

Securely attach the access tubes to the interior of the reinforcement cage of the drilled shaft. Furnish and install one access tube for each foot of drilled shaft diameter, rounded to the nearest whole number, unless otherwise shown in the Plans. A minimum of three tubes will be required. Place the access tubes around the drilled shaft, inside the spiral or hoop reinforcement and centered between the adjacent vertical reinforcement, at a uniform spacing measured along the circle passing through the centers of the access tubes. If these minimums cannot be met due to close spacing of the vertical reinforcement, then bundle the access tubes with the vertical reinforcement. For drilled shafts with anchor bolts, verify CSL access tubes will not interfere with anchor bolt installation before excavating the shaft. Move CSL tube up to 2 inches to avoid conflict.

If trimming the cage is required and access tubes for crosshole sonic log testing are attached to the cage, either shift the access tubes up the cage, or cut the access tubes provided that the cut tube ends are adapted to receive the watertight cap as specified.

Install the access tubes in straight alignment and as near to parallel to the vertical axis of the reinforcement cage as possible. Extend the access tubes from the bottom of the drilled shaft to at least two feet above the top of the drilled shaft. Splice joints in the access tubes, if required to achieve full length access tubes, must be watertight. Clear the access tubes of all debris and extraneous materials before installing the access tubes. Care must be taken to prevent damaging the access tubes during reinforcement cage installation and concrete placement operations in the drilled shaft excavation.

Fill the access tubes with potable water before concrete placement, and reinstall the top watertight threaded caps.

Prior to performing any crosshole sonic log testing operations specified in this subsection, remove the concrete at the top of the drilled shaft down to sound concrete.

The Department will perform crosshole sonic log testing and analysis on all completed drilled shafts designated for testing by the Engineer. The Department will require advance notice from the Contractor to schedule all crosshole sonic log testing. The Contractor will give at least forty eight (48) hours' notice to the Engineer of the time the concrete in each drilled shaft to be sufficiently cured to allow for crosshole sonic log testing.

Perform the testing after the drilled shaft concrete has cured at least ninety six (96) hours. Additional curing time prior to testing may be required if the drilled shaft concrete contains admixtures, such as set retarding admixture or water reducing admixture. The additional curing time prior to testing required under these circumstances will not serve as grounds for additional compensation or extension of time to the Contractor. Do not perform any subsequent construction on the completed drilled shaft until the CSL tests are approved and the drilled shaft accepted by the Engineer.

After placing the drilled shaft concrete and before beginning the crosshole sonic log testing of a drilled shaft, inspect the access tubes. Replace each access tube that the test probe cannot pass through, at the Contractor's expense, with a two inch diameter hole cored through the concrete for the entire length of the drilled shaft. Unless directed otherwise by the Engineer, locate the cored holes approximately six inches inside the reinforcement and do not damage the drilled shaft reinforcement. Log descriptions of inclusions and voids in cored holes and submit a copy of the log to the Engineer. Findings from cored holes must be preserved, identified as to location, and made available for inspection by the Engineer.

The Engineer will determine final acceptance of each drilled shaft, based on the crosshole sonic log test results and analysis for the tested shafts and a review of the visual inspection reports for the subject drilled shaft, and will provide a response to the Contractor within three working days after receiving the test results and analysis submittal. The Engineer may approve continuing with drilled shaft construction prior to approval and acceptance of the first shaft if the Engineer's observations of the construction of the first shaft are satisfactory, including, but not limited to, conformance to the Drilled Shaft Installation Plan as approved by the Engineer, and the Engineer's review of Contractor's daily reports and inspector's daily logs concerning excavation, steel reinforcing bar placement, and concrete placement.

If the Engineer determines that the concrete placed under slurry for a given drilled shaft is structurally inadequate, that drilled shaft will be rejected. The placement of concrete under slurry will be suspended until the Contractor submits to the Engineer written changes to the methods of drilled shaft construction needed to prevent future structurally inadequate drilled shafts, and receives the Engineer's written approval of the submittal.

If the Engineer determines that additional investigation is necessary, or if the Contractor requests, the Engineer may direct that additional testing be performed at a drilled shaft. At the Engineer's request, drill a corehole in any questionable quality drilled shaft (as determined from crosshole sonic log testing and analysis or by observation of the Engineer) to explore the drilled shaft condition. The number, locations, diameter and depth of the core holes and lengths of individual core runs will be determined by the Engineer. Coring procedures must minimize abrasion and erosion of the core samples, and must avoid damage to the steel reinforcement. Log descriptions of inclusions and voids in cored holes and submit a copy of the log to the Engineer. Preserve the recovered core in suitably labeled wood core boxes, identified as to location and depth, and made available for inspection by the Engineer. The Engineer may direct water pressure testing in the core holes, and/or unconfined compression testing and other laboratory testing on selected samples from the concrete core.

If subsequent testing at a drilled shaft indicates the presence of a defect(s) in the drilled shaft, the testing costs and the delay costs resulting from the additional testing will be borne by the Contractor. If this additional testing indicates that the drilled shaft has no defect, the testing costs and the delay costs resulting from the additional testing will be paid by the Department, and, if the drilled shaft construction is on the critical path of the Contractor's schedule, a time extension equal to the delay created by the additional testing will be granted.

For all drilled shafts determined to be unacceptable, submit a plan for further investigation or remedial action to the Engineer for approval. All modifications to the dimensions of the drilled shafts, as shown in the Plans, required by the investigation and remedial action plan must be supported by calculations and working drawings. All investigation and remedial correction procedures and designs must be prepared by a registered Professional Engineer licensed in the State of Delaware, and submitted to the Engineer for approval. Do not begin repair operations until receiving the Engineer's written approval of the investigation and remedial action plan.

Prior to beginning coring, submit the method and equipment to be used to drill and remove cores from drilled shaft concrete to the Engineer, and do not begin coring until the Engineer's written approval has been received. The coring method and equipment will include for complete core recovery and will minimize abrasion and erosion of the core.

Dewater all access tubes and cored holes and fill with grout after tests are completed and the drilled shaft is accepted. Fill the access tubes and cored holes using grout tubes that extend to the bottom of the tube or hole or into the grout already placed.

Alternative non-destructive tests such as Gamma-Gamma, Sonic Echo/Impulse Response, or Thermal Integrity Profiling may be specified on the Plans or directed by the Engineer to use alongside, or in lieu of, CSL testing. Comply with all requirements for the alternate test methods in accordance with the Plans or Special Provisions.

O. *Drilled Shaft Load Tests*. Install test shafts at the locations shown on the Plans unless otherwise directed or approved by the Engineer.

Install test shafts to the same dimensions, details and elevations shown on the Plans, and install using the same equipment and installation procedures proposed for installation of the foundation drilled shafts.

If the equipment or procedures are changed following the completion of load testing, install additional load test shafts, and conduct additional load tests as directed by the Engineer at no additional cost to the Department.

Complete all load testing and have the results evaluated by the Engineer before installing any production drilled shafts, unless otherwise authorized by the Engineer.

1. Axial Static Load Tests. Perform static load tests in accordance with the procedures specified in ASTM D 1143.

2. Axial Force Pulse (Rapid) Load Tests. Perform force pulse (rapid) load tests in accordance with the procedures specified in ASTM D 7383.

3. Bi-Directional Load Cell Testing. Install load cells and load test instrumentation in accordance with the bi-directional load cell supplier recommendations, instructions, and procedure manual(s), as approved by the Engineer.

The bi-directional load cells must be capable of expanding to not less than 6 inches while maintaining the applied test load.

The Contractor must be responsible for coordinating with the load cell supplier to determine and/or verify all required equipment, materials, quantities, procedures, and all other applicable items necessary to complete the load testing shown on the Plans.

Furnish an acceptable pressurized gas source, a hydraulic pump, hydraulic lines, calibrated hydraulic gauge and other equipment and material necessary to perform the load tests. Furnish fresh, potable water from an approved source to form the hydraulic fluid used to pressurize the bi-directional load cells.

Furnish, install and monitor vibrating wire strain gauges as shown on the Plans and as directed by the Engineer. Place the strain gauges in pairs on opposite sides of the reinforcing cage at the elevations shown on the Plans, unless otherwise directed by the Engineer.

Attach two LVDT vibrating wire displacement gauges to each load cell to monitor the expansion and contraction of the load cell. In addition, mount two LVDT gauges on an independent reference beam and set on opposite sides of the top of the test shaft to monitor axial shaft displacement. Set two telltale rods on the top of each load cell to monitor the displacement of the top of the load cell. The telltale must consist of a 3/8-inch diameter stainless steel rod, greased for reducing friction and corrosion, and placed inside a constant 3/4-inch diameter pipe. Individual sections of telltales must be joint coupled flush so that each rod is of uniform diameter throughout its length.

Furnish a portable computer and electronic logging equipment to simultaneously monitor all instrumentation at time intervals designated by the Engineer.

Assemble the load cells, piping and other attachments in preparation for installation in accordance with the requirements of the bi-directional load cell supplier, unless otherwise specified herein or directed by the Engineer. The following guidelines must be followed.

a. Weld steel top and bottom bearing plates to the load cells. Provide holes through the bearing plates, as appropriate, to facilitate placement of tremie concrete.

b. Coat the upper surface of the bottom steel bearing plate with grease prior to installation into the shaft, to prevent concrete bonding with the bottom plate.

c. Attach the load cells and plate assembly to the reinforcement cage. Securely fasten all hydraulic hoses, telltale casing, slip joints, etc. to the rebar cage. Prior to installation into the drilled shaft excavation, protect the top of any piping to keep dirt, concrete or other deleterious materials from entering the piping.

d. Limit the deflection of the cage to a maximum of 2 feet between pick points while lifting the cage from the horizontal position to vertical. Provide additional support, bracing, strong backs, etc. to maintain the deflection within the specified tolerance.

For each load test, place the load on the drilled shaft in increments of five percent of the estimated maximum test load shown on the Plans, or until the nominal resistance load (as indicated by the instruments) is approached, or to the maximum capacity of the load cell, whichever occurs first. Unless the maximum capacity of the load cell has been reached, apply increments of 2.5 percent of the estimated maximum test load until the limiting load is attained, or the drilled shaft top displacement reaches 2 inches, or to the maximum extension of the load cell. When the load cell will be used for a subsequent loading stage, the Engineer may interrupt the loading sequence at a load cell opening of approximately 3 inches, or less. Maintain each load increment for a minimum period of 5 minutes, with complete sets of readings obtained and recorded from all gauges and instruments at 1, 2 and 5 minutes after application of the load increment. Apply each increment of load within the minimum length of time practical and take the instrument system readings immediately. It is intended that the addition of a load increment and the completion of the instrument system readings be completed within 5 to 15 minutes. The Engineer may elect to hold the maximum applied load for up to one hour.

Remove the load in decrements of about 10 percent of the maximum test load. Remove each decrement of load within the minimum length of time practical and take the instrument system readings immediately. It is intended that the removal of a load decrement and the completion of the instrument system readings be completed within 5 to 15 minutes. The Engineer may also require a reloading cycle with ten loading increments and five unloading decrements. Record the final recovery of the drilled shaft for a period up to one hour after the last unload interval.

Submit a preliminary test report containing the load displacement curves and other test data to the Engineer within three days of completing each load test. Submit the final report on the load tests to the Engineer within ten days after completion of each load test. Include at least the following items in the test report:

a. Test shaft identification number and location.
b. Date(s) of testing.
c. Description of the test shaft details, instrumentation and test procedures.
d. Tables presenting all instrumentation data.
e. Plots of load versus displacement (up and down) for each load cell level, for each stage of the test.
f. Plots of load along the length of the drilled shaft determined from the strain gauge data for at least ten applied load increments.
g. Summary of unit side resistance along the length of the drilled shaft and end bearing resistance.
h. Plots of creep displacement for each load increment.
i. Plot of equivalent top-of-shaft displacement for the test shaft, developed from the load test data.

After completion of the load test to the satisfaction of the Engineer, and when authorized in writing by the Engineer, flush all hydraulic fluid from the bi-directional load cells and hydraulic lines, and replace with cement grout in accordance with the approved Drilled Shaft Installation Plan. Also grout any voids remaining outside the load cells after completion of the load test.

P. *Technique Shafts*. Demonstrate the adequacy of its methods, techniques and equipment by successfully constructing a technique shaft or shafts in accordance with the requirements shown on the Plans and these Specifications. Position the technique shaft(s) at the location(s) shown on the Plans or as directed by the Engineer, but not less than a clear distance of three drilled shaft diameters from the closest production shaft. Drill the technique shaft(s) to the maximum diameter and maximum depth of any production drilled shaft shown in the Plans. Unless shown otherwise on the Plans, reinforce the technique shaft(s) with the same reinforcement as the corresponding size production shaft, and also include CSL tubes as specified herein. Technique shaft(s) must be completed and accepted by the Engineer prior to initiating installation of the load test shafts and foundation drilled shafts. Failure by the Contractor to demonstrate to the Engineer the adequacy of methods and equipment will be

reason for the Engineer to require alterations in equipment and/or method by the Contractor to eliminate unsatisfactory results. Any additional technique shaft(s) required demonstrating the adequacy of altered methods or construction equipment will be at the Contractor's expense. Once approval has been given by the Engineer to construct production drilled shafts, no changes will be permitted in the methods or equipment used to construct the satisfactory technique shaft(s) without the written approval of the Engineer.

The technique shaft(s) will be used by the Engineer to determine if the Contractor can:

1. Control dimensions and alignment of excavations within tolerance.
2. Install casing and remove temporary casing.
3. Seal the casing into impervious materials.
4. Control the size of the excavation under caving conditions by the use of a mineral or polymer slurry or by other means.
5. Properly clean the completed drilled shaft excavation.
6. Construct drilled shafts in open water areas.
7. Handle and install reinforcing cages.
8. Satisfactorily place concrete meeting the Specification requirements within the prescribed time limit.
9. Satisfactorily execute any other necessary construction operation.

When authorized in writing by the Engineer, cut off the technique shaft(s) not less than 2 feet below finished grade and left in place. Restore the disturbed areas at the sites of the technique shaft(s) as nearly as practical to their original condition.

Method of Measurement:

A. The Engineer will measure drilled shafts by the length in linear feet from the plan top of shaft elevation to the final bottom of shaft elevation. The Engineer will not separately measure excavation, blasting, slurry, reinforcing steel, concrete, grout, integrity testing tubes, or non-destructive testing.

B. The Engineer will measure technique shafts by the length in linear feet from the existing ground surface elevation at the center of the trial shaft hole prior to drilling to the authorized bottom elevation of the hole. The Engineer will not separately measure excavation, blasting, slurry, reinforcing steel, concrete, grout, integrity testing tubes, or non-destructive testing.

C. The Engineer will measure permanent casing by the length in linear feet of each size casing used, as measured along the casing from the top of the shaft elevation or the top of casing, whichever is lower, to the bottom of the casing.

D. The Engineer will measure load tests by the number of load tests completed according to the specified loading procedures and to the designated maximum load shown on the plans. Payment will include all costs related to the performance of the load test and for the reporting of procedures and results.

E. The Engineer will measure exploratory drilling by the length in linear feet from the ground elevation where the drilling begins to the bottom of the exploration hole.

Basis of Payment:

Drilled shafts will be paid for at the contract unit price per linear foot, complete-in-place, and accepted by the Engineer. Such payment will be considered to be full compensation for all costs involved with shaft excavation, using slurry when necessary, removal from the site and disposal of excavated material, the furnishing and placing of concrete and reinforcing steel including all labor, materials, equipment, temporary and permanent casing, Integrity Testing, and incidentals necessary to complete the drilled shafts to the diameters and depths under the Contract Documents. Additional compensation will not be allowed for concrete required to fill oversized excavations and casings.

Rock sockets including furnishing and setup of rock socket equipment, drilling, dewatering, inspecting, testing, the furnishing and placing of concrete and reinforcing steel including all labor, materials, and equipment. will be paid for at the Contract price per linear foot for each diameter of rock

socket for the pertinent Rock Socket item. The final length will be determined as the difference between the top of the rock socket elevation shown on the plans or as determined by DelDOT and the final bottom of the surface of the rock socket excavation elevation, as determined and authorized, complete, and accepted by DelDOT.

8/24/15

619519 - DYNAMIC PILE TESTING BY CONTRACTOR

Description:

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

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

Materials and Construction Methods:

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

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

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

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

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

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

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

All dynamically tested piles shall be driven to an adequate depth to achieve the minimum tip elevation and the minimum initial driving resistance specified by the Engineer. Should the field data indicate the hammer system is not transferring to the pile the full energy anticipated at the end of initial drive, the Contractor shall increase the hammer stroke and/or driving resistance until the minimum initial drive capacity is displayed on the dynamic testing apparatus. However, in no case, shall the permissible stress limits be exceeded.

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

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

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

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

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

Reporting

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

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

Within three (3) working days of the completion of each dynamic test, the Contractor's specialty subcontractor shall submit to the Department a report meeting the requirements of this Special Provision that is signed and sealed by a Professional Engineer licensed in the State of Delaware. In addition to the raw data and ASTM D4945 requirements, the report shall include detailed results of the CAPWAP analyses including, but not limited to, all extrema tables; pile profile and pile model tables; simulated load test curves for the tip and top of the pile; the soil parameters used in the analysis by matching the measured and computed values of forces, velocities, and displacements; and static resistance distribution along the length of the pile, in a format approved by the Engineer.

All raw data and computer analyses shall be made available in electronic format to the Department for additional analysis. The Engineer shall furnish to the Contractor production pile driving criteria and recommended pile order lengths within three (3) working days of receiving complete and acceptable high-strain dynamic testing reports for all associated test piles within the subject pile group.

Method of Measurement:

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

Basis of Payment:

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

10/22/07

705530 – TRIANGULAR CHANNELIZING ISLANDS

Description:

Furnish all materials to construct Triangular Channelizing Island(s) on a prepared foundation as shown on the details in Plans, at the location(s) shown on the Plans, and/or as directed by the Engineer.

Materials:

Provide materials as specified in:

Graded Aggregate Base Course	Section 302
Bituminous Pavement	Section 401
Bituminous Patching	Section 406
Portland Cement Concrete	Section 812, Class B
Expansion Joint Material	Subsection 808.06
Curing Compound	Subsection 812.02 (i)
Delineator	As Submitted and approved by Engineer

General: Submit all proposed sources of materials to Materials and Research Section in accordance with Subsection 106.01.

Construction Methods:

A. Construction of Triangular Channelizing Island(s)

1. Sawcut existing bituminous concrete pavement or PCC pavement, if applicable;
   a. For bituminous concrete pavements, sawcut 2' minimum from the proposed face of curb of the island to allow enough room to achieve compaction for hot-mix patching;
   b. For PCC pavement, sawcut at the proposed face of curb.

2. Remove bituminous concrete pavement or PCC pavement and dispose of in accordance with Subsection 106.09 and/or permits, if applicable;

3. Prepare the foundation for the curb in accordance with Subsections 701.05;

4. Place Graded Aggregate Base Course (GABC) for curb installation at the location and depths shown on the plans in accordance with Section 302;

5. Layout and pour PCC Curb Type II in accordance with Section 701 unless otherwise specified on the plans or directed by the Engineer;
   a. Finish curb in accordance with Subsection 701.11;
   b. Cure curb in accordance with Subsection 701.13;
   c. Backfill curb in accordance with Subsection 701.14 after removal of forms, or upon completion of slip-form operation;

6. Prepare the foundation for the sidewalk in accordance with Subsection 705.05;

7. Place concrete for sidewalk at depth(s) shown on plans in accordance with Section 705;
   a. Install 4" PVC sleeve for signs at locations shown on plans;

8. Construct Curb Ramps, if applicable, in accordance with the requirements of the Standard Construction Details, any modifications on the plans and to all the applicable requirements of Section(s) 302 and 705 of the Standard Specifications.

9. Furnish and install Sidewalk Surface Detectable Warning System, if applicable, in accordance with the requirements of the Standard Construction Details and to all the applicable requirements of Section 705.

10. Perform bituminous concrete patching in accordance with Section 406 and/or PCC patching in accordance with Section 503, if applicable, as shown on plans or otherwise match existing pavement structure;

11. Furnish and install Delineator(s) on the leading ends/corners of the island(s).

Method of Measurement:

The quantity of Triangular Channelizing Island(s) will be measured as the number of square foot (square meter), from face of curb to face of curb, of Triangular Channelizing Island(s) installed and accepted.

Sidewalk Surface Detectable Warning System will be measured and paid for under Item No. 705007.

Basis of Payment:

The quantity of Triangular Channelizing Island(s) will be paid for at the Contract unit price per square foot (square meter). Price and payment constitutes full compensation for sawcutting hot-mix, sawcutting concrete full depth, removal and disposal of existing materials, foundation preparation, furnishing and placing all materials including but not limited to; GABC, concrete for curb and sidewalk, expansion joint material, the construction of curb ramps within the limits of the island, bituminous pavement and/or PCC pavement patching, for furnishing and installing delineator(s) and for all labor, tools, and incidentals necessary to complete the work.

No additional payment will be made under other contract items for work necessary to construct the island except Item No. 705007 - Sidewalk Surface Detectable Warning System.

Note: The curb and sidewalk components are not to be placed monolithically unless otherwise directed by the Plans or the Engineer.

10/25/2013

710506 - ADJUST AND REPAIR EXISTING SANITARY MANHOLE

Description:

This work consists of adjusting and repairing existing sanitary manholes in accordance with notes and details on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Materials and construction methods shall conform to the applicable requirements of Section 710 of the Standard Specifications, and the Standard Specifications of the owner of the sewer system. If there is a conflict between the Department's Specifications and the Specifications of the owner, the latter will prevail.

Method of Measurement and Basis of Payment:

The method of measurement and basis of payment for the item shall be made in accordance with Subsections 710.09 and 710.10 of the Standard Specifications.

8/28/01

712506 - GABIONS

Description:

The item shall consist of furnishing all materials and assembling, filling open wire baskets with aggregate forming gabions of the type indicated on the Plans and as directed by the Engineer.

Materials:

Materials for the gabions include stone, wire baskets and filter cloth.

Stone for gabions shall be hard, durable, angular in shape; resistant to weathering and to water action; free from overburden, spoil, shale, slate and organic material; and shall meet the size requirements below:

Gabion Height	Aggregate Size
Less than 1 ft	3 - 5 inch
1 ft or over	4 - 8 inch

QUALITY REQUIREMENTS

Test and Method	Specification Limits
Apparent Specific Gravity, AASHTO T 85, min.	2.50
Absorption, AASHTO T 85, % max.	3.00
Sodium Sulfate Soundness, 5 cycles, 63-37.5 mm (2 1/2 - 1 1/2 in.) Aggregate - AASHTO T 104, % max. loss	12.00

Wire for gabions shall have a minimum tensile strength of 60,000 psi when tested in accordance with ASTM A370. The netting shall have a minimum 12 percent elongation and a minimum 4,000 lb. load bearing resistance, and shall have galvanized or zinc coating of not less than 0.8 oz/ft when tested in accordance with AASHTO T 65 and extruded with a coating of poly vinyl chloride (nominal thickness of 0.02165 inches).

Filter fabric shall be AMOCO 4551 or MIRAFI 160N or Exxon 150D or approved equal.

Construction Methods:

Excavation shall be made in reasonably close conformity with the lines and grades shown on the Plans. The subgrade shall be smooth, firm and free from protruding objects or voids that would affect the proper placement of the wire baskets or damage the filter fabric when one is specified.

When filter fabric is specified on the Plans, it shall be carefully and loosely placed on the prepared subgrade and held in place by methods acceptable to the Engineer. Adjacent strips shall be overlapped by a minimum of 8 in. Care shall be exercised in placing, stretching and holding the empty basket units in good alignment in order to avoid damage to the cloth. If the filter fabric should be torn or damaged, it shall be replaced or repaired at the Contractor's expense.

The empty wire basket units shall be set on the prepared subgrade and the vertical ends bound together with wire ties at spacings that are adequate to permit stretching of the units to remove kinks. Stretching methods shall be optional with the Contractor. The use of stakes, pins or other acceptable methods shall be used to insure a good alignment of the empty wire basket units.

The empty basket units shall be filled carefully with stone placed by hand or machine to assure good alignment with a minimum of voids between stones and to avoid bulging of mesh. The maximum height from which the stone may be dropped into the units shall be 36 in. The stone shall be so placed as to provide a minimum of two courses. Care shall be taken in placing the top layer of stone to assure a uniform surface thus avoiding any bulging of the lid mesh. After a basket unit has been filled, its lid shall be bent over until it meets the ends of the unit. The lid shall then be secured to the sides and ends with wire ties. When a complete basket unit cannot be installed on slopes or channels because of space limitations, the basket unit shall be cut to fit in the manner approved by the Engineer.

Any excavation voids existing along the edges of the completed gabions shall be backfilled to the satisfaction of the Engineer.

Method of Measurement:

The measurement of gabions, will be by the Cubic Yard of stone filled wire baskets.

Basis of Payment:

The payment for the accepted quantities of gabions as measured above, shall be at the contract unit price bid per Cubic Yard for "Gabions", complete in place, which prices and payment shall be full compensation for excavation, filter fabric, when specified, disposal of surplus materials, backfill, backfilling, as well as all labor, materials, equipment, tools and incidentals necessary to complete the work.

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

720556 - BOLLARD

Description:

This work consists of furnishing and installing a removable timber bollard in accordance with the notes, Standard Construction Details and as directed by the Engineer.

Materials and Construction Methods:

The bollard shall be made of seasoned uniform, and straight timber conforming to the requirements of Section 601 and treated with the water borne preservative chromated copper arsenate in accordance with Section 814.

Concrete shall be Class B conforming to the requirements of Section 612.

Reflector panels, if required, shall conform to the requirements of Section 749.

