STATE OF DELAWARE

DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T200911303.01

FEDERAL AID PROJECT NO. NH-2015(23)

US 301, LEVELS ROAD TO SUMMIT BRIDGE RD

NEW CASTLE COUNTY

ADVERTISEMENT DATE: (Month) (Day), 2015

COMPLETION TIME: 1,230 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 **{enter data - letting date}**

Contract No.T200911303.01
Federal Aid Project No. NH-2015(23)

US 301, LEVELS ROAD TO SUMMIT BRIDGE RD
NEW CASTLE COUNTY

GENERAL DESCRIPTION

LOCATION

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

DESCRIPTION

The improvements consist of furnishing all labor and materials for US301, LEVELS ROAD TO SUMMIT BRIDGE ROAD, 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 1,230 Calendar Days. The Contract Time includes an allowance for 190 Weather Days. It is the Department's intent to issue a Notice to Proceed such that work starts on or about January 11, 2016.

PROSPECTIVE BIDDERS NOTES:

1. BIDDERS MUST BE REGISTERED with DelDOT and request a cd of the official plans and specifications in order to submit a bid. Contact DelDOT at dot-ask@state.de.us, or (302) 760-2031.
2. QUESTIONS regarding this project are to be e-mailed to dot-ask@state.de.us no less than six business days prior to the proposal opening date in order to receive a response. Please include T200911303.01 in the subject line. Responses to inquiries are posted on-line at http://www.bids.delaware.gov.
3. This project incorporates the electronic bidding system **Expedite**, **version 5.9a**. Bidders wishing to use the electronic bidding option will find the installation file on the plan holders bid file disk. The installation file and instructions are also available on DelDOT's Website at: http://www.deldot.gov/information/business/bids/const_proj_bid_info.shtml.
4. Each proposal must be accompanied by a deposit of either surety bond or security for a sum equal to at least 10% of the bid.
5. No retainage will be withheld on this contract.
6. The Department's External Complaint Procedure can be viewed on DelDOT's Website at; http://www.deldot.gov/information/business/, or you may request a copy by calling (302) 760-2555.

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7. **SPECIFICATIONS**: New Supplemental Specifications to the August 2001 Standard Specifications were issued November 24, 2014 and apply to this project. They can be viewed here. The Department is currently updating the August 2001 Specifications for Road and Bridge Construction. Through this update, some Divisions were renumbered and some new ones were created and added. The ***Specifications Note*** document is for the use by the bidders to reference the new numbers to the past numbers used for bidding purposes on previous Department contracts.
8. **PLEASE NOTE** the requirements of special provision 'Changes to Project Documents During Advertisement' have moved to Supplemental Specifications, the special provision is no longer needed.

9. **PLEASE NOTE** federal requirements for the DBE program under 49CFR §26.53(b)(3)(i)(B) have changed effective November 3, 2014. Submission of DBE participation information is now required from the lowest apparent bidder no later than seven (7) days after bid opening *(formerly 10 days)*.

10. **BREAKOUT SHEETS** MUST be submitted either with your bid documents; or within seven (7) calendar days following the bid due date by the lowest apparent bidder. Refer to instructions adjacent to the Breakout Sheets in this document.

11. **PROPOSSED TRAINEE PLANS** as required. Number of required programs is listed in the Training Special Provisions within Contract General Notices. The program(s) must be submitted within 10 Calendar Days of notification of apparent low bidder status. Contract Award will not take place until acceptable On-the-Job (OJT) program plans are received by the Civil Rights Group of the Department.

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

CONSTRUCTION ITEMS UNITS OF MEASURE

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

*Not used for units of measurement for payment.

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GENERAL NOTICES

SPECIFICATIONS:

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

CLARIFICATIONS:

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

ATTESTING TO NON-COLLUSION:

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

QUANTITIES:

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

PREFERENCE FOR DELAWARE LABOR:

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

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

EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS:

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

> "a. As a condition of the awarding of any contract for public works financed in whole or in part by State appropriation, such contracts shall include the following provisions:
>
> `During the performance of this contract, the contractor agrees as follows:

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

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

TAX CLEARANCE:

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

LICENSE:

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

SUBCONTRACTOR LICENSE: 29 DEL. C. §6967:

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

DIFFERING SITE CONDITIONS,

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

Differing site conditions: During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract 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 NEW CASTLE County.