Steel housing for accommodating the bollard shall be galvanized and installed in the hole in vertical position on a 6 (150 mm) bed of stone and encased with concrete as shown on the Standard Construction Details and/or as directed. All hardware shall be galvanized steel.

Method of Measurement:

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

Basis of Payment:

The quantity of bollards will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing and placing all materials, including stone, steel housing and hardware, reflector panels as shown on the Standard Construction Details, timber and concrete, excavation, backfilling, disposing of the surplus material, for all labor, tools, equipment and necessary incidentals to complete the work.

1/29/02

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 25:1 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.

8/12/2013

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

727555 - RIGHT-OF-WAY MARKER, CAPPED REBAR

Description:

Furnish necessary materials and labor to set at the locations shown on the Plans, and as directed by the Engineer.

Materials:

Provide Right-of-Way Marker, Capped Rebar constructed in accordance with the details shown in the Standard Construction Details using materials specified in:

Bar Reinforcement	Section 603
Aluminum 2" Flat Survey Marker for Rebar	As Submitted and approved by Engineer

Construction Methods:

A. Exact location to be set by a Delaware Professional Land Surveyor in accordance with the plans or as directed by the Engineer;
B. Place Rebar in a vertical position at depth shown on the plans;
C. Place Aluminum 2" flat survey marker on rebar taking care not to move the location of the rebar.

Method of Measurement:

Right-of-Way Marker, Capped Rebar will be measured as the actual number of Right-of-Way Marker, Capped Rebar set and accepted.

Basis of Payment:

The quantity of Right-of-Way Marker, Capped Rebar will be paid for at the Contract unit price per Each. Price and payment will constitute full compensation for furnishing all materials required and setting the Right-of-Way Marker, Capped Rebar by a Delaware Professional Land Surveyor and any incidentals necessary to complete the item. Existing Right-of-Way Marker, Capped Rebar damaged will be replaced as required by Subsection 107.09 of the Standard Specifications and will be repaired, replaced, and set at the Contractor's expense.

9/15/11

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

745601 – FURNISH & INSTALL UP TO 3" FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT
745602 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)
745603 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (OPEN CUT)
745604 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)
745605 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (ON STRUCTURE)
745606 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (TRENCH)
745607 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (BORE)
745608 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (OPEN CUT)
745609 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (ON STRUCTURE)
745610 - FURNISH & INSTALL UP TO 4" NONMETALLIC POLE RISER SHIELD

Description:

Furnish and install HDPE, PVC, or Galvanized steel conduits of any size less than or equal to 4 inches in diameter (3 inches or less for Flexible Metallic Liquidtight Conduit) as described below.

Materials:

All conduits shall be UL listed.

HDPE Conduit - 4" or less diameter, high density polyethylene (HDPE) schedule 80, smooth wall conduit with permanently pre-lubricated lining, meeting ASTM D2447, ASTM D3035 and NEMA TC7 specifications.

PVC Conduit - 4" or less diameter, schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

Galvanized Steel Conduit - 4" or less diameter, rigid galvanized steel conduit meeting National Electric Code 2002, Article 344.

Nonmetallic Pole Riser Shield – 4" diameter or less nonmetallic pole riser shield with belled ends meeting NEMA TC-19 specifications.

Flexible Metallic-Liquidtight Conduit – meets National Electric Code 2002, Article 350

Weatherhead for galvanized or PVC conduit – material shall match the adjoining conduit

Insulated grounding bushing with knockouts - meet or exceed UL 514 B

Condulets for conduit sizes - material shall match the adjoining conduit

Anchors - A 307, Galvanized per A 153

One hole conduit hangers - Steel City Series 6H or 6H-B, CADDY CD3B Rigid Conduit Hanger, or approved equal

End caps - material shall match the adjoining conduit

LONG sweep sections for conduit sizes - material shall match the adjoining conduit, and shall be manufactured 90 degree sweeping bends.

Construction Methods:

General Installation Requirements - The Department has the right to reject any installation method proposed for a given work site. PVC shall not be installed under existing pavement unless it is on a continuous roll or with the Engineer's written approval.

Conduit installed underground shall be installed in a straight line between terminal points. In straight runs, junction well spacing shall be no more than 600 feet for fiber optic conduit or no more than 300 feet for copper in conduit, or as directed by the Engineer. If bends are required during installation, they must be manufactured sweeping bends. The Engineer will be consulted before any bends are installed to ensure that the proper arc is provided.

Conduit shall have a minimum cover as measured from the finished grade of 24 inches and a maximum cover of 48 inches.

The opening shall be filled half way with the cover material, and tamped down firmly before filling in the remainder of the opening. Additional lifts shall be used as required to install the metallic warning tape at the specified depth. All cover material shall be free of rocks, debris, vegetation or other deleterious material that may damage the conduit. An underground utility warning tape shall be installed as specified in this section and the remainder of the fill shall be added, tamping down the top layer.

Conduit not terminated to a base or in a junction well shall be terminated 2 feet beyond the edge of the pavement unless otherwise directed by the Engineer, and properly capped. Tape is NOT an approved method. Conduit shall not extend more than 3 inches inside a junction well. See Standard Construction Details or applicable Plan Details for typical methods of termination.

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

The color of the metallic warning tape identifying fiber optic cable should be bright orange (preferably AULCC orange), and shall read "WARNING - OPTICAL CABLE" or other wording approved by the Engineer that conveys the same message. The color of the tape identifying all other cables shall be bright red, and shall read "WARNING —BURIED ELECTRIC BELOW" or other wording approved by the Engineer that conveys the same message.

Using conduit tools, rigid metallic conduit shall be cut, reamed, and threaded. The thread length shall be as necessary to ensure that the sections of conduits when screwed into a coupling and tightened correctly will butt together and the joint will be watertight. A three-piece threaded union, as approved by the Engineer, shall be used to join two threaded lengths of conduit in the case where a standard coupling will not work. A threaded union shall not be used in a conduit run that is to be driven. At no time is a threadless coupling or a split-bolt coupling to be used for direct buried conduit.

All lengths of HDPE conduit shall be connected with irreversible fusion couplings. Mechanical and removable couplings will not be accepted.

All lengths of PVC conduit shall be connected by one conduit end fitting inside the flared end of the other conduit section. If this is not possible, then a coupling may be used. Regardless of how connection is made, all joints shall be sealed with the appropriate epoxy to ensure that the two conduit pieces bond to one another to form a solid waterproof link. Using conduit tools, the conduit shall be cut and prepared. If approved by the Engineer, a coupler module may be used where conduit segments do not align properly to allow the flared end of one conduit segment to mate with the normal end of the other segment.

Sealed end caps (with knockouts if empty) shall be placed on the ends of all conduits, after compressed air has been used to clear all foreign matter.

If not already pre-installed by the manufacturer, a polyester or polypropylene pulling rope or tape (fish wire) with a minimum rated strength of 1250 pounds shall be installed in each conduit for future use. In instances where the Contractor installs the cable, the fish wire may be eliminated.

All PVC and HDPE conduits shall have a continuous metallic trace wire installed for the entire length of the conduit run for all fiber installations.

Installation Of Conduit Under Existing Pavement, Directional Bore -

Directional bore shall be used for installation of conduits under existing pavement with a conduit diameter not less than 1-1/2". The size of a bore shall not exceed the outside diameter of the conduit by more than 1 inch. If it does, cement grout shall be pumped into the void. **Only HDPE and/or Galvanized Steel conduit may be installed by Directional Bore methods.**

Installation Of Conduit Under Existing Pavement, Open Cut -

Installation by sawcutting the full pavement depth and removing the existing pavement with an excavator or by hand methods, shall be used only for conduits not less than 1-1/2" diameter. The Engineer must first approve all open cutting of roadways. The width and length of open cut and patch restoration materials shall be as shown on the plan details. The Contractor shall be responsible for the removal of all cut pavement and surplus excavation, and for the replacement and correction of any damaged pavement outside the sawcut limits after the conduit(s) are installed. Asphalt pavement, concrete, base course, sawcutting, and/or borrow from an outside source as required to restore the roadway will be paid for separately under their respective bid items.

Installation Of Conduit Under New Pavement, Unpaved Trench -

Trenching or other approved method shall be used for installation of conduit in unpaved trench or under new pavement. Backfill in conduit trenches shall be compacted thoroughly as it is being placed. At the discretion of the Engineer, sod, that must be removed for the placement of conduit, shall be removed either by the use of an approved sod cutter and then replaced, or 6 inches of topsoil shall be placed and the surface seeded in accordance with Section 908 - Seeding. In areas where new pavement is to be placed or in areas where total reconstruction is taking place, sodding or seeding may not be required by the Engineer. Sodding and/or topsoil from an outside source if required will be paid for separately under their respective bid items. Seeding is considered incidental to the conduit item.

Installation Of Conduit On Structure -

Conduit installed on structure shall consist of 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 apart. Any 90-degree turns in the conduit run shall be accomplished by placing the proper size and type manufactured sweeping bends for the application needed.

Installation of Nonmetallic Riser Shield or Flexible Metallic Liquidtight Conduit -

Riser Shield and/or Flexible Metallic Liquidtight Conduit installed on wood poles, metal poles, structures, and/or mast arms shall be installed in a straight line. The conduit, when attached to poles, shall be attached with 2-hole straps spaced not more than 36 inches apart with the top-most strap being 12 inches from the weatherhead and the lower-most being 12 inches from the condulet. A weatherhead matching the diameter of the conduit shall be installed on the upper end of the conduit. A condulet of the same size as the conduit being installed, but not smaller than 2 inches shall be placed 48 inches above finished grade. Install two, 2-hole straps of the proper size, evenly spaced below the condulet. Nonmetallic pole risers (U-guard) shall be installed on poles to allow interduct to be connected directly to messenger cable. The underground conduit shall be as close to the base of the pole as possible. If the nonmetallic pole riser or metallic liquidtight conduit is not the same size as the conduit, an adapter shall be used at no additional cost to the Department. The nonmetallic pole riser or metallic liquidtight conduit shall be attached to the pole with 1/4" x 1-1/2" galvanized lag bolts with washers. Lag bolts will be used every 36 inches on BOTH sides of the nonmetallic pole riser or liquidtight conduit, and in the top most and bottom most set of slots. Flexible metallic liquidtight conduit shown on the plans to be installed on mast arms or on metal structure shall also include stainless steel banding placed at a maximum of 5 feet intervals.

Method of Measurement:

The quantity of conduit or riser shield installed as specified, shall be measured as the number of linear feet of each conduit or riser shield installed as specified, complete in place, and accepted.

The length of each conduit installed under existing pavement by a directional bore or by open cutting the pavement shall be measured along the path of the bore or open cut, from the point that cannot be trenched to the point that trenching can resume.
The length of any conduit that is reduced or divided (with a junction well or conduit body) shall be measured as part of the larger conduit.

Basis of Payment:

The quantity of conduit or riser shield will be paid for at the Contract unit price per linear foot. Price and payment shall include full compensation for furnishing all conduit and/or riser shield materials, equipment, labor, and incidentals necessary to complete the item.

For conduit installed by Directional Bore, the linear foot payment also includes excavation and backfilling for Bore Equipment, placing the conduit, caps if required, and all other requirements and incidentals listed in the body of this specification.

For conduit installed by Open Cutting existing pavement, the linear foot payment also includes excavating, backfilling, placing the conduit, disposal of excess materials, and all other requirements and incidentals listed in the body of this specification.

For conduit installed in an Unpaved Trench, the linear foot payment also includes excavating, removal of sod if required, backfilling, placing the conduit, disposal of excess materials, replacing excavated on-site sod if required, seeding if required, and all other requirements and incidentals listed in the body of this specification. Sod and/or topsoil furnished from an outside source, will be paid for separately.

For conduit installed on a structure, the linear foot payment also includes furnishing and installing anchors and hangers, removal of excess materials, and all other requirements and incidentals listed in the body of this specification.

For riser shield or flexible metallic conduit installed on poles, mast arms, or structures the linear foot payment also includes furnishing and installing straps, weatherhead, condulet, lag bolts and washers, any other required mounting hardware, and all other requirements and incidentals listed in the body of this specification.

7/20/15

746511 - CABLES, 1/#4 AWG
746512 - CABLES, 1/#6 AWG
746513 - CABLES, 1/#8 AWG
746514 - CABLES, 1/#10 AWG
746515 - INSULATED GROUND CABLE, 1/#6
746527 - CABLES, 1/#2 AWG
746543 - CABLES, 1/#9 AWG
746546 - CABLES, 1/#12 AWG
746564 - INSULATED GROUND CABLE, 1/#4
746565 - CABLES, 1/#3/0 AWG
746566 - CABLES, 1/#1 AWG
746567 - CABLES, 1/#1/0 AWG
746577 - INSULATED GROUND CABLE, 1/#8
746598 - INSULATED GROUND CABLE, 1/#2
746605 - INSULATED GROUND CABLE, 1/#10
746622 - CABLES, 1/#4/0 AWG
746658 - INSULATED GROUND CABLE, 1/#1/0
746690 - INSULATED GROUND CABLE 1/#12
746817 - CABLES, 1/#2/0 AWG
746861 - INSULATED GROUND CABLES, 1/350 KCMIL

Description:

This work consists of furnishing all cables of the size(s) required by the Contract in accordance with the notes and details shown on the Plans and/or as directed by the Engineer.

Materials and Construction Methods:

All wire(s) to be used in this contract shall be manufactured in conformance with the National Electrical Code, insulated for 600 volts, and be of the type USE and/or RHW.

Method of Measurement:

The quantity of cables will be measured as the number of linear feet (linear meters) of each size along the longitudinal axis of each cable.

Basis of Payment:

The quantity of cables will be paid for at the Contract price per linear foot (linear meter). Price and payment will constitute full compensation for furnishing the cables.

No separate payment will be made for furnishing the connector kits with #10 AWG wiring of the type as indicated on the plan for the lighting standards as shall be included in the items for lighting standards.

9/09/2010

746516 - SERVICE INSTALLATION

Description:

This work consists of furnishing all materials, and making connections to the pole bases of the street lights and/or overhead signs and/or traffic signals, etc., from the existing utility poles in accordance with the notes and details on the Plans and/or as directed by the Engineer.

Materials and Construction Methods:

All electrical materials including 2/#2 AWG ground copper wire shall conform to the requirements of the National Electric Code of the National Fire Protection Association, to all local and Special laws, and/or to ordinances governing such installation. When 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 cuttings for all electrical and related materials shall be submitted by the Contractor for approval.

The Contractor will be required to consult and make all arrangements with the Owner of the Utility Company as specified on the Plans and/or as directed by the Engineer to determine the actual location(s) of the electrical service(s) prior to beginning any work. After a location has been determined the Contractor will be required to install a conduit riser with weatherhead unless otherwise shown on the Plans or as directed by the Engineer. The Contractor will also supply and install the service cable as requested by the Owner of the electrical utility as part of this item. Extra cable will be coiled at the weatherhead for the Owner to connect to the power supply.

Method of Measurement:

The quantity of service installations will be measured as the actual number of service installations completed and accepted under the terms of this Contract.

Basis of Payment:

The quantity of service installations will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all materials, installation of conduit risers, pull boxes, cable, all incidentals, equipment, tools and labor necessary to complete the installation to the satisfaction of the Engineer.

The payment for the item shall also include furnishing and installation of approved service-disconnect at the utility pole or at the directed location with appropriate fuses.

08/30/01

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, 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 ft^2 (0.3m^2). Computations confirming conformance with AASHTO Specifications, with the year of the edition specified, shall be submitted to the Delaware Department of Transportation.

All electrical materials shall conform to the requirements of the National Electrical Code of the national Fire Protection Association, and shall conform to all local and special laws and/or ordinances governing such installations. Where these requirements do not govern, and where not otherwise specified, electrical materials shall conform to the Standardization Rules of the Institute of Electrical and Electronic Engineers.

Shop drawings and catalog cuts for all electrical and related materials shall be submitted by the Contractor for approval.

The bolts are to be supplied by the Contractor. The bolts will be installed using a template, and set so that luminaire arm is perpendicular to the roadway.

Anchor bolts, nuts, couplings, washers, and cap screws shall be of carbon steel conforming to the requirements of ASTM A307, and hot-dip galvanized in accordance with AASHTO M 232/M 232M..

New aluminum lighting standards shall consist of a tapered aluminum shaft having a base welded to the lower end. The pole shaft, pole extensions, and davit arms shall each be spun from one piece of seamless tubing, the strut and arm plates shall be extruded, all of which conform to the requirements of ASTM B221 aluminum alloy 6063-T6. The shaft shall have no circumferential welds, except at the lower end joining the shaft to the base and shall conform to the dimensions listed in the chart below. The shaft shall contain an internal vibration dampening device positioned approximately 2/3 the height of the pole. The top of the lighting standard shaft shall be drilled for two 1/2" (13 mm) lockbolts to secure the davit bracket to the lighting standard shaft. If the pole is not placed on a transformer base, it will have one 3" x 5" (75 mm x 125 mm) handhole which after pole is set should face so that maintainer may view oncoming traffic.

HEIGHT OF POLE	DAVIT ARM LENGTH	OUTER DIAMETER	WALL THICKNESS
30' (9 m)	10' (3.0 m)	10" (250 mm)	0.156" (3.96 mm)
	12' (3.6 m)	10" (250 mm)	0.156" (3.96 mm)

HEIGHT OF POLE	DAVIT ARM LENGTH	OUTER DIAMETER	WALL THICKNESS
	15' (4.6 m)	10" (250 mm)	0.156" (3.96 mm)
	20' (6.1 m)	10" (250 mm)	0.156" (3.96 mm)
35' (10.5 m)	10' (3.0 m)	10" (250 mm)	0.156" (3.96 mm)
	12' (3.6 m)	10" (250 mm)	0.156" (3.96 mm)
	15' (4.6 m)	10" (250 mm)	0.156" (3.96 mm)
	20' (6.1 m)	10" (250 mm)	0.188" (4.78 mm)
40' (12 m)	10' (3.0 m)	10" (250 mm)	0.188" (4.78 mm)
	12' (3.6 m)	10" (250 mm)	0.188" (4.78 mm)
	15' (4.6 m)	10" (250 mm)	0.188" (4.78 mm)
	20' (6.1 m)	10" (250 mm)	0.219" (5.56 mm)
45' (13.5 m)	10' (3.0 m)	10" (250 mm)	0.188" (4.78 mm)
	12' (3.6 m)	10" (250 mm)	0.188" (4.78 mm
	15' (4.6 m)	10" (250 mm)	0.188" (4.78 mm)
	20' (6.1 m)	10" (250 mm)	0.250" (6.35 mm)

Bracket arms shall be of the davit type consisting of an aluminum shaft having the outer diameter and wall thickness as listed in the table above. The davit arm shall be designed to slip over the top of the lighting standard shaft for a distance of at least 12" (300 mm). The luminaire end of the davit arm shall be fitted with a 2" (50 mm) NPS aluminum pipe not less than 6" (150 mm) long. The height of the lighting standards will be determined by the Contractor to provide a nominal mounting height as shown on the Plans. The length of the davit arm will be as shown on the Plans 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 which shall be 2" x 4" (50 mm by 100 mm) fabricated from clear anodized 1/16" (1.6 mm) thick aluminum. The edge shall be smooth and corners rounded and the tag shall be curved to fit the light standard shaft. Tags shall be secured to shafts by means of four (4) 1/8" (3 mm) diameter 18-8 stainless steel round head drive screws of self-tapping screws. The embossed identifying letters and/or numerals shall be not less than 3/4" (19 mm) high with stroke of not less than 3/16" (4.8 mm). Identifying letters and/or numerals shall be designated on the Plans.

Transformer Base: Transformer bases, when required, 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: The luminaire shall have a precision die cast aluminum housing with an optical assembly, a removable mounting door and of wattage and type as specified on the Plans. The luminaire shall be of the multi-voltage ballast regulator type.

The refractor of the optical assembly shall be attached to the luminaire housing thru a hinge and latch arrangement. The optical assembly shall consist of a highly polished aluminum reflector, and a heat resistant shatter resistant borosilicate glass refractor. The refractor door shall be tightly sealed with an appropriate gasket. 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.

The luminaire shall be equipped with a porcelain, corrosion resistant socket. The socket shall be easily adjustable to give one of twelve 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 of luminaire if not indicated.

The luminaire shall have a 2 bolt slipfitting suitable for mounting on 1/2" to 2" (13 mm to 50 mm) pipe. The luminaire shall be designed with a leveling pad and capable of being adjusted $\pm$5 degrees for proper leveling.

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.

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.

All major electrical components, including ballast and the photoelectric control, shall be mounted on a removable door assembly and connected to the fixture electrically through a quick disconnect plug. The removal of the door shall be accomplished by loosening the captive screw and unplugging the quick disconnect plug. The luminaire shall employ solderless push-on type connectors for all wiring connections to facilitate the replacement of any component.

The unit shall contain an integral ballast capable of maintaining the wattage of the H.P.S. lamp throughout the life of the lamp. The ballast and the photoelectric control shall be suitable for operating the units in the wattage as shown on the Plans. The wattage of the luminaires for this Contract are listed on the quantity sheet.

No luminaire shall be installed until the lamp socket position has been inspected and approved by the Engineer. If no light distribution pattern is given the socket position shall produce a light pattern as indicated on the Plans, then type III as designated in the specification for the luminaire. 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 manufacturers recommendations.

The Contractor shall furnish and install one or more of the following luminaires or an approved equal as specified on the Plans and/or as required by the Utility owner.

STANDARD MATERIALS

LUMINAIRE 400 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-25 Regulated Multi-voltage Ballast, Type III Light Pattern, or as shown on Plans, 1 1/2" - 2" (38 mm - 50 mm) Slipfitter

Cooper/Crouse Hinds OVY Swing-down	Cat. #OVY40SWW3ET4
GE M-400A Power/Door	Cat. #M4AR40S0A2GMN32

LUMINAIRE 250 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-26 Regulated Multi-Voltage Ballast, Type III Light Pattern, or as shown on Plans, 38 mm - 50 mm Slipfitter

Cooper/Crouse-Hinds OVY Swing-down	Cat. #OVY25SWW3ET4
GE M-250 A2 Power/Door	Cat. #M2AR25S0A2GMS32

LUMINAIRE 100 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-27 120V Regulator Ballast, Type II Light Pattern, or as shown on Plans, 1 1/4" - 2" (32 mm - 50 mm) Slipfitter

Cooper/Crouse-Hinds OVX Swing-down	Cat. #OVX10SK22ET4
GE M-250A2 Power/Door	Cat. #M24R10S1M1AMS21

LUMINAIRE 70 Watt High Pressure Sodium Alley/Security, 120V with Normal Power Factor Ballast, Photo Cell, 9110-60-28 Lamp and Type II Acrylic Lens for Mounting on 1 1/4" - 2" (32 mm or 50 mm) Bracket (Not Included)

Cooper/Crouse Hinds RMA (Specify Less Bracket w/Type II Lens)	Cat. #RMA70SR222LV5
GE Type 201 SA (Specify Less Bracket w/Type II Lens)	Cat. #SAM07S1N5S4LV5ALC

LUMINAIRE 70 Watt High Pressure Sodium Black Colonial, with 120V Photo Cell Receptacle, 120V Reactor 9110-69-34 Ballast, Type III Acrylic Lens, Black Finish with 3" (75 mm) Slipfitter

Cooper/Crouse-Hinds	Cat. #LXF70SR2334
GE TC 100	Cat. #T10R07S1N2AMS3BL
ITT American Rev.	Cat. #47-570E3-6

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 on 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 concrete, labor, equipment, hardware, anchor bolts, washers, shims and nuts, supply and installation of the transformer 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.

6/25/13

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.

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

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 4A
746851 - POLE BASE, TYPE 4B
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, 4A, 4B, 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.

"Drop-in" Expansion Anchors and Bolts for Type 4A Pole Bases shall be provided by the Contractor. The anchors shall be stainless steel and shall accept ½" diameter stainless steel bolts. Anchors shall be Concrete Fastener Systems Model DIS 12, Hilti HDI SS 303, or approved equal.

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 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 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 of the outer edge.

Excavation for the pole bases may not exceed the dimension of the foundation by more than 12 inches in any one direction. If a form is used in the excavation more than 18 inches 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 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 4A or 4B Base, increase the depth to 4 feet.
   b. 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 (d) below, or 9 feet, whichever is greater.
   c. For a proposed Type 6 Pole Base, substitute a Type 2 Pole base and increase the depth in accordance with (d) below.
   d. 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.

Should excavated material be unsuitable for trench backfill, the Contractor shall furnish material meeting the requirements of Borrow, Type C from other excavations or from borrow sites within the contract limits. Payment will be made using the item under which the material was initially excavated. Hauling, placement, and compaction are incidental to the item being backfilled.

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:

No payment will be made for backfill material meeting Borrow, Type C requirements that is placed outside of the vertical plans located 18" 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.

747508 - LIGHTING CONTROL CENTER - 100 A
747509 - LIGHTING CONTROL CENTER - 200A

Description:

This work consists of furnishing and installing a lighting cabinet and all necessary electrical equipment, as indicated on the Plans, Standard Construction details, or as directed by the Engineer.

Materials:

Cabinet

The service cabinets and doors shall have a minimum size of 44" wide by 48" tall by 25" deep (Type R).

The cabinets and doors shall be constructed form 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 ¼" diameter stainless steel hinge pin. Hinge shall be secured with 1/4-20 stainless steel carriage bolts and stainless steel nylock nuts.

Cabinets shall be provided with a 5052-H32 aluminum alloy metal back panel of 0.125" .minimum thickness. All mounting hardware shall be furnished. All internal hardware shall be either stainless steel or cadmium pressed steel Type II, Class I.

Cabinets finish shall be natural aluminum mill finish for Federal Specification QQA-250/8.

Panelboard

Panelboards for three phase service shall be rated for 277/480 volt, three phase, four-wire operation. Panelboards for single phase service shall be rated for 240 volt, single phase three-wire operation. The panel board shall be UL listed and have a minimum of 200 amp rated main busses and main lugs only for 200A services and 100 amp rated main busses and main lugs only for 100A services. It shall have a minimum of 30 spaces for branch circuit breakers. It shall have a minimum 22,000 RMS symmetrical ampere short circuit current rating for 277/480V services or 10,000 RMS symmetrical ampere short circuit rating for 120/240V services. It shall conform to Federal Specification W-P-115C, Type 1, Class 1.

A solidly bonded equipment ground bar and neutral bar shall be provided.

The panel board shall be mounted within its own enclosure. It shall be of dead front construction and be rated NEMA Type 1. Finish shall be gray baked enamel.

Branch Circuit Breakers

Provide circuit breakers of quantity and current rating as required by the plans for proper circuiting and provide two spare breakers of like current rating as the other lighting circuit breakers. Circuit breakers shall be UL listed and comply with NEMA Standards and Federal Specification W-C-375B. Circuit breakers shall be rated for 10 KAIC for 120/240 volt service or 22KAIC for 277/480 volt service.

Lighting Contactor, Photocell and Override Control

Provide a central lighting contactor. Lighting contactor shall be electrically held, two or three pole as required for the given service type. Contacts shall be rated for 200 amps at the given service voltage. Coil shall be rated for the same voltage as the light fixtures.

Provide a remote photoelectric light control (photocell) mounted on the side of the lighting control cabinet using an OLB condulet body. Photocell shall be a cadmium-sulphide type with fail-safe in the "on" position. It shall be enclosed in a weatherproof housing, not susceptible to distortion, discoloration, cracking or crazing. It shall be a plug-in, locking type for mounting in a receptacle meeting UL Specification 773. It shall be rated for 1800 VA for ballast type loads and used to energize a contactor. It shall be designed to operate at the required voltage and at -20 degrees F ambient temperature. It shall have a turn-off time delay to prevent false turn-off due to lightning, stray lighting or flashing lights.

Provide 600 volt-rated three position maintained contact selector switch (automatic-off-manual) for override of photocell control.

Construction Methods:

Service conduit shall be installed in accordance with DelDOT standard specification and utility company requirements. It will be paid for separately under its respective unit bid price item.

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

Electrical equipment shall be installed as indicated on the plans.

Method of Measurement:

The quantity of lighting cabinets shall be the actual number of lighting cabinets furnished and installed, including the cabinet, all electrical equipment, photo electric cell, and incidentals, complete in place, operational and accepted.

Basis of Payment:

The quantity of lighting cabinets will be paid for at the Contract unit price per each at the phasing and amperage specified; Item 747509 for 200 Amp Service and Item 747508 for 100 Amp Service. Price and payment will constitute full compensation for furnishing and installing the cabinet, internal electrical materials, photocell, and for all labor, equipment, tools and incidentals necessary to complete the item.

The cabinet base, conduits (except for sweeps included in the cabinet base), and required wiring shall be paid for separately under their respective bid items.

11/17/14

747514 - CABINET BASE TYPE F
747515 - CABINET BASE TYPE M
747516 - CABINET BASE TYPE P
747517 - CABINET BASE TYPE R

Description:

This work consists of constructing cabinet base Type F, M, P and R in accordance with the Standard Construction Details or applicable Plan Details and at locations as directed by plans or the Engineer.

Materials:

Class B Concrete
3/4" x 10' sectional copperclad steel ground rods
5/8" Zinc plated or Stainless Steel Drop-in Anchors manufactured by Hilti Systems, Concrete Fastening Systems, or approved equal
5/8" x 1-1/2" galvanized hex bolts
3/4" acorn type ground clamps
PVC conduit sweeps

Construction Methods:

The base shall conform to the dimensions as indicated in the cabinet base detail on the Standard Construction Details or applicable Plan Sheets. A concrete collar is only required when installed in earth areas or as directed by the engineer. Conduits entering the base must enter only in the designated area. A minimum distance of 1 inch shall be maintained between conduits and a minimum distance of 2 inches between conduits and the ground rods.

A minimum of 8 foot of the ground rods must be driven into undisturbed soil through the 2 inch PVC sleeve. The PVC sleeve shall be driven into the ground so that the top of the sleeve will be flush with the concrete when the base is poured.

Method of Measurement:

The quantity of cabinet bases will be measured as the number of bases constructed in accordance with these specifications, complete in place, and accepted.

All conduit sweeps extending into the cabinet base as shown on the Plans or Standard Details as applicable shall be included in the price for each cabinet base..

Basis of Payment:

The quantity of cabinet bases will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all concrete, ground rods, labor, equipment, tools, conduit sweeps, and incidentals required to complete the work as shown on the standard details or applicable plan sheets.

10/9/2012

748502 - RAISED/RECESSED PAVEMENT MARKER

Description:

This work consists of furnishing and installing raised/recessed pavement markers in accordance with the Plans and these specifications.

Materials:

The cast iron housing shall meet the requirements of ASTM A 536-84, Grade 72-45-84.

The reflectors shall meet the requirements of ASTM D 4383-03.

For installation on interstates, freeways, and principal arterials, the pavement marker shall have red reflectorized material on the back side (the side not facing the direction of traffic).

Epoxy shall meet the requirements of AASHTO M237, Type IV.

The followings models have been tested and approved by the Department and shall be used:

1. Ennis Paint - Stimsonite Model 101LPCR with Model C40 reflective pavement markers.
2. Ray-O-Lite Model 300 Snowplowable Marker with Model 2004 Reflector.
3. Or Approved Equal.

Construction Methods:

Pavement shall be saw cut to match the bottom contour of the marker housing using a saw and blade suitable for the pavement material being sawed. The depth of the cut slot must allow the housing to be set in epoxy, with leveling lugs resting on the pavement surface, so that the front edge of marker is at or below the surface of the pavement. Excessive saw cuts must be repaired to the satisfaction of the Engineer. When cutting is complete, the slot shall be cleaned as recommended by the manufacturer of the epoxy material. The epoxy and pavement marker will be installed in the prepared contour slot in the pavement per the manufacturer's recommendations.

Placement shall be in accordance with the DE MUTCD.

Method of Measurement:

The quantity of raised/recessed pavement markers will be measured as the actual number installed and accepted.

Basis of Payment:

The quantity of raised/recessed pavement markers will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials, installation, saw-cutting, cleaning, disposal of discarded materials, for all labor, tools, equipment, all necessary incidentals associated with the item to complete the work.

07/26/2011

748506 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 4"
748507 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 6"
748508 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"
748509 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"
748510 - PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT
748535 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 4"
748536 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 6"
748537 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 8"
748538 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 10"
748539 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 12"
748540 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 16"
748548 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"
748549 -PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"
748557 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"
748559 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 5"
748568 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 9"
748569 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 14"

Description:

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

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

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

Materials Requirements:

A. White and Yellow Reflectorized Epoxy

1. Epoxy Composition Requirements:

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

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

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

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

The entire pigment composition shall consist of either titanium dioxide and/or organic yellow pigment. No extender pigments are permitted. The white pigment upon analysis, shall contain a minimum of 16.5% 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 $\pm$ 50 tolerance will be applied to the target value to establish the acceptance range.

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

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

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

2. Physical Properties of Mixed Composition:

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

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

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

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

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

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

d. Drying Time (Field). When installed at a minimum wet film thickness of 20±1 mils (500 or 625 um) and reflectorized with glass spheres, the maximum drying times shall correspond to these temperatures:

80 F (27 C)	10 minutes
70 F (21 C)	10 minutes
60 F (16 C)	15 minutes
50 F (10 C)	25 minutes
40 F (4 C)	45 minutes
35 F (2 C)	60 minutes

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

e. Abrasion Resistance. The wear index of the composition shall not exceed 82 when tested in accordance with ASTM C501 using a CS-17 wheel and under a load of 1000 grams for 1000 cycles.

f. Tensile Strength. The tensile strength of the epoxy composition shall not be less than 6000 psi (41 MPa) when tested in accordance with ASTM D638 using a Type IV specimen [0.125" ± 0.010" (3.18 ± 0.25 mm) thick]. Tests shall be conducted at an ambient temperature of 75 ± 5 F (24 ± 3 C). The testing machine shall operate at a speed of 0.20" (5.1 mm) per minute.

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

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

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

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

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

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

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

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

Five molds will be prepared from 1/2" (12 mm) I.D., 1/16" (1.5 mm) wall thickness acrylic tubing, cut in 1 1/2" (38 mm) lengths. After spraying the inside of the mold with

a suitable release agent,[1] the cylindrical tubes are placed in a vertical position on a PTFE sheet base. A sufficient amount of epoxy composition is thoroughly mixed in the proper proportions (A:B) and poured into the mold to a depth of approximately 1 1/4" (32 mm). After a minimum of 72 hours curing, the specimens are removed from the molds and machined to a length of 1" ± 0.002" (25 mm ± 0.05 mm).

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

B. Reflective Glass Spheres/Beads

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

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

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

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

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

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

M247 AASHTO Type 1 Glass Spheres

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

Type 4 Large Spheres

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

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

C. Black Epoxy Contrast Markings

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

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

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

Composition:	Component	Percent By Weight
	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:

Sieve Size	Percent Retained
#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.

Hardness:	The black aggregate hardness shall be 6.5-7 on Moh's Mineral Scale.
Porosity:	The black aggregate porosity shall be less than two (2) percent.
Moisture Content:	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 -White Edge lines on Portland cement concrete pavements shall have a 3 inch black contrast line running parallel to the white edge line. The contrast line shall be to the inside or travel lane side of the edge line. The black contrast marking is to be applied with a single drop of graded black aggregate. Once it has cured sufficiently so as not to track, the reflectorized white line is to be applied along side of the contrast line and the two lines shall adjoin each other.

Dotted Line: All dotted 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 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 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 LTL-X Retrometer (30 meter geometry). Five readings will be taken per line per mile (1.6 km). Projects less than 1 mile (1.6 km) in length will have a minimum of 5 readings per line. These readings will then be averaged for the overall project average.

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

White 450
Yellow 325

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

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

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

Method of Measurement:

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

Basis of Payment:

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 3", 4", 5", 6", 8", 9", 10", 12", 14", 16" (75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 225 mm, 250 mm, 300 mm, 350 mm, or 400 mm) line and the Contract unit price per square foot (meter) of symbol. The quantity of permanent pavement marking (white, yellow, or black epoxy resin paint) will be paid for at the Contract unit price per linear foot (meter) of line and the Contract unit price per square foot (meter) of symbol. Price and payment shall include striping layout, cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

NOTE:

For information only:

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

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

2. IPS - Ennis Paint
   P.O. Box 13582
   Research Triangle Park, North Carolina 27709
   Tel. 1-877-477-7623

3. Epoplex
   One Park Avenue
   Maple Shade, NJ 08052
   Tel. 1-800-822-6920

4. Or an approved equal.

8/7/2013

748530 - REMOVAL OF PAVEMENT STRIPING

Description:

This work consists of removing pavement markings of all kinds including paint, tape, etc., in accordance with this special provision, notes on Plans and/or as directed by the Engineer. The Contractor shall coordinate with the Engineer for maintaining traffic during the operation, prior to starting the work.

Materials and Construction Methods:

Paint and Epoxy Resins:

Shot/abrasive grit blasting or water blasting equipment shall be used for removal of markings from pavement surfaces.

Alkyd Thermoplastic:

In addition to the removal techniques discussed for paint and epoxy, grinding (erasing machines) equipment may also be used for removal of markings from pavement surfaces.

The removal operation shall be performed in a manner that will not damage the pavement surface.

The Contractor shall collect and dispose of all shot/abrasive grit and pavement marking materials removed from the pavement surface. Washing or sweeping such material to the roadside will not be permitted.

After removal of striping on bituminous concrete asphalt sealer shall be used to cover any exposed aggregate or embedded paint at no additional cost.

Method of Measurement:

The quantity of pavement striping removal will be measured as the number of square feet (meters) of pavement striping removed and accepted. The area of lines will be calculated by multiplying the nominal width of line times the length and the area of symbols will be as specified in Subsection 748.10 of the Standard Specifications.

Basis of Payment:

The quantity of pavement striping removal will be paid for at the Contract unit price per square foot (meter) for "Removal of Pavement Striping". Price and payment shall be full compensation for furnishing all materials, removing the pavement markings, disposing of the removed marking material, covering up the exposed aggregate, and for all labor, equipment, tools and incidentals necessary to complete the work.

Note:

There will be no measurement and payment for removal of pavement markings placed incorrectly by the Contractor.

5/21/2013

748541 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 4”
748542 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 6"
748543 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 8"
748544 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 12”
748545 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 16"
748546 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, SYMBOL/LEGEND
748553 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, BIKE SYMBOL
748554 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, PEDESTRIAN SYMBOL
748555 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, HANDICAP SYMBOL

Description:

This work consists of furnishing and installing preformed retroreflective thermoplastic pavement marking with a preapplied Federal Specification Type IV glass bead coating throughout its entire cross section on bituminous asphalt pavement at the locations and in accordance with the patterns on the Plans, or as directed by the Engineer.

The preformed retroreflective markings shall conform to the size and dimensions as shown in the Federal “Standard Highway Signs” book found at: http://mutcd.fhwa.dot.gov/SHSe/pavement.pdf as referred to in the Delaware Manual on Uniform Traffic Control Devices, Part 3, Markings.

Materials:

General: Only materials listed on the Department’s Approved Pavement Markings Material List will be used for this item. The preformed retroreflective markings shall be fusible to bituminous asphalt pavement by means of the normal heat of a propane type of torch. Adhesives, primers or sealers are not necessary prior to the preformed retroreflective markings application on bituminous asphalt pavement.

The preformed retroreflective markings shall conform to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics and be capable of fusing to itself and previously applied worn hydrocarbon and/or alkyd thermoplastic pavement markings.

The preformed retroreflective markings shall be capable of application on bituminous asphalt pavement wearing courses during the paving operation in accordance with the manufacturer's instructions. After application the markings shall be immediately ready for traffic. The preformed retroreflective markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

The preformed retroreflective thermoplastic markings shall not be brittle and must be sufficiently cohesive and flexible at temperatures exceeding 50°F (10°C) for one person to carry without the danger of fracturing the material prior to application.

Composition: The retroreflective pliant rosin ester thermoplastic pavement markings shall consist of a homogeneous mixture of high quality polymeric thermoplastic binders, pigments, fillers and glass beads. The thermoplastic material must conform to AASHTO M249-79(86) with the exception of the relevant differences due to the material being preformed, and identified herein.

Intermix Glass Beads: The preformed retroreflective material shall contain a minimum of 30% glass spheres which shall conform to AASHTO M247-81 Type 1. Glass spheres shall have a minimum of 80% true spheres overall.

Top Beads: To provide the required retroreflectivity, the preapplied factory top coating of glass beads shall be a combination of both Federal Spec. Type IV and AASHTO M247-81 Type I beads. Federal Spec. Type IV beads shall be evenly disbursed across the entire surface of the product at a minimum rate of 4 lb. (1.8 kg) per 100 ft^2 (9.3 m^2) and the AASHTO at 3 lb.(1.4 kg) per 100 ft^2 (9.3 m^2). In combination, the total glass bead coverage shall be 7-8 lb. (3.2-3.6 kg) per 100 ft^2 (9.3 m^2). The AASHTO M247-81 Type I beads shall have a minimum of 80% true spheres overall and the Federal Spec. Type IV beads shall be 80% true spheres on the 12 and 14 sieves and shall be no less than 75% true spheres on the remaining sieves.

Retroreflectivity: 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. Testing will be done using a Delta LTL 2000 Retrometer (30 meter geometry). The required minimum initial reflectivity reading in millicandellas shall be:

White 300
Yellow 200
Blue 200

Skid Resistance: The surface of the preformed retroreflective thermoplastic markings shall provide a pre-appled minimum skid resistance value of 45-51 BPN and a post-applied minimum skid resistance value of 45-55 BPN when tested according to ASTM E303-74.

Thickness: The thickness of the supplied material shall have a minimum average thickness of .090" (90 mils) for all Longitudinal lines and a thickness of .125" (125 mils) for all transverse lines and symbols/legends.

Tensile Strength and Elongation: The preformed retroreflective thermoplastic material shall have a minimum tensile strength of 150 lb. per square inch (1054 kg per square mm) of cross section, at .002" (2.28 mil) thickness, when tested according to ASTM D638-76 except that a sample 6" by 1" (150 mm by 25 mm) shall be tested at a temperature between 70°F and 80°F (21°C and 27°C) using a jaw speed of 10" to 12" (250 mm to 300 mm) per minute. The sample shall have a maximum elongation of 20% at break when tested by this method.

Flexibility: The preformed retroreflective thermoplastic marking material shall have flexibility at 50°F such that when a 1" by 6" (25 mm by 150 mm) sample is bent through an arc of 90 degrees at a uniform rate in 10 seconds (9 degrees per second) over a 1" (25 mm) mandrel, no cracking occurs in the test sample. The sample must be conditioned prior to testing at 50°F±2 degrees (10°C) for a minimum of four hours. At least two specimens tested must meet the flexibility requirements at 50°F (10°C) for a passing result.

Environmental Resistance: The applied markings shall be resistance to deterioration due to exposure to sunlight, water, oil, diesel fuels, gasoline, pavement oil content, salt and adverse weather conditions.

Effective Performance Life: When properly applied, in accordance with manufacturer's instructions, the preformed retroreflective pavement markings shall be neat and durable. The markings shall remain skid resistant and show no lifting, shrinkage, tearing, roll back or other signs of poor adhesion for a period of one winter season.

Oil/grease Resistant Test: The preformed retroreflective thermoplastic material shall not dissolve or smear after rubbing a small amount of motor oil on a small piece of the thermoplastic material for two minutes.

Bond Strength: The material shall exhibit a bond strength to Portland Cement Concrete (PCC) equal or exceed 180 psi when tested at room temperature (73.4±3°F) (23°C) in accordance to ASTM Standard Test Method for Bond Strength of thermoplastic marking Material D4796-88. Place a coarse

brick in a 400°F (204°C) oven for 5 minutes. Prepare a 4 square inch test specimen. Place the test specimen on the brick and further heat in the 400°F (204°C) oven for 15 minutes. The test specimen is then allowed to cool to room temperature and prepared for testing.

Low Temperature Cracking (Stress) Resistance for Extended Period: The material shall be tested according to AASHTO T250 Section 7 with Section 7.2.3 modified for and extended cold temperature 15 degrees ±3°F (-9.4±2°C) exposure period 72 hours. Any cracking shall constitute failure of the material for PCC road surfaces.

Impact Resistance (Gardner Falling Weight): A 2" by 7.5" (50 by 190 mm) specimen shall be applied on a course concrete brick. Using a Gardner Impact Tester, a 2 lb (.91 kg) weight is dropped from a height of 80" (2032 mm). The specimen when tested at room temperature 73.4±3°F (23°C) should show no sign of cracking. (Test procedure is in accordance with ASTM D5420-93).

Packaging: The flexible preformed retroreflective thermoplastic marking materials, for use as transverse or longitudinal markings as well as legends, arrows and symbols shall be available in flat form material or in rolls. Flat material shall be supplied in maximum of 4' (1.2 m) lengths up to 2' (.6 m) in width. The material shall be packed in suitable cartons clearly labeled for ease of identifying the contents.

Construction Methods:

The markings shall be applied in strict accordance with the manufacturer's recommendations on clean and dry surfaces. Marking configurations shall be in accordance with the "Delaware Manual on Uniform Traffic Control Devices, Part 3, Markings."

The preformed retroreflective thermoplastic material shall be fusible to the pavement by means of a propane torch recommended by the manufacturer. Preheating the surface to remove any latent moisture will be done just prior to the placement and installation of the Symbol/ Legend.

No markings shall be placed when the ambient temperature is below 40°F (4°C). The material shall be kept in a location above 55°F (13°C) until just before application.

The supplier shall provide technical services as may be required.

Method of Measurement:

The quantity of pavement striping (748541-748545) will be measured by the number of linear feet (linear meters) of 4", 6", 8", 12", or 16" pavement striping line placed and accepted. The quantity of symbol/ legend (748546) will be measured by the number of square feet (meters) of symbol/legend placed and accepted. The quantity of bike symbol, pedestrian symbol, and handicap symbol (748551-748553) will be measured as each placed and accepted. The dimensions for the symbol/legends are as follows:

Bike Rider Symbol shall be 3' x 6' and accompanying 2' x 6' Arrow Symbol.
Pedestrian shall be 4' X 8'.
Handicap Symbol shall be 40" X 40".

Basis of Payment:

The quantity of pavement striping payment will be paid for at the Contract unit price per linear foot (linear meter) for 4", 6", 8", 12" and 16" (100 mm, 150 mm, 200 mm, 300 mm, and 400 mm) line. The quantity of symbol/legend will be paid for at the Contract unit price per square foot (meter). The quantity of bike symbol, pedestrian symbol, and handicap symbol will be paid for at the Contract unit price per each. Price and payment shall include cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

Warranty:

The Contractor shall warrant to the Department that the installed retroreflective preformed thermoplastic pavement markings are free of defects, as hereafter defined, for a period of one winter season beginning at the initial acceptance of the marking installation by the Department. The initial acceptance of the marking installation will occur upon the satisfactory correction of all deficiencies noted

in the marking installation during the Final Inspection of the project. The markings shall be warranted against failure due to blistering, excessive cracking, bleeding, staining, discoloration, oil content of the pavement materials, smearing and spreading under heat, deterioration due to contact with grease deposits, oil, diesel fuel, or gasoline drippings, chipping, spalling, poor adhesion to the pavement materials, vehicular damage, and wear from normal maintenance activities including snow plowing.

The Contractor shall repair all defective areas identified by the Department after initial installation or during the Warranty Period. All repairs shall begin immediately following the notice to the Contractor by the Department unless weather limitations prevent the corrective work. Should the contractor not commence work within the period stated in the notice, weather permitting, and pending severity, the Department reserves the right to remedy the condition and charge the contractor for the work. Any corrective work shall be as recommended by the manufacturer of the marking material and approved by the Department. The Department shall be given notification before the Contractor begins corrective work to allow for inspection of the operation. All costs associated with the repair work shall be the responsibility of the contractor. These costs shall include, but are not limited to, removal, material, maintenance of traffic, etc.

6/2/16

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, Ra, 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)$cd \cdot lx^{-1} \cdot m^{-2}$
[B] Values for 0.1 observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

The ground mounted sign sheeting shall meet or exceed the following values. The coefficients of Retroreflection shall be determined in accordance with ASTM E-810. This table contains "core" values as found in ASTM D 4956. The 0.1 observation angle is not required for this item.

TABLE 7 Type III Sheeting[A]								
Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue	Brown
0.1 [B]	-4	300	200	120	54	54	24	14
0.1 [B]	+30	180	120	72	32	32	14	10
0.2	-4	250	170	100	45	45	20	12
0.2	+30	150	100	60	25	25	11	8.5
0.5	-4	95	62	30	15	15	7.5	5.0
0.5	+30	65	45	25	10	10	5.0	3.5

[A] Minimum Coefficient of Retroreflection(R_A) cd/fc/ft²($cd \cdot lx^{-1} \cdot m^{-2}$)
[B] Values for 0.1 observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

WARRANTY

The sheeting manufacturer shall submit with each lot or shipment, a certification that states the material supplied will meet all the requirements listed herein.

Field Performance Requirements:

The retroreflective sheeting will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than the minimum specified for that sheeting during that period listed.

85% of values listed in Table 7 Type III after 10 years
80% of values listed in Table 3 Type IX after 12 years.

All measurements shall be made after sign cleaning according to sheeting manufacturer's recommendations.

Sheeting Manufacturer's Replacement Obligation:

Where it can be shown that retroreflective signs supplied and used according to the sheeting manufacturer's recommendations, have not met the performance requirements of this specification the sheeting manufacturer shall cover restoration costs as follows for sheeting shown to be unsatisfactory during:

The entire 12 years (Type IX) and 8 years (Type III): the sheeting manufacturer will replace the sign in it's 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

749687 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON SINGLE SIGN POST

Description:

This work consists of installing or removing traffic sign(s) on a single post or other type of pole at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in boring holes constructed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than or equal to 48 inches shall be installed on multiple sign posts under Item 749690 - Installation or Removal of Traffic Sign on Multiple Sign Posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the Delaware MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. Signs and plaques shall be mounted no lower than the minimum mounting height specified in the Delaware MUTCD. Signs and plaques shall be mounted no higher than one foot above the minimum mounting height specified in the Delaware MUTCD. Any excess sign post protruding above the top of the top sign shall be cut off and removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. The Contractor is responsible for disposal of all signing material removed from the project

Method of Measurement:

The number of single sign installations or removals will be measured as the actual number of signs installed or removed and accepted.

Basis of Payment:

The quantity of single sign post installations or removals will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed in accordance with the Delaware MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

5/28/2013

749690 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON MULTIPLE SIGN POSTS

Description:

This work consists of installing or removing traffic sign(s) on multiple sign posts at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in holes installed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than 48 inches shall be mounted on two (2) posts. Signs with a length greater than or equal to 78 inches shall be mounted on three (3) sign posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the Delaware MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. Signs and plaques shall be mounted no lower than the minimum mounting height specified in the Delaware MUTCD. Signs and plaques shall be mounted no higher than one foot above the minimum mounting height specified in the Delaware MUTCD. Any excess sign post protruding above the top of the top sign shall be cut off and removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. The Contractor is responsible for disposal of all signing material removed from the project..