REV. 11-3-80

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

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
   d. "Minority" includes:
      i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
      ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
      iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
      iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Program Office or from the Federal procurement contracting offices. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

   a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
   b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
   c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
   d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
   e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
   f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
   g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff,

termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontractors from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participating, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all

minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under utilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Order of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment-related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

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

* * * * *

TRAINING SPECIAL PROVISIONS

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

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

The number of trainees to be trained under the special provision will be {enter data - training count} . 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 {enter data - dbe goal} Percent

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

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

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

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

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

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CRITICAL DBE REQUIREMENTS

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

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

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

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

* * * * *

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.

THE STATE WAGE RATES GO HERE

GENERAL DECISION: DE150011 06/26/2015 DE11

State: DELAWARE

Construction Type: HIGHWAY

COUNTY: New Castle County in Delaware

HIGHWAY CONSTRUCTION PROJECTS

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

Modification Number	Publication Date
0	06/26/2015

SUDE2015-002 04/23/2015

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

Truck Driver 32.31

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

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

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

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

Union Average Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

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

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

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

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

END OF GENERAL DECISION

APPLICABILITY OF DAVIS-BACON LABOR STANDARD PROVISIONS TO FLAGGERS

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

* * * * *

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

GUIDELINES

HIGHWAY CONSTRUCTION

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

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

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

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

SUPPLEMENTAL SPECIFICATIONS
TO THE
AUGUST 2001
STANDARD SPECIFICATIONS

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

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

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

The full Website Link is;
http://www.deldot.gov/information/pubs_forms/manuals/standard_specifications/index.shtml

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

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

SPECIAL PROVISIONS

CONSTRUCTION ITEM NUMBERS

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

Standard Item Number:

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

Special Provisions Item Number:

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

Examples

Standard Item Number - 202000 Excavation and Embankment

202 Indicates Section Number

000 Indicates Sequential Number

Special Provision Item Number - 202500 Grading and Reshaping Roadway

202 Indicates Section Number

500 Indicates Sequential Number

NOTE:

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

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

401502 - ASPHALT CEMENT COST ADJUSTMENT

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

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

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

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

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

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

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

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

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

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

NOTE:

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

5/05/15

202505 - SETTLEMENT PLATFORM
202518 - SETTLEMENT MONUMENT

Description:

The work of this section includes furnishing, installing, protecting and maintaining settlement monitoring plates (SMP), pipe extensions, and monument settlement points conforming to the design and at the locations shown on the Plans or as directed by the Department. All labor, materials, equipment and incidentals necessary to complete this work shall be considered part of this item required to provide devices to observe ground movement during and after construction. The Contractor shall perform the monitoring, recording and reporting of the settlement.

Submittals:

1. Qualifying Experience

The Contractor shall submit proof of three or more projects of similar size and complexity on which the firm and personnel assigned to the project have successfully installed similar instrumentation within the last three years. The Contractor shall present the following information for each project listed as a reference at or prior to any preconstruction meetings:

1. Project Name, Location, Project Description, and Completion Date.
2. Surface and Subsurface Conditions.
3. Type and number of instruments installed.
4. Installation equipment and techniques utilized when applicable.
5. Provide names, current phone numbers, and current business addresses for the owner/designer, geotechnical consultant, and contract manager.

2 Settlement surveying and monitoring plan for review prior to construction. The plan shall identify the detailed location of settlement monitoring points, reference benchmarks, survey schedules and procedures and reporting formats.

3. Description of the surveying equipment to be used.

4. Settlement Plate Layout and Installation Details: Within two days after the installation of each settlement plate, the Contractor shall submit an installation record sheet including appropriate items from the following list.

i. Project name.
ii. Contract name and number.
iii. Settlement plate number.
iv. Material sizes and compositions.
v. Planned location in horizontal position and elevation.
vi. Planned orientation.
vii. Personnel responsible for installation.

viii. Date and time of start and completion.
ix. Weather conditions at the time of installation.
x. Notes of importance on the installation including problems encountered, delays, unusual features of the installation, and details of any events that may have a bearing on settlement plate behavior.