Method of Measurement:

The number of sign installations or removals will be measured as the total square foot of the sign(s) installed or removed and accepted.

Basis of Payment:

The quantity of sign installations or removals will be paid for at the Contract unit price per square foot. Price and Payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed accordance with the Delaware MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

5/28/2013

753516 - SANITARY SEWER SYSTEM

Description:

This work consists of furnishing and related work to install a relocated portion of the City of Milford's sanitary sewer system as shown on the City of Milford Sewer and Water Relocation Plans (sheets MS-1 through MS-15) in accordance with the locations, details, and notes on the Plans, and as directed by the Engineer as extra or additional work. The existing sewer service shall be abandoned or salvaged as specified on the Plans.

The City of Milford from hereafter shall be addressed as the Owner. The contractor is advised to obtain and be fully acquainted with the specifications of the Owner. . The City of Milford's standards for sewer installations are available to view at http://www.cityofmilford.com/176/City-Standard-Construction-Specification.Cost to comply are considered incidental to Item 753516.

The work shall be performed in accordance with these Special Provisions, Delaware Standard Specifications, and the requirements of the Standards and Specifications of the City of Milford. In case of conflict between these Special Provisions, Delaware Standard Specifications, and the Standards and Specifications of the City of Milford, the Standards and Specifications of the City of Milford shall prevail.

A "Breakout Sheet" is included in the contract to establish unit prices for the items listed below. The total of the unit prices multiplied by the estimated quantities will establish the total Lump Sum price to be submitted with the bid. Each listed item will be measured as a unit price item in the field. The final Lump Sum payment for Item 753516 will be adjusted by change order, either plus or minus, to match the final totals of all unit price items established in the Breakout Sheet. Failure to complete and submit the Breakout Sheet with the bid will cause the bid to be considered unresponsive.

Breakout Item	Unit	Description
S-1	**(LF)**	Furnish & Install DR 18, C-900, PVC Forcemain, Including Fittings and Appurtenances
S-2	**(EA)**	Furnish & Install Resilient Wedge Gate Valve, Including Valve Box
S-3	**(LF)**	Furnish & Install SDR 9 HDPE Forcemain, Including Fittings and Appurtenances
S-4	**(LF)**	Furnish & Install Schedule 40 Steel Casing Pipe by Open Cut, Including CarrierPipe, Casing Spacers, and End Seals
S-5	**(EA)**	Furnish & Install Combination Air Valve and Structure, Including Frame & Cover
S-6	**(LF)**	Furnish & Install SDR 9 HDPE Sewer Lateral, Including Fittings
S-7a	**(EA)**	Furnish & Install Curb Stop, Including Curb Box
S-7b	**(EA)**	Furnish & Install Curb Stop, Including Curb Box
S-8	**(EA)**	Furnish & Install Direct Bury Check Valve
S-9	**(EA)**	Remove Air Release Valve, Frame & Cover, and Concrete Top on Structure and Dispose of Properly, Cap Forcemain and Fill Structure with Flowable Fill
S-10	**(EA)**	Shut Off Curb Stop or Valve and Remove Curb or Valve Box and Turn Over to City
S-11	**(LS)**	Cap Existing Forcemain Where Directed and Abandon in Place
S-12	**(SY)**	Remove and Properly Dispose of All Existing Asphalt Paving at Pump Station
S-13	**(SY)**	Undercut to Proper Depth and Compact Sub-Grade Within Footprint of New Area to Be Paved at Pump Station
S-14	**(CY)**	Furnish, Install, and Compact CR-6 (Crusher Run) Stone Base
S-15	**(TON)**	Install Type C Superpave Hot Mix Asphalt Paving

Materials:

All the materials including pipe, fittings, and all other accessories as listed under this Special Provisions, shall conform to the material and quality requirements of the Standards and Specifications of the City of Milford. The Owner shall have right to inspect and reject the materials, if his/her specifications requirements are not met.

Portland Cement Concrete required for the job shall be Class B, and shall conform to Section 812 of the Delaware Standard Specifications. Backfill shall conform to the requirements of Borrow Type C as specified in Section 209 of the Delaware Standard Specifications.

Special Requirements:

The Contractor's attention is directed to the following special requirements.

The Owner shall have the sole right of determining at what times and in what order the Contractor shall undertake work, of making connections and modifications to the existing sewer system. Prior notice, a minimum of forty-eight (48) hours shall be given to the Owner and Engineer for inspection and supervision to be coordinated before work involving the sewer line relocations can begin. No work shall be started by the Contractor until he/she has received permission from both the Engineer and the Owner to proceed. The Contractor shall immediately notify both the Engineer and the Owner of all delays.

It is of prime importance that the Contractor, in the performance of his/her work, does not disrupt the operation of the existing sewer facilities in any manner or at any time, without the express prior approval of the Owner. The Contractor shall construct, maintain and remove, following construction, such temporary bypasses as may be required during construction to maintain sewer mains in service.

The Contractor will be permitted to close down specific sewer mains and services for a period of time not exceeding four (4) hours after obtaining approval from the Owner in order to make connections as shown on the Plans. The schedule for making connections will be so arranged that the sewer users will be out-of-service for a period of time not exceeding four (4) hours.

Before any shutdown, as specified above, the Contractor must give the utility Owner forty-eight (48) hour notice; and the Contractor must also furnish written notice to all users.

Any and all emergency repairs required during the period of this Contract shall be the responsibility of the Contractor. The Owner will notify the Contractor by telecommunication and the Contractor shall be required to attend the repair immediately. In the event the Owner is unable to contact the Contractor for immediate emergency repair work in length of time as determined by the Owner, the Owner reserves the right to attend to any or all emergency repair work.

All materials and work, or part thereof, which are unsatisfactory as to any or all requirements of the Owner or the Engineer, and/or as specified herein, shall be removed and replaced or repaired in an acceptable manner by the Contractor at his/her own expense.

The Contractor shall guarantee that all workmanship, materials, and work performed under the Contract, shall be in strict accordance with the Contract Documents. This guarantee shall be for a period of two years from and after the date of acceptance of the work. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee.

A Maintenance Bond representing 15% of the total price bid for Item 753516 shall be furnished to the Owner upon successful completion of the item and shall be in effect for the duration of the guarantee and shown above. Costs to provide the warranty and furnish the Bond shall be included in the Lump Sum price bid for item 753516.

Construction Methods:

All work in connection with construction of sewer mains and service connections shall conform to the applicable requirements of the Standard Specifications of the City of Milford, except as modified by the Plans and these Special Provisions. In case of conflict, the Specifications of the City of Milford shall prevail.

Excavation and Backfill - Excavation shall be performed in accordance with Section 208 - Excavation and Backfill for Pipe Trenches, except as amended herein. The bottom of the trench shall ensure that the pipe barrel has adequate bedding for the entire pipe length. The trenches for sewer mains shall be excavated to such depth as will provide pipe elevations as indicated on the Sewer Main Relocation Profiles. The trenches for service connections shall be excavated to the minimum standard depth or to such depth as required to connect to existing mains or service pipes.

If work is stopped on any trench or excavation at the fault of the Contractor, the Engineer reserves the right to direct the Contractor to backfill the trench or excavation, at his/her own expense, and shall not again open said trench until he/she is ready to complete the work therein.

Where rock is encountered and blasting is required for trenching, all rock excavation work shall be performed in accordance with Subsection 107.08 of the Standard Specifications and as modified; and the trench shall be excavated an additional 150 mm below grade. After the excavation is completed, a minimum of 150 mm in depth of Borrow Type C shall be placed in the bottom of the trench, leveled off and thoroughly tamped. In absence of item for Rock Excavation under this Contract, a fixed price of $135 per cubic yard ($175.00 per cubic meter) shall be paid for rock excavation.

Final Location Drawings - Within thirty (30) days after completion of required work, the Contractor shall submit an accurate redline print or prints showing the horizontal and vertical location of mains, bends and other appurtenances to the Engineer and the Owner.

FURNISH & INSTALL DR 18, C-900, PVC FORCEMAIN, INCLUDING FITTINGS AND APPURTENANCES (Breakout Item S-1)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install the appropriate size DR 18, C-900, PVC forcemain, including fittings (not included as other bid items) and appurtenances as shown on the drawings or directed by the Engineer, including connection to existing forcemain and required pressure testing.

   The prices bid per linear foot for furnishing and installing forcemain shall also include, but not limited to, the following:

   a. furnishing and installing the specified pipe and fittings;
   b. installing concrete thrust blocking and joint restraints at bends and fittings;
   c. installing tracer wire and tracer wire boxes;
   d. erosion and sediment control as necessary;
   e. saw cutting and removal of existing pavement of the various types encountered;
   f. clearing & grubbing and removal & offsite disposal of stumps/roots;
   g. stripping and stockpiling of topsoil;
   h. removal and excavation of all materials encountered in trench excavation;
   i. hauling wet or excess excavated material to stockpile area for drying, re-hauling and use as trench refill materials;
   j. backfilling of trenches with suitable material from the excavation;
   k. disposal of excavated material not suitable for refill or in excess of the quantities required for refill;
   l. compaction and top-grading of backfilled material;
   m. installing any fittings not paid by unit price;
   n. placing and removal of sheeting, shoring, and bracing;
   o. obtaining permit for dewatering, dewatering, and disposal of water;
   p. locating, supporting, protecting all utilities or structures and their restoration in case of injury or damage;
   q. repair of existing utilities encountered and damaged during main installation;
   r. temporary (cold patch) and permanent trench , driveway, and pavement restoration;
   s. pipe pressure testing;
   t. connecting new forcemain to existing forcemain at locations indicated on the construction drawings;
   u. topsoiling and seeding disturbed grass areas;
   v. restoring drainage ditches and swales to their original grades, vegetate and install erosion control matting as required;
   w. installing pipeline detection tape;
   x. maintenance of traffic & traffic control;
   y. all surveys required in accordance with these Specifications; and
   z. all else necessary and incidental to the complete and acceptable installation.

FURNISH & INSTALL RESILIENT WEDGE GATE VALVE, INCLUDING VALVE BOX (Breakout Item S-2)

A. The price bid for furnishing and installing resilient wedge gate valves and valve boxes shall include all labor, materials, and equipment necessary to complete this bid item, including furnishing and installing concrete collars where specified, furnishing socket wrenches, and all other work and materials required for completion of this item, including all other applicable work as listed in Item S-1, A, necessary to complete the installation.

FURNISH & INSTALL SDR 9 HDPE FORCEMAIN, INCLUDING FITTINGS AND APPURTENANCES (Breakout Item S-3)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install the appropriate size SDR 9 HDPE forcemain, including fittings and appurtenances as shown on the drawings or directed by the Engineer, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

FURNISH & INSTALL SCHEDULE 40 STEEL CASING PIPE BY OPEN CUT, INCLUDING CARRIER PIPE, CASING SPACERS, AND END SEALS (Breakout Item S-4)

A. The price bid for this item shall include all labor, materials, and equipment necessary to install, by open cut method, schedule 40 standard wall steel casing pipe, including excavation, 360° welding of casing pipe joints, the installation of DR 18, C-900 PVC carrier pipe with casing spacers, furnishing and installing casing pipe end seals, backfill, surface restoration, and all applicable work as listed in Item S-1, A, necessary to complete the installation.

FURNISH & INSTALL COMBINATION AIR VALVE AND STRUCTURE, INCLUDING FRAME & COVER (Breakout Item S-5)

A. The price bid for this item shall include all labor, materials, and equipment necessary to install combination air valve and structure, including frame and cover. This item shall also include excavation, installation of the structure including furnishing and installing the flanged and tapped spool piece, the flanged x plain end ductile iron pipes on either side of the spool piece, the ductile iron MJ spool pieces outside the structure to connect to the forcemain, all items shown on the associated detail included in the plans, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

FURNISH & INSTALL SDR 9 HDPE SEWER LATERAL, INCLUDING FITTINGS (Breakout Item S-6)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install the specified size SDR 9 HDPE sewer lateral pipe, including fittings and appurtenances, connecting to wye on the new forcemain and to the existing sewer lateral where specified, and all related items and work as shown on the drawings or directed by the Engineer. This item shall also include backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

FURNISH & INSTALL CURB STOP, INCLUDING CURB BOX (Breakout Item S-7A & S-7B)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install the specified size curb stop and box and connecting the curb stop to the sewer lateral pipe at the locations shown on the plans or as directed. Work associated with this bid item shall also include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

FURNISH & INSTALL DIRECT BURY CHECK VALVE (Breakout Item S-8)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install the specified size direct bury check valve and connecting it to the sewer lateral pipe at the locations shown on the plans or as directed. Work associated with this bid item shall also include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

REMOVE AIR RELEASE VALVE, FRAME AND COVER, AND CONCRETE TOP ON STRUCTURE AND DISPOSE OF PROPERLY, CAP FORCEMAIN AND FILL STRUCTURE WITH FLOWABLE FILL (Breakout Item S-9)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to remove the existing air release valve, frame and cover, and top of concrete structure. Work shall also include capping both ends of the existing forcemain, filling the structure with flowable fill, all necessary excavation, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

SHUT OFF CURB STOP OR VALVE AND REMOVE CURB OR VALVE BOX AND TURN OVER TO CITY (Breakout Item S-10)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to shut off the curb stop or valve and to remove the curb or valve box and dispose of properly. Work shall include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

CAP EXISTING FORCEMAIN WHERE DIRECTED AND ABANDON IN PLACE (Breakout Item S-11)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to securely cap the existing forcemain where directed. Work shall include all necessary excavation, backfill and compaction of excavation, top soiling, seeding, and mulching of disturbed grassed areas, and all applicable items listed in Item S-1, A, necessary to complete this item.

REMOVE AND PROPERLY DISPOSE OF All EXISTING ASPHALT PAVING AT PUMP STATION (Breakout Item S-12)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to remove all existing paving from main road to and around the existing pump station. Work shall include all necessary excavation, asphalt removal and proper disposal off-site, backfilling, top soiling, seeding, and mulching of existing paved area not being re-paved, including disturbed grassed areas. This item shall also include all applicable items listed in Item S-1, A, necessary to complete this item.

UNDERCUT TO PROPER DEPTH AND COMPACT SUBGRADE WITHIN FOOTPRINT OF NEW AREA TO BE PAVED AT PUMP STATION (Breakout Item S-13)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to undercut existing area within footprint of new area to be paved at pump station to proper depth. Work shall include all necessary excavation, removal and proper disposal off-site of material removed, proper compaction of sub-grade; and backfilling, top soiling, seeding, and mulching of any disturbed grassed areas not being paved. This item shall also include all applicable items listed in Item S-1, A, necessary to complete this item.

FURNISH, INSTALL, AND COMPACT CR-6 (CRUSHER RUN) STONE BASE (Breakout Item S-14)

A. The price bid for this item shall include furnishing all labor, materials, and equipment necessary to install and compact CR-6 crusher run to the specified depth in preparation for paving.

INSTALL TYPE C SUPERPAVE HOT MIX ASPHALT PAVING (Breakout Item S-15)

A. The price bid for this item shall include furnishing all labor, equipment, and material necessary to complete this item. Work shall include furnishing, hauling, placing, and compacting Type C superpave hot mix asphalt surface paving. Included is all incidental work necessary to complete this item

Measurement and Payment

FURNISH & INSTALL DR 18, C-900, PVC FORCEMAIN, INCLUDING FITTINGS AND APPURTENANCES (Breakout Item S-1)

A. Measurement for this bid item shall be made horizontally along the length of forcemain actually furnished and installed. No deduction will be made for the lengths of fittings or change in vertical elevation.

B. Payment for furnishing and installing PVC forcemain will be made based on the unit price bid for the actual linear feet of pipe installed.

FURNISH & INSTALL RESILIENT WEDGE GATE VALVE, INCLUDING VALVE BOX (Breakout Item S-2)

A. No measurement will be made for this item. Note: Excavation and backfill for installation of valves will be paid for as a part of measurement and payment for forcemain.

B. Payment for furnishing and installing gate valves and valve boxes will be made at the unit price bid for each valve and valve box actually furnished and installed.

FURNISH & INSTALL SDR 9 HDPE FORCEMAIN, INCLUDING FITTINGS AND APPURTENANCES (Breakout Item S-3)

A. Measurement for this bid item shall be made horizontally along the length of forcemain actually furnished and installed. No deduction will be made for the lengths of fittings or change in vertical elevation.

B. Payment for furnishing and installing HDPE forcemain will be made based on the unit price bid for the actual linear feet of pipe installed.

FURNISH & INSTALL SCHEDULE 40 STEEL CASING PIPE BY OPEN CUT, INCLUDING CARRIER PIPE, CASING SPACERS, AND END SEALS (Breakout Item S-4)

A. Measurement will be made for this item horizontally along the surface with no allowance for vertical deflection. (Pay limits of casing pipe are shown on the drawings unless directed otherwise by the engineer.)

B. Payment for installation of steel casing pipe by open cut, including carrier pipe, casing spacers, and end seals will be made on a linear foot basis at the unit price bid for the actual length of casing pipe installed.

FURNISH & INSTALL COMBINATION AIR VALVE AND STRUCTURE, INCLUDING FRAME & COVER (Breakout Item S-5)

A. No measurement will be made for this item.

B. Payment for furnishing and installing the combination air valve and structure shall be made at the unit price bid for the number of air valves and structures installed, complete.

FURNISH & INSTALL SDR 9 HDPE SEWER LATERAL, INCLUDING FITTINGS (Breakout Item S-6)

A. Measurement for this bid item shall be made horizontally along the length of sewer lateral actually furnished and installed. No deduction will be made for the lengths of fittings or change in vertical elevation.

B. Payment for furnishing and installing HDPE sewer lateral will be made based on the unit price bid for the actual linear feet of lateral installed.

FURNISH & INSTALL CURB STOP, INCLUDING CURB BOX (Breakout Item S-7A & S-7B)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the size and number of curb stops and boxes actually installed.

FURNISH & INSTALL DIRECT BURY CHECK VALVE (Breakout Item S-8)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the number of direct bury check valves actually installed.

REMOVE AIR RELEASE VALVE, FRAME AND COVER, AND CONCRETE TOP ON STRUCTURE AND DISPOSE OF PROPERLY, CAP FORCEMAIN AND FILL STRUCTURE WITH FLOWABLE FILL (Breakout Item S-9)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the abandonment of the existing air release valve structure as described above, complete.

SHUT OFF CURB STOP OR VALVE AND REMOVE CURB OR VALVE BOX AND TURN OVER TO CITY (Breakout Item S-10)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the shutting off of curb stop or valve and the removal of the curb or valve box, complete.

CAP EXISTING FORCEMAIN WHERE DIRECTED AND ABANDON IN PLACE (Breakout Item S-11)

A. No measurement will be made for this item.

B. Payment for work associated with this bid item shall be made at the appropriate unit price bid for the number of locations where the existing forcemain is securely capped.

REMOVE AND PROPERLY DISPOSE OF All EXISTING ASPHALT PAVING AT PUMP STATION (Breakout Item S-12)

A. Measurement for this bid item shall be made based on the total area of existing asphalt completely removed and properly disposed of off-site.

B. Payment for work associated with this bid item shall be made at the unit price bid for the area of asphalt completely removed and properly disposed of off-site.

UNDERCUT TO PROPER DEPTH AND COMPACT SUBGRADE WITHIN FOOTPRINT OF NEW AREA TO BE PAVED AT PUMP STATION (Breakout Item S-13)

A. Measurement for this bid item shall be made based on the total area excavated and properly compacted, including disposed of excavated material off-site.

B. Payment for work associated with this bid item shall be made at the unit price bid for the area excavated to the proper depth and compacted in accordance with compaction requirements.

FURNISH, INSTALL, AND COMPACT CR-6 (CRUSHER RUN) STONE BASE (Breakout Item S-14)

A. Measurement for this bid item shall be made based on the total volume of CR-6 crusher run installed and compacted to the specified depth in the area to be paved.

B. Payment for work associated with this bid item shall be made at the unit price bid for the actual volume of stone base actually installed and compacted to the specified depth.

INSTALL TYPE C SUPERPAVE HOT MIX ASPHALT PAVING (Breakout Item S-15)

A. Measurement for these items shall be made based on the weight in tons of asphalt placed and properly compacted.

B. Payment for work associated with this bid item shall be made at the unit price bid for the tonnage of asphalt properly placed and compacted.

Payment Clarification

A percentage of the total Lump Sum will be paid based on the work performed in each pay period. The percentage will be calculated by multiplying the total unit of each completed Breakout Item times the appropriate unit price; then adding the total dollars of completed work, divided by the total Lump Sum bid price for item 753516 – Sanitary Sewer System.**2753516 - SANITARY SEWER SYSTEM** Final payment may result in less than 100% of the total Lump Sum based on the actual work performed. Should the Lump Sum total be exceeded, additional funds will be added by Change Order based on the best available estimate at the time. Failure to fully complete the Breakout Sheet for this Item will result in the bid being declared non-responsive.

9/01/17

753550 - INSTALLING SANITARY SEWER (FORCE MAIN), DIP, 18"

Description:

This work consists of furnishing all materials and installing 18" sanitary force main sewer lines as shown on the plans and meeting the requirements of the applicable DelDOT Standard Specifications, and Technical Specifications.

Any requirements included in the Technical Specifications that are not addressed on the plans or by these Special Provisions, shall be performed in accordance with the applicable sections of the Technical Specifications. The Contractor is advised to obtain and be fully acquainted with the applicable specifications of the Owner.

The Owner of the sewer line on this project is the Kent County, Delaware, Department of Public Works and the Technical Specifications are included in this contract as Appendix B to the Special Provisions.

General Requirements: All work shall be subject to inspection and subsequent approval/disapproval of the Engineer and the representative of the Owner of the utility; and the Contractor shall be required to correct the discrepancies at his/her expense.

Included in this work are, in addition to the pipe, all items indicated on the plans within the identified payment limits for each pipe size. Items outside these limits will be paid for under other contract items. All modifications to services, as required by the present Standards and Specifications of the Owner and all relocations of such services necessary to avoid conflicts with utilities and highway drainage facilities are included in the work. Since the exact locations of the conflicts cannot be determined prior to trench excavation operations, the Contractor must coordinate and schedule any required relocation efforts of each sanitary sewer connection on an individual basis with the utility Owner and the property owner.

It is of prime importance that the Contractor, in the performance of his/her work, does not disrupt the operation of the existing sanitary sewer facilities in any manner or at any time, without the expressed prior approval of the Owner.

Any and all emergency repairs required during the period of this Contract shall be the responsibility of the Contractor. In the event the Owner is unable to contact the Contractor for the immediate emergency repair items of work, or in the event the Contractor does not take action when contacted within a reasonable length of time, the Owner of the utility reserves the right to attend to any and all emergency repair work items and to resubmit the costs directly to the Contractor for complete payment.

The Contractor shall be required to coordinate their activities with the City of Milford Relocations for their water and sewer facilities.

All Sewer line materials removed that are deemed salvageable by Kent County Public Works Department shall be delivered by the Contractor to the Kent County Regional Resource Recovery Facility.

Specifications:

DelDOT Standard Specification Sections 208.04, 209.04, 812.02, 812.03 (Class B), and 821.03

Technical Specification Sections 02530

Kent County Standard Details

Contract Drawings

These Special Provisions

Materials:

Material requirements are as listed in the plan notes. Any items not addressed shall be referred to the Technical Specification requirements.

Warning tape for sanitary force main shall be printed polyethylene plastic tape with a metallic core, manufactured specifically for warning and identification of buried utility lines. The tape shall be of a roll type, 6" minimum width, and color coded for sewer (green), with warning and identification imprinted in bold black letters continuously and repeatedly over the entire length of tape. The code and letter color shall be permanent and unaffected by moisture and other substances contained in trench backfill materials. Imprinted on the tape shall be "Sanitary Sewer", or a similar message as approved by the Engineer.

Concrete shall meet the requirements of Section 812, Class B of the Delaware Standard Specifications.

Borrow Type C for backfilling shall conform to the requirements of Section 209.04 of the DelDOT Standard Specifications.

Pipe bedding shall meet the requirements of Graded Aggregate Base Course, Type B in accordance with Section 821.03 of the DelDOT Standard Specifications.

Plastic Markers shall be furnished as detailed in the Plans.

Construction Methods:

All pipes shall be thoroughly cleaned before they are laid and shall be kept clean until the completed work
is accepted.

Sheeting, shoring, or an approved steel trench box shall be installed to meet all applicable OSHA requirements.

The excavation and backfill for the pipe shall be performed in accordance with the applicable requirements of DelDOT Standard Specification Section 208 including backfill requirements of Section 208.04. The trench width shall be as detailed on the plans. Type C borrow, or existing material meeting Type C borrow, shall be placed for the entire depth of trench up to the bottom of patching materials under existing and proposed roadways and shoulders. In areas outside of the roadway or proposed roadway including shoulders, Type C material shall be placed at least one foot above the top of the sewer line. Excavated material may be used for backfill above the Type C borrow in areas outside of roadway and shoulders provided it is dry and free of organic material.

The pipe shall be installed at the locations and to the lines, grades, and dimensions shown on the Plans or as directed by the Engineer.

During backfill of the sewer or force main the Contractor shall install the specified warning tape at a depth of 8" to 12" below finished grade or as directed and approved by the Engineer/Owner. Plastic Markers shall be installed at all bends in the force main in accordance with Kent County Standard Detail sheet PS-04.

No pipe shall be laid upon a foundation into which frost has penetrated or at any time when the Engineer shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation, unless the minimum length of open trench and promptness of refilling are observed.

Acceptance Testing:

Prior to the request for inspection by the Engineer, it shall be the Contractor's responsibility to examine all completed pipe lines to insure that they are laid to the proper alignment and grade and free from foreign material. After this has been done to the satisfaction of the Engineer, he/she will order tests to be made on all portions of the sewers built under the Contract.