Schedule for Settlement Platform Installations and Readings:

The Contractor shall provide settlement monitoring plates, pipe extensions and monument settlement points to monitor settlement of new fill embankments. The Contractor shall make regular readings of the settlement as indicated on the plans.

Settlement monitoring plates shall be installed as shown on the plans. Settlement monitoring plates shall be located by repeatable survey (locations and elevations) and referenced to permanent benchmarks. Locations of benchmarks are to be determined by the Contractor and approved by the Engineer, and shall be located outside the zone of influence of the construction activity. Settlement monitoring plates shall be placed level and the risers shall be plumb.

The approximate locations of each instrument to be installed by the Contractor are shown on the project plans and include the following types: settlement plates and settlement monuments. Other locations may need to be added as directed by the Engineer.

Protection of Instrumentation and Repair of Damage

a. The Contractor shall protect all instruments and appurtenant fixtures, leads, connections, and other components of instrumentation systems from damage due to construction operations.

b. If an instrument is damaged or made inoperative due to the Contractor's operations or the operation of subcontractors under the direction of the Contractor, the Contractor shall notify the Engineer immediately. The Engineer will be the sole judge of whether repair or replacement is required. For each instrument that is abandoned for these reasons, the Contractor shall replace that instrument at no additional cost to the Department.

c. Should any instrument become damaged or inoperative through no fault of the Contractor, the damaged or inoperative instrument shall be repaired or replaced at the contract unit prices for that instrument.

d. The Engineer will advise the Contractor immediately upon discovery of damage to instruments as to the necessary schedule for replacement and the times of required access. Damaged instruments shall be repaired or replaced within 24 hours of initial damage. The Contractor's construction operations in the area of a damaged instrument(s) may be halted during repair or replacement of each damaged instrument at the request of the Department.

Materials:

Settlement Plates

a. Settlement plates are sub-surface displacement reference platforms placed on the prepared ground surface prior to embankment fill placement. Risers are extended from the settlement plate as the fill is placed. A casing is placed around the riser for protection. Settlement plates are monitored by optical survey methods to determine vertical displacements occurring during and after embankment construction.

b. The base plate shall be made from steel conforming to the requirements of ASTM A36. The riser pipe and outer casing shall be steel pipe conforming to the requirements of ASTM A53, Grade B, standard weight. The casing and the risers shall be as shown on the attached detail. The casing pipe shall have a minimum wall thickness of 0.375 inches. The riser pipe shall be galvanized and have a minimum wall thickness of 0.25 inches. Couplings, pipe caps, etc. shall conform to the requirements of ASTM A865. Threaded pipes shall be used for riser and casing pipe extensions.

c. Sand shall conform to the requirements of ASTM C33.

Settlement Monuments

a. Materials for the construction of the Settlement Monument shall conform to the applicable sections of Section 812 for the Concrete, Class C of the Standard Specifications.

b. The Reinforcement Bar shall conform to Section 824 of the Standard Specifications.

Construction Methods:

1. Readings on the settlement platforms and settlement monuments shall be performed by the Contractor. The Contractor is fully responsible for establishing benchmarks, submittals, and furnishing, installing and maintaining the settlement platforms.

2. The settlement monuments shall be installed at locations indicated on the plans or as directed by the Department.

3. The settlement plates shall be installed as indicated on the plans after all clearing and grubbing and topsoil removal has been completed. The sand base shall be tamped to provide a firm, level, and unyielding bearing surface for the base plate. The riser pipe shall be marked in 1-foot increments and labeled at 5-foot increments to indicate the distances above the plate extending up through the embankment fill. Settlement plates shall be fabricated as shown on the attached detail.

4. The initial casing and riser pipes shall have a maximum length of 4 feet for each section. Spacers shall be provided between the riser pipe and the casing at a minimum of 4-foot intervals to ensure concentricity. The spacers shall not be directly attached to the riser pipe or otherwise installed that would impede the independent movement of the riser pipe.