The Contractor shall cooperate and furnish all assistance necessary to perform the tests as specified herein and as further required and directed by the Engineer and the representative of the Owner.

Testing of Force Mains shall be in accordance with Technical Specification 02530 and as noted on the Plans.

The Contractor shall furnish all equipment and personnel to conduct the tests specified and/or any proposed by the Owner of the utility.

The Contractor shall not make connections to existing sanitary sewers until after the final inspection and tests have been approved. All material and labor required for tests, including caps and plugs shall be furnished by the Contractor and the cost thereof included in the prices bid for installing sanitary pipe.

Method of Measurement and Basis of Payment:

Payment for installing sanitary sewer as required by the Contract, measured along the centerline from end-to-end, shall be paid for at the Contract unit price per linear foot for "Installing Sanitary Sewer", of the size(s) and type(s) required by the Contract, which price and payment will constitute full compensation for furnishing and installing sanitary sewer pipes, warning tape, plastic markers, bends, fittings, valves, valve boxes, wyes, clean-outs, adapters, couplings, saddles, plugs, stoppers, caps, sleeves, spools, concrete thrust blocks, buttresses, joint restraints, aggregate pipe bedding (including GABC placed between new and existing pipes), etc. as detailed on the plans and in the specifications.

Measurement will be made through the final installed lengths of pipes, bends, wyes, valves, etc. along all runs.

Costs to tie-in the Force Main to the existing pipes, including all required excavation, backfill, fittings, bends, restraints, and other appurtenances, are incidental to the linear foot price bid for “Installing Sanitary Sewer.” Also incidental is the cutting, capping, and/or removal of existing pipe and appurtenances.

Flowable fill, required to abandon existing pipes if indicated on the plans, shall be measured and paid for under Item 208001.

Included in the price per linear foot is the furnishing and installation of sheeting and/or shoring, temporary support of existing Utilities if needed, pipe excavation, Type C backfill, backfilling, dewatering, disposal of excess soil, disposal of excess sewer line materials, pipe testing and all related costs; and for all labor, tools, equipment, and incidentals to complete the work and make the sewer system functional.

All requirements contained in the “Sequence of Construction” and other plans for the work within the limits of “Installing Sanitary Sewer” are to be followed with costs incidental to the price bid per linear foot.

1/5/17

759502 - FIELD OFFICE, SPECIAL I

Description:

The field office work shall consist of furnishing, erecting, equipping, maintaining, and removing a singlewide modular office and adjacent parking area. The Contractor shall submit a specific location layout drawing and construction details for the proposed field office and its parking area for approval by the Engineer. The field office and parking area shall be for the exclusive use of Department Officials, Engineers, Designers, South Region Construction (SRC) Personnel, Consultants, and Inspectors.

The field office structure shall be free of asbestos and/or other hazardous materials. The field office and its parking area shall be constructed and installed in accordance with all applicable city, county, state, and federal codes. The Contractor shall be responsible for obtaining all required licenses and permits for installation and placement of the field office and its parking area. The costs of obtaining such licenses and permits to be incidental to the "Field Office, Special I" Item. The field office shall be available for use by the Department continuously throughout the duration of the project.

Construction and Equipment:

The 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 shall be nominal 8'-0". The exterior walls, ceiling, and floor shall be insulated. The field office shall be of weather-proof construction, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, safely secured to its support if the support is an inground anchored foundation or otherwise by tie-downs to the ground, and fully skirted with rigid watertight covering overlapping the bottom of the exterior siding to the existing ground.

The Contractor shall provide entries to the field office by constructing a stair and deck platform with canopy at each exterior door. These entries shall be fabricated using treated dimension lumber, be constructed with hand and safety railing, be designed to last the life of the Contract, and conform to the requirements of the Architectural Accessibility Board and other federal, state and local boards, bodies and/or courts having jurisdiction in the Contract limits.

The Contractor shall construct and maintain an all weather parking area adjacent to the office of at least 2500 square feet and having a minimum of 10 functional parking spaces striped for full size cars. All weather pathways from the parking area to the entrances of the field office shall also be constructed and maintained. This parking area and entrance pathways shall have a minimum of 2" type "C" hot mix on top of minimum 6" graded aggregate subbase. Snow and/or ice shall be removed from the parking area and from the entrance pathways to the field office within 12 hours after each occurrence. Costs for furnishing, placing, and maintaining the aggregate base and hot mix, and for snow and/or ice removal, to be incidental to the Field Office, Special I" Item.

The ground area 30'-0" from around the perimeter of the field office to the field office shall be landscaped and maintained. If the earthen grounds do not have a stand of weed free grass, the surface of this area shall be loosened to a depth of 4" and a satisfactory seedbed shall be prepared free of debris and extraneous matter. The area shall be seeded to a healthy stand of grass or sodded, after which the area shall be watered, mowed, and trimmed a minimum of three times a month during the growing seasons. Cost for this landscaping and maintenance to be incidental to the "Field Office, Special I" Item.

The field office shall have full carpeting, kitchenette facilities, and interior and exterior paneling, lighting, and plumbing fixtures. The field office shall have a minimum of two (2) exterior doors, each door having a passage and a deadbolt lock. These door locks shall be keyed and at least 2 complete sets of keys shall be supplied to the Engineer's representatives. The exterior doors shall be insulated or have storm doors. The field office shall have a minimum of six (6) windows, each window having a minimum glass area of 1150 square inches and a horizontal mini-blind covering the full glass area. The windows shall be insulated or have storm windows. All windows shall be equipped with a locking device. All doors and windows shall have screens installed and repaired when damaged.

At least two (2) outside water service connections shall be provided at the field office. Each water connection shall have a 3/4" frost proof hose bib with vacuum breaker and shall include 100 linear feet of 5/8" minimum diameter reinforced, industrial or commercial grade, soft rubber hose per connection.

The field office shall be provided with sufficient natural and artificial light and shall be adequately heated and cooled to provide comfortable working conditions.

The field office shall have satisfactory lighting, electrical outlets, heating equipment, exhaust fan, and air-conditioning connected to an operational power source. Plan and drawing areas shall have individual fluorescent lights situated over their worktables. Replacement fluorescent lights shall be furnished as required. Electrical current, water, and any fuel for heating equipment shall be furnished and the cost of such shall be borne by the Contractor. Maintenance of the heating, exhaust fan, and air-conditioning equipment shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

The Contractor shall furnish and maintain two fire extinguishers and provide one lighted "Exit" sign for each exterior passage door. Fire extinguisher(s) may be chemical or dry 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.

The Contractor shall provide an alarm system for field office security with electronic, direct connection to a security service provider. The security system shall have interior motion, window, and entrance detectors and built in manual fire alarm. All windows of the field office shall be covered with steel bar grids as a deterrent to forced entry. The Contractor shall provide validated monitoring and service contracts for the length of the Contract. These contracts shall allow a Department authorized project person to deal directly with the security service provider to request service and/or repair.

The Contractor shall furnish and maintain an adequate supply of cold potable water, a minimum 23 cubic foot new refrigerator, and a minimum 900-watt new microwave oven. Maintenance of the potable water supply equipment, refrigerator, and microwave shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

Suitable indoor toilet facilities, conforming to the requirements of the State and Local Boards of Health or of other bodies or courts having jurisdiction in the area, shall be provided. When separate facilities for men and women are not available or required, a sign with the wording "Rest Room" (letter heights 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.

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 field office telephone system shall have a total of 5 lines consisting of 2 direct single lines with call forward busy feature, 2 dedicated computer use line with broadband connection for either DSL or cable, and 1 dedicated facsimile line and have 5 key sets consisting of 1 master key set having privacy feature, and 4 four-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. 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. Monthly billings for the field office telephone system shall be received and paid by the Contractor. A copy of each bill shall be forwarded to the Project Resident for reimbursement on the subsequent contract pay estimate. 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 interior shall be furnished by the Contractor. The Contractor shall provide new and maintain the following office furnishings, all which are to be approved by the Engineer prior to installation in the field office. Placement of these furnishings shall be as directed by the Engineer. 6 full size office desks each with filing drawer and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 1 computer station with acoustical panels having minimum 60 NRC rating for privacy screen and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 1 large conference table for a minimum of 12 people with surrounding chairs with armrests, 2 folding tables minimum 6'-0" by 3'-0" each with ergonomic design straight back chair with armrests, 1 work table, 1 supply cabinet, 2 rough plan racks, 2 legal size filing cabinets with 4 drawers, 2 legal size fire-resistant filing cabinets with lock and key with 4 drawers and meeting fire underwriters' approval for not less than one hour test, 2 book shelves minimum 3'- 6" by 4'- 6", 3 vertical surface legal size three compartment pockets, 2 dry erase boards minimum 4' by 3' each with markers and erasers, and 2 cork bulletin boards minimum height 3' by 2'. These office furnishings will remain the property of the Contractor at the conclusion of the project.

The Contractor shall also furnish new and maintain the following office equipment, all which are to be approved by the Engineer prior to installation in the field office. 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 compact plain paper copying machine and cabinet with stationary platen, bypass feeding, and dual loading cassette system with cassettes for letter, legal, and ledger size paper. Copy machine to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity, and 20 bin collator with automatic stapling capacity;

1 desktop model, compact facsimile machine with automatic paper cutter, 10-sheet feeder, halftones with 16 levels of gray, 50-number auto dialing, answering machine hook-up, large LCD readout, date and time stamp, and advanced telephone features;

1 DVD camcorder with on-screen programming, full-range auto focus, high-speed shutter, high-resolution, bookmark search, time-lapse recording, rechargeable batteries and charger, tripod, and protective carrying case;

1 integrated color monitor and DVD/VHS cassette recorder having minimum 20" screen, automatic on/play/rewind/stop, remote, full range speaker, and digital auto tracking;

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 camera 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/card (minimum 256MB) capability, and storage case.

Consumables as required to manage the business of the project 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 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.

Included in the unit price bid per month for the Field Office on this project will be two (2) IBM compatible Microcomputer Systems both which will be furnished and maintained by the Contractor for use by the Engineer. The specified computer systems will synchronize the construction management functions of the Department to monitor, report, and perform the accounting of the project work. The computer systems and all their related equipment specified below shall be furnished new and remain the property of the Contractor at the conclusion of the Contract. A detailed listing of the proposed computer systems and all their related equipment to be provided by the Contractor shall be submitted for approval by the Engineer prior to furnishing the Microcomputer Systems. The Microcomputer Systems shall be Laptop Computer Systems each with docking station. Each of the 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 100GB 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

LaserJet HP 2550N network capable printer or latest model with 64 MB minimum total memory having up to 600 dpi resolution and using HPL6 printer language with all necessary software and cables for proper operation; and a HP Desk Jet color printer or latest model with photo quality print capability and with all necessary software, equipment, and cables for general operation as well as connection and sharing on a local network;

Scanner

A HP6100 color scanner with HP5770 ScanJet ADF (or equivalent brand) with all necessary software, equipment, and cables for general operation as well as connection and sharing 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:

office suite - "Microsoft® Office XP Professional",
antivirus - "McAfee® Total Protection for Small Business,
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) with all associated hardware (adapters, cables, etc) and soft to enable wireless networking 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 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 of the field office including its adjacent parking area, for the time required, shall consist of maintenance and/or replacement of all provided items, security system, furniture and equipment, computer systems, providing lavatory supplies, providing trash containers and waste baskets, providing entrance mats at each door, providing replacement items for lighting fixtures, maintaining all utilities, providing satisfactory and sanitary janitorial and waste disposal services twice a week, providing cleanup of trash and debris on the parking lot and landscaped area once a week, and shall be included in the monthly unit cost. The Contractor shall provide and deliver a current copy of all validated field office, equipment, and computer maintenance, service, assistance and/or monitoring agreements and/or contracts as mentioned herein above to the Department's administrative office on or before the first day the field office is ready for use.

Method of Measurement:

This item will not be measured but will be paid for on a monthly basis. Partial months will be paid at the rate of 0.033 months per day.

Basis of Payment:

The field office will be paid for on a unit price bid per month, which price shall be full compensation for performing the work specified and the furnishing of all materials, labor, tools, equipment and incidentals necessary to maintain the field office and its adjacent parking area and restore the field office area and adjacent parking area to match the original site condition. No separate payment will be made for costs involved for removing hazardous material or underground tanks to install these offices or the parking area. Payment will be made only for the actual number of months that the office is acceptably provided by the Contractor. The field office shall be ready for use not later than thirty (30) calendar days after the date of the fully executed Contract and before construction operations begin.

763501 - CONSTRUCTION ENGINEERING

1) **Description:**

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

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

The Engineer will only establish the following:

(a) Original and final cross-sections for borrow pits.
(b) Final cross-sections: Top and bottom pay limit elevations for all excavation bid items that are not field measured by Construction inspection personnel. The Contractor shall notify the Engineer when these pay limit elevations are ready and allow for a minimum of two calendar days for the Engineer to obtain the information.
(c) Line and grade for extra work added on to the project plans.

2) Equipment. The Contractor shall use adequate equipment/instruments in a good working order. He/she shall provide written certification that the equipment/instrument has been calibrated and is within manufacturer's tolerance. The certification shall be dated a maximum of 9 months before the start of construction. The Contractor shall renew the certification a minimum of every 9 months. The equipment/instrument shall have a minimum measuring accuracy of [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 and Automatic Level for the duration of the contract. The GPS rover shall be in good working condition and of similar make and model used by the Contractor. The Contractor shall provide up to 8 hours of formal training on the Contractor's GPS system to a maximum of four Engineer's appointees (DELDOT Construction Inspectors). At the end of the contract, the Engineer will return the GPS rover to the Contractor. If any of the equipment/instruments are found to be out of adjustment or inadequate to perform its function, such instrument or equipment shall be immediately replaced by the Contractor to the satisfaction of the Engineer. Choosing to use GPS technology does not give the contractor authority to use machine control.- Construction Engineering (GPS) Machine Control Grading shall only be used if noted in the General Notes in the plan set outlining the available files that will be provided to the Contractor and "the Release for delivery of documents in electronic form to a contractor" are signed by all parties prior to delivery of any electronic files. Only files designated in the General Notes shall be provided to the contractor. If machine control grading is allowed on the project see the "machine control" section of this specification. GPS technology and machine control technology shall not be used in the construction of bridges.

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

Construction Methods:

4) Performance Requirements:

(a) Construction Engineering shall include establishing the survey points and survey centerlines; finding, referencing, offsetting the project control points; running a horizontal and vertical circuit to verify the precision of given control points. Establishing plan coordinates and elevation marks for culverts, slopes, subbase, subsurface drains, paving, subgrade, retaining walls, and any other stakes required for control lines and grades; and setting vertical control elevations, such as footings, caps, bridge seats and deck screed. The Contractor shall be responsible for the preservation of the Department's project control points and benchmarks. The Contractor shall establish and preserve any temporary control points (traverse points or benchmarks) needed for construction. Any project control points (traverse points) or benchmarks conflicting with construction of the project shall be relocated by the Contractor. The Contractor as directed by the Engineer must replace any or all stakes that are destroyed at any time during the life of the contract. The Contractor shall re-establish centerline points and stationing prior to final cross-sections by the Engineer. The Vertical Control error of closure shall not exceed 0.035 ft times [Square root of number of miles in the level run] (0.01 m times [square root of number of kilometers]). The Horizontal Control precision ratio shall have a minimum precision of 1:20,000 feet (1 meter per 20,000 meters or 1:20,000) of distance traversed prior to adjustment.

(b) The Contractor shall perform construction centerline layout of all roadways, ramps and connections, etc. from project control points set by the Engineer. The Contractor using the profiles and typical sections provided in the plans shall calculate proposed grades at the edge of pavement or verify information shown on Grades and Geometric sheets.

(c) The Contractor shall advise the Engineer of any horizontal or vertical alignment revisions needed to establish smooth transitions to existing facilities. The Contractor must immediately bring to the attention of the Engineer any potential drainage problem within the project limits. The Engineer must approve any proposed variation in profile, width or cross slope.

(d) The Contractor shall establish the working points, centerlines of bearings on bridge abutments and on piers, mark the location of anchor bolts to be installed, check the elevation of bearing surfaces before and after they are ground and set anchor bolts at their exact elevation and alignment as per Contract Plans. Before completion of the fabrication of beams for bridge superstructures, the Contractor shall verify by accurate field measurements the locations both vertically and horizontally of all bearings and shall assume full responsibility for fabricated beams fitting and bearing as constructed. After beam erection and concurrently with the Department project surveyors or their designated representative, the Contractor shall survey top of beam elevations at a maximum of 10-ft (3.0-meter) stations and compute screed grades. These shall be submitted to the Engineer for review and approval before the stay in place forms are set. Construction stakes and other reference control marks shall be set at sufficiently frequent intervals to assure that all components of the structure are constructed in accordance with the lines and grades shown on the plans. The Contractor will be responsible for all structure alignment control, grade control and all necessary calculations to establish and set these controls.

(e) The Contractor, using contract plans, shall investigate proposed construction for possible conflicts with existing and proposed utilities. The Contractor shall then report such conflicts to the Engineer for resolution. All stakes for utility relocations, which will be performed by others, after the Notice to Proceed has been given to the Contractor, shall be paid for under item 763597 - Utility Construction Engineering.

(f) The Contractor shall be responsible for the staking of all sidewalk and curb ramp grades in accordance with the plans and the Departments Standard Construction Details. The Contractor shall review the stakeout with the Engineer prior to construction. The Engineer must approve any deviation from plans, Department Standard Construction Details and Specifications in writing. The Contractor shall be responsible for any corrective actions resulting from problems created by adjustments if they fail to obtain such approval.

(g) If wetland areas are involved and specifically defined on the Plans the following shall apply:

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

(h) Whenever the Engineer will be recording data for establishment of pay limits, the Contractor will be invited to obtain the data jointly with the Engineer's Survey Crew(s) in order to agree with the information. If the Contractor's representative is not able to obtain the same data, then the information obtained by the Engineer shall be considered the information to be used in computing the quantities in question.

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

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

(a) Proposed method of recording information in field books to ensure clarity and adequacy.
(b) A printout of horizontal control verification, as well as coordinates, differences and error of closure for all reestablished or temporary Control Points.
(c) A printout of vertical control verification, with benchmark location elevation and differences from plan elevation.
(d) Sketch of location of newly referenced horizontal control, with text printout of coordinates, method of reference and field notes associated with referencing control - traverse closure report.
(e) Description of newly established benchmarks with location, elevation and closed loop survey field notes - bench closure report
(f) All updated electronic and manuscript survey records.
(g) Stakeout plan for each structure and culvert.
(h) Computations for buildups over beams, screed grades and overhang form elevations.

(i) A report showing differences between supplied baseline coordinates and field obtained coordinates, including a list of preliminary input data.
(j) Any proposed plan alteration to rectify a construction stakeout error, including design calculations, narrative and sealed drawings.
(k) Baseline for each borrows pit location.
(l) Detailed sketch of proposed overhead ground mounted signs or signals showing obstructions that may interfere with their installation.
(m) Copies of cut sheets.

Machine Control Grading

This Section of the specification shall only be used if machine control is authorized for use on the project.

Description:

This specification contains the requirements for grading operations utilizing Global Positioning Systems (GPS).

Use of this procedure and equipment is intended for grading the subgrade surface; it is not intended for the use in constructing final surface grades.

The Contractor may use any manufacturer's GPS machine control equipment and system that results in achieving the grading requirements outlined in section 202 of the standard specifications. The Contractor shall convert the electronic data provided by the Department into the format required by their system. The Department will only provide the information outlined in this document and no additional electronic data will be provided.

The Contractor shall perform at least one 500 foot test section with the selected GPS system to demonstrate that the Contractor has the capabilities, knowledge, equipment, and experience to properly operate the system and meet acceptable tolerances. The engineer will evaluate and make the determination as to whether additional 500 foot test sections are required. If the Contractor fails to demonstrate this ability to the satisfaction of the Department, the Contractor shall construct the project using conventional surveying and staking methods.

Materials:

All equipment required to perform GPS machine control grading, including equipment needed by DelDOT to verify the work, shall be provided by the Contractor and shall be able to generate end results that are in accordance with the requirements of Division 200 - EARTHWORK of the Standard Specifications.

Construction:

a. DelDOT Responsibilities:

1. The Department will set initial vertical and horizontal control points in the field for the project as indicated in the contract documents, (plans set). If the Contractor needs to establish new control points they shall be traversed from existing control points and verified to be accurate by conventional surveying techniques.

2. The Department will provide the project specific localized coordinate system.

3. The Department will provide data in an electronic format to the Contractor as indicated in the General Notes.

a. The information provided shall not be considered a representation of actual conditions to be encountered during construction. Furnishing this information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered including, but not limited to site visits, and basing the bid on information obtained from these investigations, and the professional interpretations and judgments of the Contractor. The Contractor shall assume the risk of error if the information is used for any purpose for which the information is not intended.

b. Any assumption the Contractor makes from this electronic information shall be at their risk. If the Contractor chooses to develop their own digital terrain model the Contractor shall be fully responsible for all cost, liability, accuracy and delays.

c. The Department will develop and provide electronic data to the Contractor for their use as part of the contract documents in a format as indicated in the General Notes. The Contractor shall independently ensure that the electronic data will function in their machine control grading system.

4. The Files that are provided were originally created with the computer software applications MicroStation (CADD software) and INROADS (civil engineering software). The data files will be provided in the native formats and other software formats described below. The contractor shall perform necessary conversion of the files for their selected grade control equipment. The Department will furnish the Contractor with the following electronic files:

a. CAD files
   i. Inroads -Existing digital terrain model (.DTM)
   ii. Inroads -Proposed digital terrain model (.DTM)
   iii.Microstation -Proposed surface elements - triangles

b. Alignment Data Files:
   i. ASCII Format

5. The Engineer shall perform spot checks of the Contractor's machine control grading results, surveying calculations, records, field procedures, and actual staking. If the Engineer determines that the work is not being performed in a manner that will assure accurate results, the Engineer may order the Contractor to redo such work to the requirements of the contract documents, and in addition, may require the Contractor to use conventional surveying and staking, both at no additional cost to the Department.

B. Contractor's Responsibilities

1. The Contractor shall provide the Engineer with a GPS rover and Automatic Level, for use during the duration of the contract. At the end of the contract, the GPS rover and Automatic Level will be returned to the Contractor. The Contractor shall provide a total of 8 hours of formal training on the Contractor's GPS machine control system to the Engineer and up to three additional Department appointees per rover.

2. The Contractor shall review and apply the data provided by the Department to perform GPS machine control grading.

3. The Contractor shall bear all costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to application of GPS machine control grading techniques. Grade elevation errors and associated corrections including quantity adjustments resulting from the contractor's use of GPS machine control shall be at no cost to the Department.

4. The Contractor shall convert the electronic data provided by the Department into a format compatible with their system.

5. The Contractor's manipulation of the electronic data provided by the Department shall be performed at their own risk.

6. The Contractor shall check and if necessary, recalibrate their GPS machine control system at the beginning of each workday in accordance with the manufacturer's recommendations, or more frequently as needed to meet the requirements of the project.

7. The Contractor shall meet the accuracy requirements as detailed in the Standard Specifications.

8. The Contractor shall establish secondary control points at appropriate intervals and at locations along the length of the project. These points shall be outside the project limits and/or where work is performed. These points shall be at intervals not to exceed 1000 feet. The horizontal position of these points shall be determined by conventional survey traverse and adjustments from the original baseline control points. The conventional traverse shall meet or exceed the Department's Standards. The elevation of these control points shall be established using differential leveling from the project benchmarks, forming a closed loop. A copy of all new control point information including closure report shall be provided and approved by the Engineer prior to construction activities. The Contractor shall be responsible for all errors resulting from their efforts and shall correct deficiencies to the satisfaction of the Engineer and at no additional cost to the Department.

9. The Contractor shall provide stakes at all alignment control points, at every 500 foot stationing, and where required for coordination activities involving environmental agencies and utility companies at the Contractor's expense. Work that is done solely for utility companies and that is beyond the work performed under item 763501 - Construction shall follow and be paid for under item 763597 -Utility Construction Engineering.

10. The Contractor shall at a minimum set hubs at the top of finished grade at all hinge points on the cross section at 500 foot intervals on the main line and at least 4 cross sections on side roads and ramps as directed by the engineer or as shown on the plans. Placement of a minimum of 4 control points outside the limits of disturbance for the excavation of borrow pits, Stormwater Management Ponds, wetland mitigation sites etc. These control points shall be established using conventional survey methods for use by the Engineer to check the accuracy of the construction.

11. The Contractor shall preserve all reference points and monuments that are identified and established by the Engineer for the project. If the Contractor fails to preserve these items the Contractor shall reestablish them at no additional cost to the Department.

12. The Contractor shall provide control points and conventional grades stakes at critical points such as, but not limited to, PC's, PT's, superelevation points, and other critical points required for the construction of drainage and roadway structures.

13. No less than 2 weeks before the scheduled preconstruction meeting, the Contractor shall submit to the Engineer for review a written machine control grading work plan which shall include the equipment type, control software manufacturer and version, and proposed location of the local GPS base station used for broadcasting differential correction data to rover units.

14. The Contractor shall follow the guidelines set forth in the "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques" and follow a minimum of Second Order Class 1, (2-I) classification standards.

Automated equipment operations have a high reliance on accurate control networks from which to take measurements, establish positions, and verify locations and features. Therefore, a strong contract control network in the field which is the same or is strongly integrated with the project control used during the design of the contract is essential to the successful use of this technology with the proposed Digital Terrain Model (DTM). Consistent and well designed site calibration for all machine control operations (as described below under *Contract Control Plan*) are required to ensure the quality of the contract deliverables. The Contract Control Plan is intended to document which horizontal and vertical control will be held for these operations. Continued incorporation of the Base Station(s) as identified in the Contract Control Plan is essential to maintaining the integrity of positional locations and elevations of features. The Contract Control Plan shall be submitted to the Department for review and approval by the Departments Survey Section 3 weeks prior to the start of any machine control work. The Contractor shall operate and maintain all elements of the Machine Grade Control continuously once the operations begin until otherwise approved by the Engineer.

Contract Control Plan:

The Contractor shall develop and submit a Contract Control Plan for all contracts which use Machine Control Grading. Contract control includes all primary and secondary horizontal and vertical control which will be used for the construction contract. Upon the Contractor's completion of the initial survey reconnaissance and control verification, but prior to beginning primary field operations, the Contractor shall submit a Contract Control Plan document (signed and sealed by the Delaware licensed Land Surveyor or Delaware Professional Engineer who oversees its preparation) for acceptance by the Engineer, which shall include the following:

1. A control network diagram of all existing horizontal and vertical control recovered in the field as contract control.

2. Include a summary of the calculated closures of the existing control network, and which control has been determined to have been disturbed or out of tolerance from its original positioning.

3. An explanation of which horizontal and vertical control points will be held for construction purposes. If necessary include all adjustments which may have been made to achieve required closures.

4. An explanation of what horizontal and vertical control (including base stations) was set to accomplish the required stakeout or automated machine operation. Include how the position of these new control points was determined.

5. Describe the proposed method and technique (technology and quality control) for utilizing the control to establish the existing and/or proposed feature location and to verify the completed feature location and/or measured quantity.

6. A listing of the horizontal and vertical datums to be used and the combined factor to be used to account for ellipsoidal reduction factor and grid scale factor.

7. If the Contractor chooses to use machine control as a method of measuring and controlling excavation, fill, material placement or grading operations as a method of measuring and controlling excavation, fill, material placement or grading operations, the Contractor Control Plan shall include the method by which the automated machine guidance system will initially be site calibrated to both the horizontal and vertical contract control, and shall describe the method and frequency of the calibration to ensure consistent positional results.

8. Issues with equipment including inconsistent satellite reception of signals to operate the GPS machine control system will not result in adjustment to the "Basis of Payment" for any construction items or be justification for granting contract time extension.

Method of Measurement:

The quantity of Construction Engineering will not be measured.

Basis of Payment:

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

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

3/27/15

763503 - TRAINEE

Description:

The item shall consist of providing training in the construction crafts in accordance with the requirements stated in the General Notices of this proposal under the Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246).

Basis of Payment:

The payment for the item shall be made at a fixed rate of $.80 per hour toward the hourly rate of the trainee.

5/2/02

763508 - PROJECT CONTROL SYSTEM DEVELOPMENT PLAN
763509 - CPM SCHEDULE UPDATES AND/OR REVISED UPDATES

Description:

The Contractor shall plan, schedule and construct the Project by using a Critical Path Method Project Schedule (CPM) meeting the requirements of these specifications. Use the CPM for coordinating and monitoring the Work specified in the Contract Documents including all activities of Subcontractors, vendors, suppliers, utilities, railroads, the Department, and all other parties associated with the construction of the Contract. Include all Work in the CPM; including but not limited to submittals, major procurement, delivery, and construction activities. Include all activities, including bid items, quantified in the Contract Documents. Base the CPM upon the entirety of the Contract Documents. Utilize CPM software that generates files compatible with Primavera P6 Project Management Release: 7.0.0.

Scheduling Representative:

Designate a scheduling representative prior to submission of the Original Critical Path Method Project Schedule (OCPM). The scheduling representative is the person primarily responsible for development and maintenance of the CPM schedule; the Contractor's representative in all matters regarding the schedule; and the Contractor's designated attendee for all schedule related meetings. The scheduling representative shall also be knowledgeable of the status of all parts of the Work throughout the duration of the Project. Replacement of the scheduling representative will require written approval from the Engineer.

Submit the qualifications of the scheduling representative to the Engineer for approval. This approval is required before the OCPM will be accepted. The scheduling representative shall have at least three years of verifiable experience for preparing and maintaining CPM project schedules on Contracts of similar size and complexity.

Critical Path, Project Completion Date, and Float:

The critical path is defined as the series of activities in a CPM that has the longest path in time. The submitted activity sequence and durations must generate a CPM with only one critical path. Divide Project wide activities such as Maintenance of Traffic, Construction Engineering, or Temporary Erosion Control that, by their nature, generate long durations and complement other activities into "establish" and "conclude" activities to prevent this type of Work from occupying a significant portion of the critical path.

The project start date, or initial data date, of the original CPM shall be the first chargeable day of Work. Nonproductive Work and administrative activities may begin and/or end prior to the project start date. The Original CPM must use all of the Contract Time and contain a critical path containing exactly zero float. Early completion schedules are not permitted. The schedule ending date of the Original CPM that uses all of the Project Time is the contract completion date.

Total Float is the difference between the schedule's finish date and the contract completion date. Free float is the difference in time between an activity's early finish and late finish. Free float is a shared commodity for the use of the Department and the Contractor and is not for the exclusive use or benefit of either party. Both parties have the full use of free float until depleted.

Submittal of the OCPM; the Start of Work and the Schedule of Record:

Complete and submit the proposed original CPM schedule (OCPM) database and the written narrative (WN) within 30 calendar days after Contract is Awarded. The WN is a description of any elements of the Schedule that deviate from the proposed construction sequence shown in the Contract Documents. Submit the OCPM in CPM format fully compatible with Primavera P6 Project Management Release: 7.0.0 by email or CD ROM as a single compressed database in CPM format.

The Engineer will complete the review of the OCPM within 30 calendar days after submittal. If required, a Joint Review Conference will be convened at which time the Engineer and Contractor may make corrections and adjustments to the proposed OCPM. If a revision is necessary due to the Engineer's review or the Joint Review Conference, submit the proposed revision within seven calendar days after receiving the Engineer's review comments or within seven calendar days after the date of the Joint Review Conference, whichever is the latest. Make revisions in accordance with the requirements for the OCPM. The Engineer will respond to the revised OCPM within seven calendar days after receipt. Clearly identify each submittal and resubmittal for clarity by labeling "2nd Draft", "3rd Draft", etc.

Do not start any Work until the OCPM is accepted. If the Engineer is ready to issue a Notice to Proceed but the OCPM is not yet accepted, the Engineer may issue the NTP and start Contract Time, but forbid Work to begin until the OCPM is accepted. The Engineer may partially accept a OCPM and allow Work to begin if the required corrections to the OCPM are minor, but the Engineer will not accept submittals that do not show the complete schedule. The Engineer will not pay any estimates until the OCPM is partially accepted. Once the OCPM is partially accepted, the Engineer will pay the first estimate. If the Contractor fails to make a good faith effort to address the Engineer's comments before the second estimate is due for payment, the Engineer will not pay the second estimate until a good faith effort is made by the Contractor to comply. The Engineer may not withhold an estimate payment if, within the estimate period in question, the Engineer has failed to provide timely review comments in response to the Contractor's submittal. The Engineer may, however, withhold the payment of subsequent estimates if the Contractor fails to make a good faith effort to address the Engineer's comments. Upon issuance of the Notice to Proceed, the start date utilized in the OCPM will be adjusted to comply with the first chargeable day of Work. Any delay in starting Work caused by the acceptance of the OCPM by the Engineer will not be considered as a basis for any adjustment in the Contract amount or time. For Contracts that have fast-tracked starts, the Engineer and the Contractor may agree to alter the response times and approval dates listed above.
Upon notification that the OCPM has been accepted, the corrected copy will become the CPM of record. The CPM of record shall be the Contractor's work plan for completing the entire Contract as specified in the Contract Documents.

Requirements for the OCPM:

The format of the OCPM database shall be the precedence diagram method with days as the planning unit and shall be based on Calendar Days. Use the Department's partially predetermined coding structure (CS) that is furnished by the Engineer.

Activity Sequencing. Activity sequence must be logical and representative of the Contractor's order of the Work. Successors and predecessors determine the schedule logic or activity sequence. A given activity cannot start until all of the given activity's predecessors have been completed. Use only finish to start dependency relationships (links); do not use lag times without approval from the Engineer. The Engineer may request that the Contractor resequence the activities to reflect realistic job logic. When scheduling using multiple resources, each resource unit shall have a corresponding activity. Durations of activities include all the time necessary to complete the activity including, but not limited to, Contractor's non-work periods (other than those shown on the calendars), reasonably foreseeable inclement weather, weekends and holidays. Base schedule calculations on retained logic, contiguous durations, and total float as finish float.

Activity Resources. Sequence activities to reflect resource apportionment. Logically connect and code each activity to reflect the crew (resource) performing the operation. Submit a summary list of crews, their crew codes, and their operation(s) with each schedule submission, unless unchanged. Identify responsibility for each activity. Identify Subcontractors, DBE's, utilities and Work performed by others that affects the Schedule.

*Breakdown and Durations of Activities***.** An individual activity is required for each construction element or each activity not under the control of the Contractor that affects the sequence or progress of the Work. The Engineer reserves the right to require additional breakdown of the Work activities at any time. Each activity must be identified by a name, symbol and coding, and shall have a duration, sequence, responsibility and resource(s). Choose activity names that are descriptive and identify single construction elements. Activity symbols, or ID's, shall be unique and systematic.

Activity types must be either "task", "start milestone", or "finish milestone". Do not use "hammock" type activities. Date constraints, float and duration constraints, and/or flags for activities are not permitted.

Assign a reasonable duration to each activity representative of its scope. Durations may not exceed 14 calendar days unless approved by the Engineer. Determine the duration of each activity by using productivity rates based on Calendar Days.

Include the preparation and approval of Working Drawings as activities. Include phasing (staging) milestones as activities. Correlate phasing milestones with the sequence of construction provided in the Contract Documents. Use a separate start and finish milestone activity to delineate each phase (stage).

Utility Work. Include all Work performed by utilities on the Project as activities in the OCPM. Include each utility item of Work shown in the Contract's Utility Statement as an activity. Durations for utility activities shall be the same as the durations shown in the Utility statement for each activity unless otherwise approved by the Engineer.

Calendars. Assign a calendar to each activity in the schedule. Use a minimum of 6 calendars, when applicable: (1) Full Schedule; (2) Permit Requirements; (3) Winter Condition; (4) Concrete Work; (5) Asphalt Paving Work; and (6) Nighttime Asphalt Paving Work. Use additional calendars if needed. Calendar non-work periods shall reflect the average Delaware weather history for the jobsite and the restrictions identified in the Contract Documents. The Contractor may choose perform Work during an activity's calendar non-work period at no additional cost to the Department if weather conditions are favorable for such Work and the Work does not violate a set forth in the Contract Documents. The maximum allowable non-work period for each calendar is set forth below. The Contractor may choose to shorten non-work periods at his/her discretion.

CALENDAR	MAXIMUM NON-WORK PERIOD
Full Schedule	None
Winter Condition	December 1 through March 15
Concrete Work	December 1 through March 15
Asphalt Paving	November 15 through March 15
Nighttime Asphalt Paving	October 15 through April 30

Written Narrative (WN). Provide a written narrative (WN) as part of the OCPM explaining the following:

(a) Relationships between activities not obviously identified
(b) Equipment usage and limitations.
(c) Manpower usage and limitations.
(d) Use of additional shifts and overtime.
(e) Activity codes, abbreviations, and activity identification system.
(f) All calendars utilized in the CPM and the basis of determining each non-work period
(g) All abbreviations.
(h) Use of calendars.
(i) Any other conditions that affect the schedule and are not readily discernible in the database.

CPM Updates:

Provide monthly updates to the CPM of record. Meet with the Engineer once a month prior to submitting the update to review the status of the schedule's activities. Prepare an updated list of activities showing all of the actual start and actual finish for each of the schedule's activities so that both parties can agree on the dates. Use the dates that were agreed upon in the meeting to status the CPM of record and submit the updated schedule to the Engineer for approval. Assign a unique file name to each update (Number/version). The data date of the update shall be the next day after the end of the update period. As part of the monthly update, submit a written description that identifies any delays or disruptions to the schedule experienced during the period of an update, any change in manpower or equipment, and any potential delays to the completion date of the schedule.

Do not include any revisions to the CPM without prior approval. Failure to submit complete updates in a timely manner may result in the withholding of estimates by the Engineer. The Engineer agrees to refrain from withholding estimates unless the Contractor is habitually late in providing updates, is more than four weeks late in submitting an update or has failed to submit an update that is part of a resolution to a serious problem that must be addressed immediately.

Revisions to the Schedule of Record:

Revisions are defined as any changes to the database other than status updates, log entries and moving the data date. Discuss any proposed revisions to the CPM verbally with the Engineer. If the revision is minor in nature, the Engineer may allow the revision to be included on the next Update of the CPM. If the Engineer determines that the revision is not minor in nature, submit the proposed revision for review and approval prior to deviating from the approved CPM. When a revision to the CPM is required due to changes in the Contract initiated by the Engineer, immediately contact the Engineer to discuss the changes. The Engineer may allow a deviation from the approved CPM for specific mitigating activities.

The Engineer may direct the Contractor to revise the schedule of record at the Contractor's expense if: the critical path has less than minus ten (-10) Calendar Days of total float due to the Contractor's failure to perform the Work in accordance with the schedule; the Contractor requests to re-sequence the Work; and/or the Contractor has performed a significant amount of Work out of sequence. The Engineer may direct the Contractor to revise the schedule for any other reason; and such a revision will be paid at the unit cost for a CPM Revision.

The Engineer will review and respond to the proposed revision within 7 Calendar Days after receipt. Resubmit, if required, within seven calendar days after receipt of the Engineer's review comments. The Engineer reserves the right to reject any proposed revision that adversely impacts the Department, utilities, or other concerned parties.

Extensions of Contract Time and/or Incentive/Disincentive Dates.

Make requests for extension of Contract time in writing and subject to the notice and timeliness of submission provisions as provided for elsewhere in the Contract. Requests for an extension of Contract time or change in an incentive/disincentive date will be evaluated by the Engineer's analysis of the CPM of record and any proposed revision submitted. Include in the request a written narrative of the events that impacted the schedule and a detailed explanation of why the Contractor cannot meet the requirements of the schedule of record. Only delays to activities that affect the Contract completion date or will be considered for an extension of Contract time. Only delays to activities that affect the completion duration of an incentive/disincentive period will be considered for an extension of an incentive/disincentive completion date. The extension of the specified Contract completion date or incentive/disincentive date will be based upon the number of Calendar Days the Contract completion date or incentive/disincentive date is impacted as determined by the Engineer's analysis. The Engineer and Contractor may agree to defer the analysis of a potential impact to the schedule until the completion of the activities that are affected. Such a deferment does not relieve the Contractor of his/her duty to identify potential impacts to the schedule in the applicable schedule updates.

All requests for extensions of Contract Time must be supported by the most recent CPM Update. If, within a reasonable period of time, the Contractor fails to make a good faith effort to produce an acceptable CPM update and uses an unacceptable CPM update to support a request for a time extension, the Contractor loses the right to receive that time extension; and/or the right to receive compensation for that delay caused in whole or in part by the Engineer.

Final As Built Schedule.

Submit a final CPM Schedule database within 14 Calendar Days of Substantial Completion. Failure to submit a final CPM Schedule may result in the withholding of estimates by the Engineer.

Method of Measurement:

The Project Control System will be measured in two items. The item, "Project Control System Development Plan" will be lump sum. The item "CPM Schedule Updates and/or Revised Updates" will be measured one each per update that is submitted and accepted.

Basis of Payment:

The item, "763508 – Project Control System Development Plan" will be paid at the Contract's lump sum bid price on the next monthly estimate after completion of the requirements of the Project Control System Development Plan, which includes the approval of the Original CPM Schedule. Price and payment will constitute full compensation for preparing the CPM database, acquiring the necessary software, attending all scheduling meetings with the Department, submitting and resubmitting all documents and for all labor, tools, equipment and incidentals necessary to complete the Work.

The item, "763509 – CPM Schedule Updates and/or Revised Updates" will be paid at the Contract unit price per each approved CPM schedule update as described above. Price and payment will constitute full compensation for preparing, submitting and resubmitting all CPM updates, for attendance at all scheduling meetings with the Department, for preparing and reviewing a list of actual start and actual finish dates with the Engineer, and for all labor, tools, Equipment and incidentals necessary to complete the Work.

2/11/2015

907510 - COMPOST FILTER LOG

Description:

This item shall consist of furnishing all materials and constructing a compost filter log in accordance with the locations and notes on the Plans and/or as directed by the Engineer.

Materials:

The filter sock shall be 5 millimeter biodegradable HDPE material, and be at least 18" in diameter. The compost media used within the logs shall be a plant derived compost that complies with compost material standards and DNREC specifications (see table below), including being produced from a certified facility through the U.S. Composting Seal of Testing Assurance (STA) program.

Parameter	Range	Testing Method
Particle Size	For Amendments: 100% pass through a ½" screen For Compost Logs: 99% pass through a 2" screen; max. 40% pass through a 3/8" screen	TMECC 2.02-B
pH	6.0-8.0	TMECC 4.11
Manufactured Inert Material	<1% dry weight basis	TMECC 3.08-A
Organic Matter	35-95% dry weight basis	TMECC 5.07-A
Soluble Salt Concentratio	</= 6.0 mmhos/cm	TMECC 4.10-A
Carbon to Nitrogen Ratio	</= 25:1	
Stability (Carbon Dioxide evolution rate)	</= 2 C / unit VS / day	TMECC 5.08-B
Maturity (seed emergence and seedling vigor)	>90% relative to positive control	TMECC 5.05-A
Trace Metals	"Pass"	
Dry Bulk Density	12.5-25 lb/cu.ft.	
Moisture content	40-50%	

Construction Methods:

The compost filter logs shall be assembled by tying a knot in one end of the filter sock, filling the sock with the composted material, then knotting the other end once the desired length is reached. The compost shall be uniform throughout the sock and shall not have any gaps or the presence of large materials that would impede flow and/or create gaps. The compost filter log may be supplied pre-filled and simply rolled out in place.

The ends of the compost filter log should be angled upslope to prevent runoff from washing around the ends; minimum one foot (1') elevation difference. Stakes shall be installed through the middle of the compost filter log, maximum four feet (4') on center. The stakes shall be hardwood stakes, minimum 2" x 2" and 36" long. The stakes shall be set a minimum 12" below grade.

The compost filter logs shall be inspected weekly and after storm events. Accumulated sediment shall be removed when it reaches half of the effective height of the sock, and disposed of in an appropriate manner. If the sock fabric is torn or damaged prior to completion of the project, the compost filter log shall be replaced at the expense of the contractor. If the compost filter log has been flattened due to equipment or vehicular traffic, it shall be re-shaped back to proper dimensions. If the effective height cannot be restored, then the compost filter log shall be replaced at the expense of the contractor.

Upon completion of construction and stabilization of disturbed areas, the contractor shall remove the compost filter log in its entirety.

Method of Measurement:

The quantity of compost filter logs, completed in place and accepted, shall be paid for at the Contract bid per linear foot for "Compost Filter Logs"

Basis of Payment:

Price and payment shall constitute full compensation for furnishing all materials including filter socks, compost material, wooden stakes, disposal of surplus and unsuitable materials, removal and disposal of used filter sock and sediment during and upon completion of construction and for all labor, tools, equipment and incidentals necessary to complete the item.

6/8/15

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

JENNIFER COHAN
SECRETARY

Utility Statement
May 4, 2017
Revised May 23, 2017
STATE CONTRACT #T201112201
SR 1, NE FRONT STREET GRADE SEPARATED INTERSECTION
F.A.P #NHS – K008 (13)
P6 #09-25000

The following utility companies own and/ or maintain facilities within the project limits:

Delaware Electric Cooperative
Comcast Cablevision
Verizon Delaware, LLC
City of Milford, Electric
City of Milford, Public Works Water
City of Milford, Public Works Sewer
Kent County Engineering
Chesapeake Utilities
Unknown Telecommunication Cable

The following companies will perform proposed utility relocations to their existing utility facilities as described. Additional utility relocations during construction will be performed by the respective agencies as warranted and directed by the DelDOT Construction Engineer, Supervisor, and/or Inspector.

Delaware Electric Cooperative

Delaware Electric owns and maintains an existing aerial electric span, utility poles and appurtenances on the noted offsets of NE Front Street, New Wharf Road, NE 10th and Silicato Parkway as follows:

1518+35 LEFT (RL/O)	54666 NE FRONT
1517+12 RT (RL/O)	54667 NE FRONT
1520+45 RT (DND)	55664 NE FRONT
1523+25 RT (DND)	UNKN NE FRONT
1525+30 LEFT (DND)	54651 NE FRONT
1525+30 RT (DND)	54662 NE FRONT
*525+15 LEFT (RL/O)	54652 NE FRONT

1526+65 RT (RL/O)	54645 NE FRONT
1528+45 RT (RL/O)	54644 NE FRONT
1531+50 RT (RL/O)	54643 NEW WHARF
1534+10 RT (RL/O)	54641 NEW WHARF
1535+35 LEFT (DND)	54639 NEW WHARF
1535+35 RT (DND)	54638 NEW WHARF
1537+85 RT (DND)	54636 NEW WHARF
1540+45 LEFT (DND)	54635 NEW WHARF
1541+20 RT (DND)	54633 NEW WHARF
1544+05 LEFT (DND)	54632 NEW WHARF
1544+70 RT (RL/O)	54631 NEW WHARF
1546+45 RT (DND)	54630 NEW WHARF
1547+65 LEFT (DND)	54629 NEW WHARF
1548+20 RT (RL/O)	54628 NEW WHARF
1550+35 LEFT (RL/O)	NE 10TH
1550+25 RT (RL/O)	54627 NEW WHARF
*44+00 (DND) EAST OFFSET OF RAMP C	650460/250205 @ PUMP STATION
*45+30 (RL/O) WEST OFFSET OF RAMP C	Pole Number: Unknown
1925+80 LEFT (DND)	550460/250200 SLCTO
1927+35 LEFT (DND)	550460/250195 SLCTO
1928+95 LEFT (DND)	550460/250195 SLCTO
1930+60 LEFT (DND)	550460/250185 SLCTO
1932+20 LEFT (DND)	550XX/250180 SLCTO
1933+80 LEFT (DND)	550460/250175 SLCTO
1935+40 LEFT (DND)	550460/250170 SLCTO
1936+95 LEFT (DND)	550460/250165 SLCTO
1938+65 LEFT (DND)	550460/250160 SLCTO

DEC maintains a two phase aerial span on NE Front St between stations 1513+00 and 1528+45.

The two phase aerial span traverse SR 1 between utility pole # 54644 at stationing 1528+45 RT (in the NE Front / SR 1 intersection) unto utility pole # 54643 at stationing 1531+50 RT (in the SR 1/ New Wharf Road intersection).

A three phase aerial span continues eastward on the north and southern offset of New Wharf Rd, unto the NE 10th St.
On the northern (left) offset of the existing NE Front Street at stationing 1515+00, DEC utility pole 550259/240573 has an u.g. line proceeding westward for 45ft which then extends beneath the existing NE Front street, perpendicular to the alignment at station 1514+45.

At stationing 1708+10 DEC maintains an existing buried cable in between the NE and Se offset of the NE 10th/ SR 1 intersection.

NOTE:
On Silicato Parkway, DEC maintains an existing buried facility at pole 550460/250200 @stationing 1925+85 that continues northward unto station 1926+80 wherein in extends beneath Silicato Parkway unto the eastern offset of the road shoulder and terminating at an existing electric cabinet. The facility continues northward unto stationing 1928+00 onto private property.
This facility will be adjusted in the field as warranted to avert impact to the proposed 10" water installation for the City of Milford.

DEC proposes to perform utility relocations beginning at eastern most part of New Wharf Rd at the NE 10th intersection and continuing westward unto NE Front Street as follows:

Beginning at a point beyond the construction limits on NE 10th DEC will install a new 3-phase aerial electric line from the NW offset of NE 10th unto a newly installed utility pole on the southern offset of New Wharf Rd near stationing 551+60 (in a position rearward of the proposed ditch and CZ)..

From the newly installed pole (on the southern offset of New Wharf Rd at stationing 551+60), a 3-phase aerial strand extends westward along the southern alignment of the proposed New Wharf Rd unto a newly installed utility pole at stationing 548+85 (at a position rearward of the proposed ditch and CZ).

From the newly installed pole in the southern alignment of the proposed New Wharf Rd at stationing 548+85, a 3-phase aerial strand extends northward unto the opposite offset of the proposed New Wharf Rd at stationing at a newly installed utility pole (positioned rearward of the proposed CZ, aligning with the existing 3-phase aerial span on the southern offset of the existing New Wharf Rd unto stationing 1535+40).

DEC will replace its existing utility poles with newer poles throughout the southern offset of the existing New Wharf Rd beginning at stationing 1533+00 unto the proposed New Wharf Rd connection.

At stationing 1533+50 on the southern offset of the existing New Wharf Road, DEC will install a new utility pole and begin its underground installation at this location.

The underground installation proceeds southward from its origin, and extends beneath the proposed New Wharf Rd at stationing 533+50 into its southern offset road shoulder.

The u.g. installation continues westward as shown on plans, and extends beneath SR 1's northbound and southbound travel lanes; and thereafter into the SW leg of the SR 1- Southbound lane & existing NE Front St intersection. *(This installation will coordinate with the proposed installation of the 10" Water Main (as shown on plans to avert conflict)*;

At the SW leg of the SR 1 – SB lane & existing NE Front Street, DEC will install a 3 phase transformer cabinet. A single phase buried facility continues westward from the cabinet along the southern offset of the existing NE Front Street unto a newly installed utility pole at stationing 1524+00.