5. As the height of fill above the settlement plate changes, the casing and riser pipes shall be increased or decreased in a maximum of 4-foot intervals to maintain the top of the riser pipe and casing above the embankment. As each additional length of pipe is added or removed, the pipe cap on the casing shall be immediately transferred to the top section on the settlement plate so as to prevent fill material from entering the casing. At other times, the cap shall only be removed to check settlement.

6. The casing pipe shall be marked by flags or other approved method to clearly show its location and to warn equipment operators and others of its location. The Contractor shall maintain the flags during the entire length of the Contract and replace those flags that are missing. At no time shall the settlement plate risers and casings extend higher than 5 feet above the ground surface elevation. Sections shall be added or removed as necessary during embankment construction to maintain the tops of the risers and casings at least 1-foot above the surface of the embankment.

7. The Contractor is responsible for maintaining the settlement plates in working order during the length of the Contract. Settlement Plates which are to be abandoned at the completion of the project shall

have their riser pipes cut off two feet below roadway subgrade level and capped. If an instrument is damaged, moved, or disturbed due to causes other than settlement, the Contractor shall repair, reset, or replace the damaged instrument at no additional cost to the Department within three days after being damaged. The Engineer will be the sole judge of whether repair, resetting, or replacement is required. No additional fills shall be placed within fifty (50) feet of a damaged settlement platform until the damage has been corrected to the satisfaction of the Engineer. The Engineer may impose a work stoppage in the vicinity of the damaged instrument until it is again operational at no additional cost to the Department. Any repairs or replacements required will be at the Contractor's expense.

8. By the end of the first work day in each week, the Contractor shall submit to the Engineer a description of the work performed during the previous week. This description shall include at a minimum: a plan view location of the placed embankment, the volume of embankment placed, and in-situ density test results in accordance with Standard Specification sections 202 and 209.

9. The use of the settlement platforms for collecting data related to embankment foundation response will extend beyond the time of completion of the Contractor's embankment placement operations. The Contractor shall be responsible for assuring that all platforms are in working order until the time of completion of the Contract.

10. Readings on all settlement monitoring devices shall be taken at a minimum of 3 calendar day intervals.

11. For vertical deformation monitoring, runs shall be performed by a single run beginning and ending on two different benchmarks installed in accordance with NGS standards. Settlement monitoring points shall be used as turning points or as intermediate foresights from two different turning points, allowing elevations to be adjusted and eliminating significant observational errors. The maximum length of line of sight shall be 150 feet, and the imbalance between backsight and foresight shall not exceed 30 feet. Allowable level loop misclosure shall not exceed ±0.033 times the square root of M feet (where M is the distance of the level run in miles) for a single run between two benchmarks. A formal initial reading on a settlement monitoring point will consist of the average of three elevations, from three independent level runs, which meet the closure specified herein. Elevations established subsequent to a formal initial reading shall be determined by a single run as specified herein. The least count (without estimation) of the rod and level combination shall read to 0.003 foot or less, such that the accuracy of an elevation measurement shall be ±0.01 foot (at 95 percent level of confidence).

12. Data shall be recorded in U.S. survey feet or inches.

13. Instruments used for vertical deformation monitoring shall have a minimum accuracy of plus or minus 0.005 of a foot (standard deviation for 3300 feet of double run leveling) and a minimum setting accuracy of plus or minus 1.0 arc seconds. Leveling rods shall be non-telescopic in design (i.e. "Chicago" style leveling rod). A bull's eye bubble shall be used to plumb the leveling rod. The use of fiberglass rods will need approval of Engineer prior to use.