An additional new pole will be installed at stationing 1523+00 along the same offset in alignment with described pole installed at 1524+00.

At the proposed pole installed on the southern offset of the existing NE Front Street at station 1524+00, DEC proposes to install an underground facility proceeding northward into the northern offset of the proposed NE Front St & Ramp "C" intersection.

DEC will install a pad-mounted transformer for DelDOT lighting services at this location.

DEC is advised to use caution while working on the southern offset of the existing New Wharf Road within the vicinity of the existing buried 10" water main between stations: 1534+00 and 1535+50 (at the cul-de-sac), and while working between stations 1544+00 and 1545+50.

DEC is advised to use caution while working on the southern offset of the existing NE Front Street within the SR 1 –SB lane & the existing NE Front St intersection to avert conflict with the proposed 10" water main installation.

DEC will make adjustments as warranted to the u.g. electric service on the southern offset of existing NE Front Street at the stationing 1523+30 for the proposed ditch excavation.

The existing 3 phase aerial span on the northern offset of the existing New Wharf Rd between stationing 1535+00 unto 1549+00 will not be relocated.

The existing 3 phase aerial span on the southern offset of the existing New Wharf Rd between stationing 1535+00 unto 1547+00 will not be relocated.

Any additional relocations/adjustments to DEC facilities shall be arranged, if necessary during the construction of the project. The time to complete any relocations/adjustments will depend on the nature of the work.

Utility relocations require 90 days to perform after receiving 30days advanced notice.

Utility relocations shall occur in advance of the construction project after pertinent features are staked-out/identified in the field as warranted (i.e. right-of-way, proposed road/bridge features, clearing and grubbing; cuts and fills) and upon issuance of Notice To Proceed from the Utility Engineer.

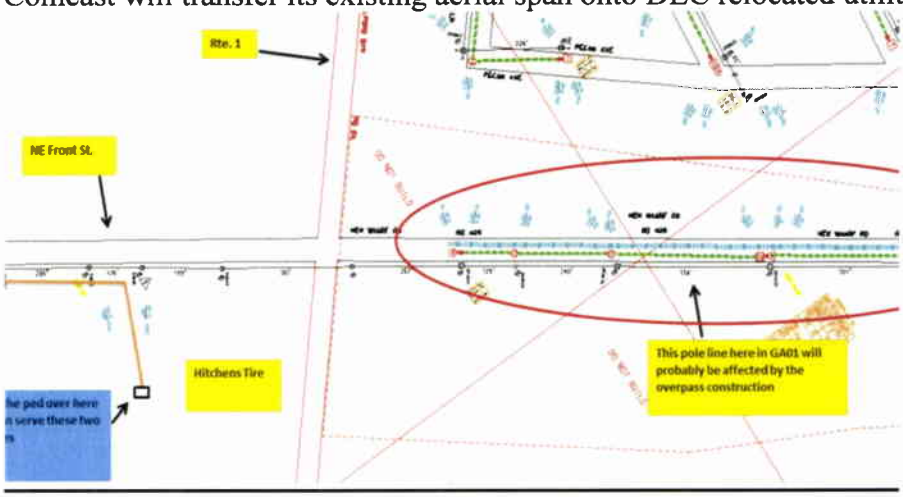
No facility can be taken out of service until the replacement facility has been installed and in operation.

Comcast

Comcast maintains an existing underground facility on the SE offset of the NE Front St between stations 1516+00 and 1527+00. The facility was installed after 2013 (when the Dept. obtained subsurface utility engineering). Adjustments will be performed as warranted to avert conflict with the proposed swale on the SE offset of NE Front between stations 1516+00 and 1528+50.

Comcast maintains aerial facilities on DEC utility poles on New Wharf Road.

Comcast will transfer its existing aerial span onto DEC relocated utility poles in like kind.



Comcast maintains an underground service on the southern (right) offset of Silicato Parkway between stationing 1937+00 unto 1939+00 that will remain in place.

Any additional relocations/adjustments to Comcast facilities shall be arranged, if necessary during the construction of the project. The time to complete any relocations/adjustments will depend on the nature of the work.

Utility relocations require 30 days to perform after receiving 30days advanced notice.

Utility relocations shall occur in advance of the construction project after pertinent features are staked-out/identified in the field as warranted (i.e. right-of-way, proposed road/bridge features, clearing and grubbing; cuts and fills) and upon issuance of Notice To Proceed from the Utility Engineer.

No facility can be taken out of service until the replacement facility has been installed and in operation.

Verizon's existing facilities have an origin westward of the construction limits, and abide on the northern (left) offset of the existing NE Front St between stations 1512+00 unto 1528+00; beneath SR 1 between stations 1528+00 unto 1531+00; and the northern (right) offset of New Wharf Rd between stations 1531+00 unto 1552+00.

On the northern (left) offset of the existing NE Front Street construction alignment, Verizon's existing u.g. telecommunication facility extends from station 1512+00 and unto an existing pedestal at stationing 1528+40.

An underground installation proceeds southward from the pedestal, beneath the existing NE Front St onto private property and continues in that direction beyond the project limits.

At stationing 1528+40 a buried facility proceeds eastward beneath SR 1 into the north-western (left) offset of the existing New Wharf Road and terminates at an existing pedestal at stationing 1532+70.

At stationing 1532+70 (on New Wharf Rd), two buried cables proceed eastward unto a pedestal at stationing 1538+05.

At stationing 1538+05 a singular cable continues eastward from the pedestal unto stationing 1546+00.

At station 1546+00 a singular cable continues along the shoulder into the south west leg of the NE 10th / New Wharf Rd intersection; and extends beneath NE 10th into the north-west leg of the intersection, continuing eastward along the offset of New Wharf Rd. beyond the construction limits.

An existing u.g. line extends beneath NE Front St at station 1521+00 (perpendicular to the alignment).

At NE Front St, on the northern (left) offset of the existing station 1521+10 a buried facility (perpendicular to the alignment) proceeds onto the southern (right) offset of NE Front, and continues unto station 1523+25 terminating at DEC utility pole.

An existing u.g. line extends beneath NE Front St at station 1521+20 (perpendicular to the alignment), and extends eastward

Verizon maintains an existing buried facility in the southern (right) offset of NE 10th St between station 1700+00 and an existing pedestal in the SW leg of the (SB) SR 1 / NE 10th St intersection (@ 1709+50);

at a location within the SW leg of the intersection a cable proceeds beneath SR 1 (from the southbound offset to the northbound) at stationing 1232+00.

Verizon proposes to install new u.g. facilities of the northern (left) offset of the proposed NE Front St unto the existing New Wharf Road.

Verizon's 25 pair buried cable on northern (left) offset of NE Front St between stations 1513+00 and 1532+25 will be abandoned in place.

Verizon's existing 100 pair buried cable (on the left offset), and underground service wire (on the right offset) of the existing NE Front St between stations 1521+25 unto 1528+40 (within NE Front / SR 1 SB intersection) will remain in place; *adjustments to Verizon's u.g. facility will occur as warranted to avert conflict with proposed rip rap outlet in the NE Front / SR 1 SB intersection.*

Verizon's u.g. "duct-bank" beneath SR 1 will be abandoned in place.

Verizon's 100 pair buried cable along the northern (left) offset of the existing New Wharf Rd between stations 1532+67 unto the NE 10th St intersection (at stationing 1553+17) will remain in place.

Verizon will adjust telephone pedestals labeled as RL/O on construction plans as shown.

Any additional relocations/adjustments to Verizon facilities shall be arranged, if necessary during the construction of the project. The time to complete any relocations/adjustments will depend on the nature of the work.

Utility relocations require 30 days to perform after receiving 30days advanced notice.

Utility relocations shall occur in advance of the construction project after pertinent features are staked-out/identified in the field as warranted (i.e. right-of-way, proposed road/bridge features, clearing and grubbing; cuts and fills) and upon issuance of Notice To Proceed from the Utility Engineer.

No facility can be taken out of service until the replacement facility has been installed and in operation.

City of Milford, Electric owns and maintains an existing three phase aerial span and utility poles on the southern (left) offset of Silicato Parkway between stations 1925+00 unto 1939+00 as follows:

550460/250205	(Lft)	At/near Pump Station
550460/250200	(Lft)	Station 1925+85
550460/250195	(Lft)	Station 1927+50
550460/250190	(Lft)	Station 1928+80
550460/250185	(Lft)	Station 1930+55
550460/250180	(Lft)	Station 1932+00
550460/250175	(Lft)	Station 1933+80
550460/250170	(Lft)	Station 1935+40
550460/250165	(Lft)	Station 1937+00
550460/250160	(Lft)	Station 1938+50

City of Milford Electric, proposes to leave the entire pole span on the southern offset of Silicato Parkway in place. It is not impacted by proposed construction.

Existing utility pole #550460/250205 installed in front of the gated pump station will be relocated to a position rearward of the gated pump station and anchored.

City of Milford Electric owns and maintains two existing 3- phase aerial spans and utility poles on the north (left) offset of the proposed NE Front Street as follows:

550243/240576 (Rt)	Station 513+20
550259/240573 (Rt)	Station 514+90

City of Milford Electric proposes to move the existing utility pole #550460/250205 to a position rearward of the clear zone located near the front of the existing fence surrounding the pump station. C.O.M. will install a second pole, guy and anchor in a position rearward of the fence surrounding the existing pump station and transfer the aerial span onto the new poles.

City of Milford Electric proposes to install a new underground facility within the State's right of way on the northern (left) offset of the proposed NE Front Street beginning at an existing utility pole westward of the project limits.

The proposed buried installation will continue unto a proposed fiber-glass splice/service box installed at stationing 515+00 on the northern (left) offset of the proposed NE Front St. Afterwards, C.O.M. will remove the following two utility pole's along the northern offset of the proposed NE Front St:
550243/240576 at stationing 513+20 and
#550259/240573 at stationing 514+90.

Any additional relocations/adjustments to C.O.M. Electric facilities shall be arranged, if necessary during the construction of the project. The time to complete any relocations/adjustments will depend on the nature of the work.

Utility relocations require 30 days to perform after receiving 30days advanced notice.

Utility relocations shall occur in advance of the construction project after pertinent features are staked-out/identified in the field as warranted (i.e. right-of-way, proposed road/bridge features, clearing and grubbing; cuts and fills) and upon issuance of Notice To Proceed from the Utility Engineer.

No facility can be taken out of service until the replacement facility has been installed and in operation.

City of Milford Public Works - Water

Having an origin west-ward of the construction limits on the northern (left) offset of the existing NE Front Street, City of Milford maintains a buried 10" water main beneath the road shoulder between existing stations 1512+00 and 1528+55.

There the facility turns northward and extends 70 ft diagonally (NNE) into the existing road shoulder of the SR 1 SB/ NE Front St intersection; and beneath SR 1, (at stationing 61+18) into the existing road shoulder at the SR 1 NB/ New Wharf intersection.

The facility continues eastward & parallel to the existing road shoulder of the existing New Wharf Rd on its southern (right) offset of the construction alignment unto stationing 1551+10.

There, its direction turns NNW into the eastern offset road shoulder of the New Wharf & NE 10th intersection, and continues at that offset to a point beyond the construction limits.

City of Milford Public Works - Water proposes to install a new 10" water main as follows:

Beginning on the northern (left) offset of the proposed NE Front St at proposed stationing 513+00 City of Milford will attach a new 10" water main onto the existing 10"water main buried in the NE Front St road shoulder.

The installation continues at the described offset, unto proposed stationing 522+50 at the Ramp "C" / NE Front St intersection.

There, the proposal turns perpendicularly toward the NNW, and will follow the entire "Ramp C" western alignment unto the Silicato Parkway / Ramp "C" intersection.

There, the proposal continues along the southern offset of Silicato Parkway until connecting to existing 10" water main at stationing 44+50.

The 10" water main installation continues starting at stationing 520+00 crossing "Ramp C" and following the northern (left) offset of the existing NE Front Street connecting to the existing 10" water main at stationing 1521+50.

Continuing from stationing 1528+00 the 10" water main crosses State Route 1 by jack & bore then follows the southern (right) offset of "Ramp ?". At stationing 535+25 the main crosses "Ramp ?" continuing to the southern shoulder of New Wharf Road. There it connects to the existing 10" water main at stationing 1536+00.

The water main installation concludes starting at stationing 549+00 in the northern (left) offset of "Ramp ?" crossing Northeast 10th Street and connecting to existing 10" water main at stationing 552+00.

At the existing NE Front St at existing stationing 1514+45, two proposed 1" water-mains will be installed beneath roadway perpendicular to the construction alignment.

At the existing NE Front St at existing stationing 1514+70 a proposed 2" water-main will be installed beneath roadway perpendicular to the construction alignment.

At the existing Silicato Parkway at stationing 44+00 a proposed 1" water main will be installed to existing pumping station.

The proposal will be installed by the State's contractor and inspected by City Of Milford personnel or consultant representatives.

No facility can be taken out of service until the replacement facility has been installed and in operation.

City of Milford Public Works - Sewer

Having a (western) origin beyond the limits of construction on the southern (right) offset of NE Front Street, City of Milford maintains an existing 4" FM beneath the road shoulder between existing stationing 1512+00 and 1525+40, where it terminates at an existing sewer valve.

There, the 4" FM proceeds NNE, (beneath the proposed NE Front; and the proposed interior radius of proposed Ramp "C"), and continues in direction beyond the project limits.

The 4" FM re-enters the project limits at stationing 43+00 on the interior of Ramp "C" and connects into the existing pump station.

City of Milford Public Works - Sewer proposal:
Beginning on the southern (right) offset of the existing NE Front Street at stationing 1513+00 a new 4" sewer forcemain runs to stationing 1524+00.

There, the 4" FM proceeds NNE, (beneath the proposed NE Front, and proposed interior radius of proposed Ramp "C"), and continues along northern alignment of Silicato Parkway until connecting to existing 4" FM at stationing 43+00.

The forcemain extends on the southern (right) offset from stationing 1524+00 as a 2" line terminating at stationing 1663+00.

The proposed utility relocations will be performed by the State's contractor and inspected by City Of Milford personnel or consultant representatives.

No facility can be taken out of service until the replacement facility has been installed and in operation.

Kent County Engineering - Sewer
Having a point of origin beyond the construction limits, on the eastern (right) offset of the existing NE Front St, Kent County Engineering maintains an existing 18" FM between stationing 1513+00 and 1518+75.

At stationing 1518+75 the existing 18" FM turns perpendicular to the alignment into the western (left) offset of the existing NE Front road shoulder, and continues for 75ft. There it turns northward at existing stationing 1519+50 continues, beyond the project limits.

The existing 18" FM re-enters the project limits beneath proposed stationing 38+50 at Ramp "C" at a northward direction, and exits Ramp "C" at the exterior/western offset at stationing 43+00, and continues into private property of Silacto Parkway.

Kent County Engineering – Sewer proposal:

The proposal will be installed by the State's contractor and inspected by Kent County Engineering personnel or consultant representatives.

No facility can be taken out of service until the replacement facility has been installed and in operation.

The DelDOT Contractor shall perform the work for the Kent County Sewer relocations as described in the Contract Documents. In general, these relocations include:

Beginning at the eastern offset of the existing NE Front St. road shoulder at proposed sewer station 1004+05 (*i.e. proposed NE Front Street station 516+10)* a proposed 18" ductile iron pipe attachment will connect to the existing FM and continue unto sewer station 1007+04.50± (i.e. *proposed NE Front Street station 519+05).*

There the proposed 18-inch ductile iron pipe turns to the northwest and continues with two bends and then continues perpendicular to the proposed NE Front Street alignment, and will be encased and installed beneath the proposed NE Front Street from Sewer Station 1007+78± to Station 1008+43±; and afterwards continues NNW where the connection point shall be field verified.

Beginning at a point left of Ramp C Station 37+80±, the proposed 18 inch FM will tie-in to the existing FM at a point to be determined in the field. The proposed FM will then continue northward along the proposed RW-DA of Ramp C to a point left of Ramp C Station 43+50± where it will connect to the existing FM at a point to be determined in the field.

The proposed sewer facilities will be installed by the State's contractor per the Contract Documents and inspected by DelDOT, Kent County Public Works Department personnel and/or consultant representatives.

Simultaneous work must occur on both sewer relocation sites to minimize the downtime of the 18" force main as described in the Contract Documents.

Once the flow has been shut off to the existing line, renewal of service must be restored to the line in a time not to exceed 14 calendar days from the date of service termination. A minimum of fourteen calendar days of operation is required between any service interruptions.

The contractor shall provide Kent County DPW with a minimum advance notice of two business days to divert the flows during the connection work as described in the Contract Documents and a minimum advance notice of two business days to reintroduce the flows once the relocations have been accepted by the Kent County DPW.

These Utility relocations shall occur simultaneously with the construction project and shall be installed in advance of all other utilities and any other proposed features that may be installed above the relocation.

The existing facility can only be taken out of service during the work to make the connections between the existing and proposed facilities in accordance with the Contract Documents

Chesapeake Utilities

Chesapeake Utilities maintains buried high density plastic gas mains within the project limits as follows: Chesapeake Utilities maintains underground high density plastic gas mains within the project limits as follows:

Beginning at an existing gas locate station in the SW shoulder of NE 10th Street & Silicato Way an existing 2" gas main proceeds southward (parallel to Silicato Way) in the road shoulder to the interior radius of Ramp C (at/near station 44+30 i.e. near the existing pump station).

The 2" gas main proceeds eastward from the eastern/interior radius of Ramp C and attaches to/ties into an existing 4" gas main in the SB shoulder of SR 1 with a valve present on the 2" main before the tie-in.

At an existing gas locate station in the interior radius of proposed Ramp D/@ station 1450+48 a 4" gas in the SB lane road shoulder of SR 1 continues southward unto the NE Front Street intersection, (between existing SR 1 construction stationing 1222+70 and 1208+73).

At the NE Front Street intersection the 4" gas main attaches to/ties into

a (second) 4" existing gas main which is parallel to NE Front Street in it's northern (left) offset of the road shoulder, between existing construction stationing 1528+75 and 1512+00.

Chesapeake Utilities proposed relocations are as follows:

On the southern offset of the existing NE Front St road shoulder a new 2" gas main will be installed between stationing 1512+77 unto stationing 1529+00 (having an exterior offset of 10ft-20ft from the proposed swale). At stationing 1528+83 the proposed main turns perpendicularly north; and continuing parallel to SR 1 SB shoulder, "ties-into"/ "connects" to the existing gas main in the NNW road shoulder of SR 1 SB.

Beginning on the eastern offset of Ramp C/Ramp D at stationing 46+26 Chesapeake will install a new 2" gas main connecting to the existing. The installation continues SSE and connects into the existing main extending perpendicularly westward at the southern offset of Silcato Parkway.

Any additional relocations/adjustments to Chesapeake's Utilities' facilities shall be arranged, if necessary during the construction of the project. The time to complete any relocations/adjustments will depend on the nature of the work.

Utility relocations previously identified require 45 days to perform after receiving 30days advanced notice

Utility relocations shall occur in advance of the construction project after pertinent features are staked-out/identified in the field as warranted (i.e. right-of-way, proposed road/bridge features, clearing and grubbing; cuts and fills) and upon issuance of Notice To Proceed from the Utility Engineer.

No facility can be taken out of service until the replacement facility has been installed and in operation.

Notes Pertaining To Chesapeake Utilities:

The contractor shall be aware that Chesapeake Utilities has requirements while working near Chesapeake Utilities pipelines. These requirements are general in nature and not specific. These requirements are not intended to be all-inclusive. Actual field conditions may change the requirements. Contractor should contact Chesapeake Utilities and consult with their engineer prior to initiating construction and abide by all Federal, State, and Local rules and regulations.

Please coordinate construction activity with your assigned line locator according to the general guidelines below. Your line locator can help determine if additional contacts are required with Chesapeake Utilities before start of excavation activity.

1. It shall be the contractor's responsibility to use the Miss Utility One Call System.
2. It shall be the contractor's responsibility to contact and coordinate with Chesapeake Utilities before starting any construction above or near the pipeline. Chesapeake Utilities may elect to have standby personnel on the job site during construction activity.
3. It shall be the contractor's responsibility to contact and coordinate with Chesapeake Utilities before moving heavy equipment above or near the pipeline. Chesapeake Utilities may require extra cover, berm or ramp, timber mats, etc. These measures are to be determined by Chesapeake Utilities depending on field conditions.
4. If the pipeline is exposed and suspended, it shall be the responsibility of the contractor to coordinate with Chesapeake Utilities the appropriate supporting measures. These measures are to be determined by Chesapeake Utilities depending on field conditions.

5. If the pipeline is exposed, it shall be the responsibility of the contractor to protect the pipeline from construction activity and the traveling public.
6. A minimum clearance of 12" shall be maintained between Chesapeake Utilities pipeline and other underground utilities and structures. If this cannot be maintained, Chesapeake Utilities shall determine an appropriate means of protection to the pipeline.

IN EVENT OF PIPELINE EMERGENCY, CALL CHESEAPEAKE UTILITIES 24 HOUR GAS CONTROL CENTER AT (302) 734-6720.

Unclaimed U.G. Telecommunication Facility
**Identified in the field and noted as being non-active.*

Having an origin westward of the construction limits on NE Front Street an u.g. telecommunication facility (labeled UNK on the plans) is beneath the existing travel lane on the (i.e. eastbound traffic), southern (right) offset of the existing construction alignment between stationing 1513+00 and 1526+00.

The facility does not belong to the companies named by Miss Utilities as having facilities within the construction limits.

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. The information shown in the Contract Documents, including the Utility Statement and the Utility Schedule contained herein, concerning the location, type and size of existing and proposed utilities, their locations, and construction timing has been compiled by the preparer based on information furnished by each of the involved Utility Companies. It shall be the responsibility of the State's Contractor to verify all information and coordinate with the Utility Companies prior to and during construction, as specified in Section 105.09 of the Standard Specifications.

3. 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.

4. 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.

5. As outlined in Chapter 3 of the DelDOT Utilities Manual, individual utility companies are responsible for obtaining all required permits from municipal, State and federal government agencies

and railroads. This includes but is not limited to water quality permits/DNREC Water Quality Certification, DNREC Subaqueous Lands/Wetlands permits, DNREC Coastal Zone Consistency Certification, County Floodplain permits (New Castle County only), U.S. Coast Guard permits, US Army Corps 404 permits, sediment and erosion permits, and railroad crossing permits.

6. Individual utility companies are required to restore any areas disturbed in conjunction with their relocation work. If an area is disturbed by a utility company and is not properly restored, the Department may have the highway contractor perform the necessary restoration. Any additional costs incurred as a result will be forwarded to the utility company.

Tom Wright	Delaware Electric Co-op.	302-349-3130
Mike Sullivan	Comcast	302-841-6316
George Zang	Verizon	302-422-1238
Ed Furlong	KCI Technologies	302-233-0650
Rick Carmean	City of Milford, Electric	302-422-1110 ext.137
Mark Whitfield	City of Milford, Public Works	302-422-1110 ext.173
Scott Adkisson	Davis, Bowen, & Friedel	302-424-1441
Andrew Jakubowitch	Kent County Engineering	302-744-2430
Brian Hall	Kent County Engineering	302-744-2430
Alan Marteney	Century Engineering	302-734-9188

DIVISION OF TRANSPORTATION SOLUTIONS

Utility Coordinator

May 23 2017
Date

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

CERTIFICATE OF RIGHT-OF-WAY STATUS

STATE PROJECT NO. T201112201

F.A.P. NO. NHS-K008(13)

SR1 NE FRONT STREET GRADE SEPARATED INTERSECTION

KENT COUNTY

Certificate of Right-of-Way Status - Stipulated

Status - Level 2

As required by 23 CFR, Part 635, and other pertinent Federal and State regulations or laws, the following certifications are hereby made in reference to this highway project:

All necessary rights-of-way, including control of access rights when pertinent, have not been fully acquired, however, the right to occupy and to use all rights-of-way required for the proper execution of the project in accordance with the project right-of-way plans has been acquired except for:

McColley (various parcels)	Stipulated Order of Possession in progress.	Clear date: August 4, 2017
NKS Parcel 8L	Order of Possession being filed.	Clear date: October 6, 2017

Note: The representative of Parcel 8L has stated they will not challenge the Order of Possession.

All necessary real property interests have been or shall be acquired in accordance with current FHWA/State directives covering the acquisition of real property.

A clear Right of Way certificate is anticipated by October 6, 2017.

Any residential displaced individuals or families have been relocated to decent, safe and sanitary housing, or adequate replacement housing has been made available in accordance with the provisions of the current Federal Highway Administration (FHWA) directive(s) covering the administration of the Highway Relocation Assistance Program; and,

Any occupants have vacated all lands and improvements; and The State has physical possession and the right to remove, salvage, or demolish any improvements acquired as part of this project, and enters on all land.

REAL ESTATE SECTION

Robert M. Cunningham
Chief of Right of Way

July 19, 2017

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

JENNIFER COHAN
SECRETARY

March 3, 2017

ENVIRONMENTAL REQUIREMENTS

FOR
State Contract No. T201112201
Federal Aid No.: NHS-K008(13)

Contract Title: SR 1, NE Front Street Grade Separated

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 C/ Class II Action.

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

GENERAL REQUIREMENTS:

1. All construction debris, excavated material, brush, rocks, and refuse incidental to such work shall be placed either on shore above the influence of flood waters or on some suitable dumping ground.

2. That effort shall be made to keep construction debris from entering adjacent waterways or wetlands. Any debris that enters those areas shall be removed immediately.

3. The disposal of trees, brush, and other debris in any stream corridor, wetland, surface water, or drainage area is prohibited.

4. DelDOT Environmental Studies Section (302) 760-2264 must be notified if there are any changes to the project methods, footprint, materials, or designs, to allow the Department to coordinate with the appropriate resource agencies (COE, DNREC, and SHPO), for approval.

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

JENNIFER COHAN
SECRETARY

RAILROAD STATEMENT
For

State Contract No.: T201112201

Federal Aid No.: NHS-K008(13)

Project Title: SR1, NE Front Street Grade Separated Intersection

The following railroad companies maintain facilities within the contract limits:

- ☐ Amtrak
- ☐ CSX
- ☐ Delaware Coast Line
- ☐ East Penn
- ☐ Maryland & Delaware
- ☐ Norfolk Southern
- ☐ Wilmington & Western
- ☑ None

DOT Inventory No.: _____ No. Trains/Day:_____ Passenger Trains (Y / N):____

In accordance with 23 CFR 635, herein is the railroad statement of coordination (check one):

☑ No Railroad involvement.

☐ Railroad Agreement unnecessary but railroad flagging required. The contractor shall follow requirements stated in the DelDOT Maintenance of Railroad Traffic Item in the Special Provisions. Contractor shall coordinate railroad flagging with DelDOT's Railroad Program Manager at (302) 760-2183.

☐ Railroad Agreement required. The necessary railroad agreement, attached, is complete and fully executed. Railroad related work to be undertaken and completed as required for proper coordination with physical construction schedules. The Contractor shall follow requirements stated in the DelDOT Maintenance of Railroad Traffic Item in the Special Provisions. Contractor shall coordinate railroad flagging with DelDOT's Railroad Program Manager at (302) 760-2183.

Approved As To Form:

Robert A. Perrine
DelDOT Railroad Program Manager

24August,2016
DATE

BID PROPOSAL FORMS

CONTRACT T201112201.01

FEDERAL AID PROJECT NHS-K008(13)

UNLESS OTHERWISE DIRECTED, SUBMIT ALL FOLLOWING PAGES TO:

DEPARTMENT OF TRANSPORTATION
BIDDERS ROOM (B1.11.01)
800 BAY ROAD
DOVER, DELAWARE 19901

Identify the following on the outside of the sealed envelope:

- Contract Number T201112201.01
- Name of Contractor

CONTRACT ID: T201112201.01 PROJECT(S): NHS-K008(13)

All figures must be typewritten.

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
	SECTION 0001 ITEMS					
0010	201000 CLEARING AND GRUBBING	LUMP	LUMP			
0020	202000 EXCAVATION AND EMBANKMENT	89324.000 CY				
0030	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	275.000 CY				
0040	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	482.000 CY				
0050	208001 FLOWABLE FILL	100.000 CY				
0060	209001 BORROW, TYPE A	1000.000 CY				
0070	209003 BORROW, TYPE C	1000.000 CY				
0080	209006 BORROW, TYPE F	1000.000 CY				
0090	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	668.000 CY				

CONTRACT ID: T201112201.01 PROJECT(S): NHS-K008(13)

All figures must be typewritten.

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0100	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP		LUMP			
0110	212000 UNDERCUT EXCAVATION	900.000	CY				
0120	302007 GRADED AGGREGATE BASE COURSE, TYPE B	12675.000	CY				
0130	302011 DELAWARE NO. 3 STONE	95.000	TON				
0140	302012 DELAWARE NO. 57 STONE	74.000	TON				
0150	401801 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS PG 64-22 (CARBONATE STONE)	10134.000	TON				
0160	401810 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22	7867.000	TON				
0170	401819 BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22	10002.000	TON				
0180	401830 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22 (NON-CARBONATE STONE)	4126.000	TON				

CONTRACT ID: T201112201.01 PROJECT(S): NHS-K008(13)

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0190	602001 PORTLAND CEMENT CONCRETE MASONRY, CLASS A	127.000	CY				
0200	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	105.000	CY				
0210	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	62.000	CY				
0220	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	410.000	CY				
0230	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	120.000	CY				
0240	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	66.000	CY				
0250	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	100.000	CY				
0260	602018 PORTLAND CEMENT CONCRETE MASONRY, CLASS D	21.000	CY				
0270	602520 EPOXY PROTECTIVE COATING FOR CONCRETE	124.000	SY				
0280	602549 FORM LINERS	1739.000	SF				

CONTRACT ID: T201112201.01 PROJECT(S): NHS-K008(13)

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0290	602553 MECHANICALLY STABILIZED EARTH WALLS, WALL 1	7685.000 SF				
0300	602646 SILICONE ACRYLIC CONCRETE SEALER	9770.000 SF				
0310	604000 BAR REINFORCEMENT, EPOXY COATED	201900.000 LB				
0320	605002 STEEL STRUCTURES	LUMP	LUMP			
0330	605501 GROUND MOUNT BREAKAWAY TYPE SIGN SUPPORTS AND FOUNDATION	LUMP	LUMP			
0340	605512 PREFABRICATED EXPANSION JOINT SYSTEM, 4"	108.000 LF				
0350	605664 STEEL SIGN STRUCTURE	LUMP	LUMP			
0360	605761 STEEL SIGN STRUCTURES, TUBULAR ARCH CANTILEVER	LUMP	LUMP			
0370	608000 COARSE AGGREGATE FOR FOUNDATION STABILIZATION AND SUBFOUNDATION BACKFILL	150.000 TON				
0380	612021 REINFORCED CONCRETE PIPE, 15", CLASS IV	1094.000 LF				

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0390	612022 REINFORCED CONCRETE PIPE, 18", CLASS IV	660.000 LF				
0400	612023 REINFORCED CONCRETE PIPE, 24", CLASS IV	144.000 LF				
0410	612034 REINFORCED CONCRETE PIPE, 36", CLASS IV	144.000 LF				
0420	612213 REINFORCED CONCRETE ELLIPTICAL PIPE, 27"X42", CLASS IV	136.000 LF				
0430	612216 REINFORCED CONCRETE ELLIPTICAL PIPE, 14"X23", CLASS IV	56.000 LF				
0440	612220 REINFORCED CONCRETE ELLIPTICAL PIPE, 29"X45", CLASS IV	144.000 LF				
0450	614506 INSTALLING WATER MAIN	LUMP	LUMP			
0460	617003 REINFORCED CONCRETE FLARED END SECTION, 18"	4.000 EACH				
0470	617005 REINFORCED CONCRETE FLARED END SECTION, 24"	6.000 EACH				
0480	617009 REINFORCED CONCRETE FLARED END SECTION, 36"	2.000 EACH				

CONTRACT ID: T201112201.01 PROJECT(S): NHS-K008(13)

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0490	617168 REINFORCED CONCRETE FLARED END SECTION, 27" X 42"	2.000 EACH				
0500	617171 REINFORCED CONCRETE FLARED END SECTION, 29" X 45"	2.000 EACH				
0510	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	2145.000 LF				
0520	618082 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 16" X 16"	1240.000 LF				
0530	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	210.000 LF				
0540	618092 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 16" X 16"	248.000 LF				
0550	618537 DRILLED SHAFT, 54"	82.000 LF				
0560	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	2145.000 LF				
0570	619062 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 16" X 16"	1240.000 LF				
0580	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	210.000 LF				

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0590	619068 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 16" X 16"	248.000 LF				
0600	619519 DYNAMIC PILE TESTING BY CONTRACTOR	7.000 EACH				
0610	701011 PORTLAND CEMENT CONCRETE CURB, TYPE 2	2208.000 LF				
0620	701012 PORTLAND CEMENT CONCRETE CURB, TYPE 1-4	367.000 LF				
0630	701019 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 3-4	2888.000 LF				
0640	701022 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 3-8	2151.000 LF				
0650	705002 P.C.C. SIDEWALK, 6"	247.000 SF				
0660	705005 P. C. C. SIDEWALK, 8"	4681.000 SF				
0670	705007 SIDEWALK SURFACE DETECTABLE WARNING SYSTEM	210.000 SF				
0680	705008 CURB RAMP, TYPE 1	1545.000 SF				

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0690	705530 TRIANGULAR CHANNELIZING ISLANDS	1502.000 SF				
0700	707005 UNDERDRAIN OUTLET	22.000 EACH				
0710	708051 DRAINAGE INLET, 34" X 24"	18.000 EACH				
0720	708057 DRAINAGE INLET, 72" X 24"	2.000 EACH				
0730	708060 REPLACE DRAINAGE INLET GRATE(S)	10.000 EACH				
0740	708061 REPLACE DRAINAGE INLET FRAME(S)	10.000 EACH				
0750	708111 MANHOLE, 48" X 30"	1.000 EACH				
0760	710506 ADJUST AND REPAIR EXISTING SANITARY MANHOLE	5.000 EACH				
0770	712020 RIPRAP, R-4	1354.000 TON				
0780	712506 GABIONS	80.000 CY				

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0790	713001 GEOTEXTILES, STABILIZATION	150.000 SY				
0800	713002 GEOTEXTILES, SEPARATION	250.000 SY				
0810	713003 GEOTEXTILES, RIPRAP	3045.000 SY				
0820	715001 PERFORATED PIPE UNDERDRAINS, 6"	13175.000 LF				
0830	715500 UNDERDRAIN OUTLET PIPE, 6"	376.000 LF				
0840	720050 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	1994.000 LF				
0850	720556 BOLLARD	1.000 EACH				
0860	720586 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2-31	6.000 EACH				
0870	720588 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3-31	2.000 EACH				
0880	725002 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31	2.000 EACH				

CONTRACT ID: T201112201.01 PROJECT(S): NHS-K008(13)

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0890	725003 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-31	2.000 EACH				
0900	726001 END ANCHORAGE 31	2.000 EACH				
0910	727014 CONSTRUCTION SAFETY FENCE	7940.000 LF				
0920	727015 MONUMENTS	19.000 EACH				
0930	727507 BRIDGE SAFETY FENCE	470.000 LF				
0940	727555 RIGHT-OF-WAY MARKER, CAPPED REBAR	8.000 EACH				
0950	743000 MAINTENANCE OF TRAFFIC	LUMP	LUMP			
0960	743003 ARROWPANELS, TYPE C	60.000 EADY				
0970	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	270.000 EADY				
0980	743005 FURNISH AND MAINTAIN PORTABLE LIGHT ASSEMBLY	250.000 EADY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0990	743006 PLASTIC DRUMS	4697.000 EADY				
1000	743007 TRAFFIC OFFICERS	800.000 HOUR	75.00000		60000.00	
1010	743008 REFLECTOR PANELS	100.000 EACH				
1020	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	200.000 EADY				
1030	743015 FURNISH AND MAINTAIN PORTABLE PCC SAFETY BARRIER	8153.000 LF				
1040	743023 TEMPORARY BARRICADES, TYPE III	16720.000 LFDY				
1050	743024 TEMPORARY WARNING SIGNS AND PLAQUES	57990.000 EADY				
1060	743025 INSTALL TEMPORARY IMPACT ATTENUATOR	5.000 EACH				
1070	743029 FURNISH TEMPORARY IMPACT ATTENUATOR - NON-GATING, REDIRECTIVE, TEST LEVEL 3	5.000 EACH				
1080	743057 FLAGGER, KENT COUNTY, FEDERAL	2000.000 HOUR				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1090	743066 FLAGGER, KENT COUNTY, FEDERAL, OVERTIME	400.000 HOUR				
1100	744506 CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE	15.000 EACH				
1110	744530 CONDUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/ POLYMER LID-FRAME	28.000 EACH				
1120	744531 CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/ POLYMER LID-FRAME	40.000 EACH				
1130	745602 FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)	1331.000 LF				
1140	745604 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)	31097.000 LF				
1150	745605 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (ON STRUCTURE)	321.000 LF				
1160	745609 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (ON STRUCTURE)	321.000 LF				
1170	746511 CABLES, 1/#4 AWG	1265.000 LF				
1180	746512 CABLES, 1/#6 AWG	44801.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1190	746516 SERVICE INSTALLATION	3.000 EACH				
1200	746517 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 30' POLE	33.000 EACH				
1210	746519 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 40' POLE	44.000 EACH				
1220	746527 CABLES, 1/#2 AWG	1212.000 LF				
1230	746565 CABLES, 1/#3/0 AWG	505.000 LF				
1240	746566 CABLES, 1/#1 AWG	6235.000 LF				
1250	746567 CABLES, 1/#1/0 AWG	3348.000 LF				
1260	746653 ELECTRICAL TESTING	LUMP	LUMP			
1270	746847 POLE BASE, TYPE 3	3.000 EACH				
1280	746848 POLE BASE, TYPE 3A	1.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1290	746852 POLE BASE, TYPE 6	77.000 EACH				
1300	747508 LIGHTING CONTROL CENTER - 100 A	3.000 EACH				
1310	747516 CABINET BASE, TYPE P	3.000 EACH				
1320	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	1827.000 SF				
1330	748019 TEMPORARY MARKINGS, PAINT, 4"	25000.000 LF				
1340	748502 RAISED/RECESSED PAVEMENT MARKER	524.000 EACH				
1350	748530 REMOVAL OF PAVEMENT STRIPING	42570.000 SF				
1360	748537 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 8"	1120.000 LF				
1370	748548 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"	89310.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1380	748549 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"	2040.000 LF				
1390	748553 PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, BIKE SYMBOL	6.000 EACH				
1400	749500 SIGN PANEL	1199.000 SF				
1410	749687 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	342.000 EACH				
1420	749690 INSTALLATION OR REMOVAL OF TRAFFIC SIGNS ON MULTIPLE SIGN POSTS	212.000 SF				
1430	750000 ADJUST WATER VALVE BOXES	7.000 EACH				
1440	753516 SANITARY SEWER SYSTEM	LUMP	LUMP			
1450	753550 INSTALLING SANITARY SEWER (FORCE MAIN), DIP, 18"	1228.000 LF				
1460	758000 REMOVAL OF EXISTING PORTLAND CEMENTCONCRETE PAVEMENT, CURB, SIDEWALK, ETC.	2509.000 SY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1470	759502 FIELD OFFICE, SPECIAL I	24.000 EAMO				
1480	760006 PAVEMENT - MILLING, HOT-MIX, 2" DEPTH	65882.000 SY				
1490	760012 RUMBLE STRIPS, BIKE-FRIENDLY, HOT-MIX	5565.000 LF				
1500	760016 RUMBLE STRIPS, HOT-MIX	8559.000 LF				
1510	760018 RUMBLE STRIPS, CENTER LINE, HOT-MIX	2555.000 LF				
1520	762001 SAW CUTTING, BITUMINOUS CONCRETE	7264.000 LF				
1530	762002 SAW CUTTING, CONCRETE, FULL DEPTH	12.000 LF				
1540	763000 INITIAL EXPENSE	LUMP	LUMP			
1550	763501 CONSTRUCTION ENGINEERING	LUMP	LUMP			
1560	763503 TRAINEE	1080.000 HOUR	0.80000		864.00	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1570	763508 PROJECT CONTROL SYSTEM DEVELOPMENT PLAN	LUMP	LUMP			
1580	763509 CPM SCHEDULE UPDATES AND/OR REVISED UPDATES	24.000 EAMO				
1590	905001 SILT FENCE	6132.000 LF				
1600	905002 REINFORCED SILT FENCE	1595.000 LF				
1610	905004 INLET SEDIMENT CONTROL, DRAINAGE INLET	40.000 EACH				
1620	905006 INLET SEDIMENT CONTROL, CULVERT INLET	5.000 EACH				
1630	906002 DEWATERING BAG	1.000 EACH				
1640	906003 SUMP PIT	2.000 EACH				
1650	907510 COMPOST FILTER LOG	200.000 LF				
1660	908004 TOPSOIL, 6" DEPTH	22877.000 SY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1670	908010 TOPSOILING, 6" DEPTH	122415.000 SY				
1680	908014 PERMANENT GRASS SEEDING, DRY GROUND	132236.000 SY				
1690	908015 PERMANENT GRASS SEEDING, WET GROUND	11944.000 SY				
1700	908017 TEMPORARY GRASS SEEDING	264472.000 SY				
1710	908020 EROSION CONTROL BLANKET MULCH	34315.000 SY				
1720	908023 STABILIZED CONSTRUCTION ENTRANCE	380.000 TON				
	SECTION 0001 TOTAL					
	TOTAL BID					

BREAKOUT SHEET INSTRUCTIONS

BREAKOUT SHEET(S) MUST BE SUBMITTED EITHER WITH YOUR BID DOCUMENTS; OR WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE BID DUE DATE BY THE LOWEST APPARENT BIDDER.

BREAKOUT SHEETS ARE TO BE SUBMITTED TO DELDOT'S CONTRACT ADMINISTRATION AS SHOWN BELOW. BREAKOUT SHEETS CANNOT BE CHANGED AFTER AWARD. THE DEPARTMENT WILL REVIEW THE FIGURES SUBMITTED ON THE BREAKOUT SHEET(S) TO ENSURE THEY MATCH THE RESPECTIVE LUMP SUM BID AMOUNT(S). MATHEMATICALLY INCORRECT BREAKOUT SHEETS WILL BE RETURNED FOR IMMEDIATE CORRECTION.

BREAKOUT SHEETS MAY BE SUBMITTED;

VIA E-MAIL TO: DOT-ASK@STATE.DE.US
SUBJECT: **T201112201.01** Breakout Sheet

OR MAILED TO: DELDOT
CONTRACT ADMINISTRATION
PO BOX 778, DOVER, DE 19903

'BREAKOUT SHEET' AND THE PROJECT NUMBER MUST APPEAR ON THE ENVELOPE.

BREAKOUT SHEET - 1 **CONTRACT NO. T201112201.01**

Item 614506 - Installing Water Main

ITEM NO.	APPROX. QTY.	UOM	SIZE OR DEPTH	DESCRIPTION	UNIT PRICE	AMOUNT
W-1	3,900	LF	10"	Furnish & Install DR 18, C-900, PVC Water Main, Including Fittings, and Appurtenances	$	$
W-2	85	LF	10"	Furnish & Install Class 50 Ductile Iron Water Main, Including Fittings, and Appurtenances	$	$
W-3	400	LF	10"	Remove and Properly Dispose of Existing Water Main	$	$
W-4	190	LF	20"	Furnish & Install Schedule 40 Steel Casing Pipe by Open Cut, Including Carrier Pipe, Casing Spacers, End Seals	$	$
W-5	170	LF	20"	Furnish & Install Schedule 40 Steel Casing Pipe by Jack & Bore, Including Carrier Pipe, Casing Spacers, And End Seals	$	$
W-6	15	EA	10"	Furnish & Install Resilient Wedge Gate Valve, Including Valve Box	$	$
W-7	7	EA	6"	Furnish & Install Hydrant Assembly, Including Hydrant Tee, Valve & Valve Box, and Ductile Iron Lead	$	$
W-8	3	EA	6"	Furnish Hydrant Assembly, Including Hydrant Tee, Valve & Valve Box, Ductile Iron Lead, and Fittings as Necessary and Install by Cutting-In on Existing Water Main	$	$
W-9a	5	EA	1"	Furnish & Install Tapping Saddle, Corporation Stop, and Tap Water Main	$	$
W-9b	1	EA	2"	Furnish & Install Tapping Saddle, Corporation Stop, and Tap Water Main	$	$
W-10a	425	LF	1"	Furnish &Install SDR 9 Water Service Pipe, Including Fittings	$	$
W-10b	140	LF	2"	Furnish &Install SDR 9 Water Service Pipe, Including Fittings	$	$
W-11a	5	EA	1"	Furnish & Install Water Meter Pit, Including Frame & Cover	$	$
W-11b	1	EA	2"	Furnish & Install Water Meter Pit, Including Frame & Cover	$	$
W-12	6	EA	---	Remove Existing Fire Hydrant, Hydrant Lead, Valve, and Valve Box and Turn Hydrant, Valve, and Valve Box Over to City	$	$
W-13	1	EA	---	Remove Existing Valve and Valve Box, Install MJ Cap(s) on Main and Turn Valve Over to City	$	$

BREAKOUT SHEET - 1 **CONTRACT NO. T201112201.01**
Item 614506 - Installing Water Main

ITEM NO.	APPROX. QTY.	UOM	SIZE OR DEPTH	DESCRIPTION	UNIT PRICE	AMOUNT
W-14	5	EA	---	Open or Close (as indicated) Existing Valve, Remove Valve Box and Turn Over or City	$	$
W-15a	5	EA	1"	Remove Existing Meter Pit and Frame & Cover and Turn Over to City	$	$
W-15b	1	EA	2"	Remove Existing Meter Pit and Frame & Cover and Turn Over to City	$	$
W-16	2	EA	10"	Furnish Resilient Wedge Gate Valve and Cut-In Valve on Existing Water Main, Including Valve Box and Fittings as Necessary, at Direction of the Engineer	$	$
W-17	50	CY	10"	Abandon Existing Water Main by Filing With Flowable Fill, Including Installing MJ Caps or Plugs and Temporary Fill and Bleed Pipes Where Necessary	$	$

TOTAL ITEM 614506 - Installing Water Main $_____
(LUMP SUM BID PRICE FOR ITEM 614506- Installing Water Main)

BREAKOUT SHEET - 2 **CONTRACT NO. T201112201.01**
Item 753516 - Sanitary Sewer System

ITEM NO.	APPROX. QTY.	UOM	SIZE OR DEPTH	DESCRIPTION	UNIT PRICE	AMOUNT
S-1	2,650	LF	4"	Furnish & Install DR 18, C-900, PVC Force Main, Including Fittings and Appurtenances	$	$
S-2	2	EA	4"	Furnish & Install Resilient Wedge Gate Valve, Including Valve Box	$	$
S-3	170	LF	2"	Furnish & Install SDR 9 HDPE Force Main, Including Fittings and Appurtenances	$	$
S-4	184	LF	8"	Furnish & Install Schedule 40 Steel Casing Pipe by Open Cut, Including Carrier Pipe, Casing Spacers, and End Seals	$	$
S-5	2	EA	---	Furnish & Install Combination Air Valve and Structure, Including Frame & Cover	$	$
S-6	65	LF	1-1/2"	Furnish & Install SDR 9 HDPE Sweet Lateral, Including Fittings	$	$
S-7a	2	EA	2"	Furnish & Install Curb Stop, Including Curb Box	$	$
S-7b	3	EA	1-1/2"	Furnish & Install Direct Bury Check Valve	$	$
S-8	3	EA	1-1/2"	Furnish & Install Direct Bury Check Valve	$	$
S-9	1	EA	---	Remove Air Release Valve, Frame & Cover, and Concrete Top on Structure and Dispose of Properly, Cap Force Main and Fill Structure with Flowable Fill	$	$
S-10	5	EA	---	Shut Off Curb Stop or Valve and Remove Curb or Valve Box and Turn Over to City	$	$
S-11	1	LS	---	Cap Existing Force Main Where Directed and Abandon in Place	$	$
S-12	185	SY	---	Remove and Properly Dispose of All Existing Asphalt Paving at Pump Station	$	$
S-13	345	SY	---	Undercut to Proper Depth and Compact Sub-Grade Within Footprint of New Area to Be Paved at Pump Station	$	$
S-14	80	CY	8"	Furnish, Install, and Compact CR-6 (Crusher Run) Stone Base	$	$
S-15	70	Tons	3"	Install Type C Superpave Hot Mix Asphalt Paving	$	$

TOTAL ITEM 753516 - Sanitary Sewer System $_____
(LUMP SUM BID PRICE FOR ITEM 753516- Sanitary Sewer System)

"ATTENTION"

TO BIDDERS

BREAKOUT SHEET(S) MUST BE SUBMITTED EITHER WITH YOUR BID DOCUMENTS; OR WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE BID DUE DATE BY THE LOWEST APPARENT BIDDER.

BREAKOUT SHEETS ARE TO BE SUBMITTED TO DELDOT'S CONTRACT ADMINISTRATION AS SHOWN BELOW. BREAKOUT SHEETS CANNOT BE CHANGED AFTER AWARD. THE DEPARTMENT WILL REVIEW THE FIGURES SUBMITTED ON THE BREAKOUT SHEET(S) TO ENSURE THEY MATCH THE RESPECTIVE LUMP SUM BID AMOUNT(S). MATHEMATICALLY INCORRECT BREAKOUT SHEETS WILL BE RETURNED FOR IMMEDIATE CORRECTION.

BREAKOUT SHEETS MAY BE SUBMITTED;

VIA E-MAIL TO: DOT-ASK@STATE.DE.US
SUBJECT: **T201112201.01** Breakout Sheet

OR MAILED TO: DELDOT
CONTRACT ADMINISTRATION
PO BOX 778, DOVER, DE 19903

'BREAKOUT SHEET' AND THE PROJECT NUMBER
MUST APPEAR ON THE ENVELOPE.

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED, NOTARIZED, AND RETURNED WITH YOUR BID.

CERTIFICATION

Contract No. T201112201.01
Federal Aid Project No. NHS-K008(13)

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 prosection 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

_____ _____ _____ _____ _____

BIDDERS MUST ACKNOWLEDGE RECEIPT OF ALL ADDENDA

MUST INSERT DATE OF FINAL QUESTIONS AND ANSWERS ON WEBSITE: _____

==========

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

_____
Name of Bidder (Organization)

Corporate Seal

By: _____
Authorized Signature

Attest _____

_____
Title

SWORN TO AND SUBSCRIBED BEFORE ME this ___ day of _____, 20____.

Notary Seal

_____
Notary

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

KNOW ALL MEN BY THESE PRESENTS That:_____

of_____ in the County of _____and State of _____ as **Principal**, and _____ of _____ in the County of _____ and State of _____ as **Surety**, legally authorized to do business in the State of Delaware ("**State**"), are held and firmly unto the **State** in the sum of _____ _____Dollars ($_____), or _____ percent not to exceed _____ _____ Dollars ($_____) of amount of bid on Contract No. T201112201.01, 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