14. All data recorded by the Contractor shall be of the following form:
    a. Raw and reduced data shall be on summary tables in printed tabular format on 8-1/2 inch x 11 inch sheets of paper.
    b. Reduced data for up to six like instruments that are located in the same geographical area shall be plotted on the same graphical plot. Each plot shall be submitted on an 8-1/2 inch x 11 inch sheet or 11 inch by 17 inch sheet.

c. Plots of deformation data at Settlement Monitoring Plates shall show absolute vertical deformation versus time with height or elevation of fill placed at time of reading. Plots of settlement monument data shall show absolute vertical deformation versus time and shall show the height or elevation of fill placed at the time of reading. Deformation plots shall also be provided in electronic data file format.
d. Survey data reports prepared by the Contractor shall be signed and sealed by either a Professional Engineer or Professional Land Surveyor licensed in the State of Delaware.

Method of Measurement:

The number of Settlement Platforms measured will be the actual number of platforms set in place and/or maintained as shown on the Plans or as directed by the Engineer. No measurement for payment will be made for pipe extensions. The number of Settlement Monuments measured will be the actual number of monuments set in place and/or maintained as shown on the Plans or as directed by the Engineer.

Basis of Payment:

Settlement Platforms and Settlement Monuments will be paid for at the Contract unit price per Each, complete in place, which price shall be full compensation for all materials, tools, labor, and work incidental thereto including pipe extensions, steel plate, sand, couplings, spacers, welding, protection of the plate and pipe extensions during construction, all labor tools, equipment, and necessary incidentals including settlement readings, settlement plots and survey data reports required to complete the work.

202508 - WETLAND ACCESS ROAD, TYPE II

Description:

Furnish, place, maintain, and remove all materials, including all engineering, testing, labor, equipment, and incidental construction required to create stable construction access to, within, and across Plan designated wetlands and Waters of the U.S. (hereinafter collectively referred to as wetlands) and to restore access areas and diverted streams to original condition as specified in the Contract Documents and as directed by the Engineer.

All work must be performed in accordance with applicable permits.

The specific type and location of the Wetland Access Road, Type II is at the discretion of the Contractor subject to the review and approval of the Engineer. The Delaware Department of Natural Resources and Environmental Control (DNREC) and the United States Army Corps of Engineers (USACE). have approved the limit of construction and requirements for wetland access and restoration shown on the plans and described in the permits and this specification.

Materials:

The materials used in the construction of the Wetland Access Road, Type II shall be in strict conformance with the requirements as stipulated by the Contractor's engineering design of the wetland access road itself. All materials used in the construction of the Wetland Access Road shall be approved by the Engineer.

As a minimum, any fill used in the construction of the wetland access road shall be a well-graded borrow free of any debris and shall meet the specific grading criteria required by the engineering designer of the road. Geotextile materials used to reinforce or strengthen the wetland access road fill installation shall be capable of resisting strain deformations of less than two (2) percent biaxially. A geotextile fabric that conforms to the separation requirements of AASHTO M288 shall be placed to separate fill materials used in the construction of the wetland access road from existing ground. The separation geotextile fabric shall also be placed and securely anchored on the sides and the entire top of the fill materials.

Construction Methods:

This work shall consist of furnishing and installing all materials necessary to construct the temporary access road which may include, but is not limited to, rip rap, stone, borrow or fill, silt fencing, reinforced silt fencing, geotextile materials, timber matting, drainage piping, and wooden crane mats. All engineering, testing, labor and equipment necessary to perform the work will be included as well. Clearing of trees in the wetland access area shall be in accordance with Section 201 of the Standard Specifications except as modified herein. This work shall also include all necessary field testing and verification to aid in the design of the temporary access road which may include additional geotechnical investigations such as borings, vane shear tests, etc. To perform any additional geotechnical investigations, access shall be within the limits of construction shown on the plans, clearing shall be kept to a minimum and in accordance with this specification and all disturbed areas shall be stabilized at the contractor's expense.

The Contractor shall design the wetland access road so that all construction activities within wetlands can be conducted from the wetland access road. The wetland access road shall minimize damage to existing wetlands that will be restored following construction.

The Contractor shall prepare working drawings of the anticipated wetland access denoting the limits of the proposed temporary road and showing the limits of construction as shown on the plans. The drawings shall also include all necessary sections and details of the proposed temporary road including the method for erosion and sediment control and maintenance of stream flow, and a sequence of construction for both the installation of the road and its subsequent removal and restoration of the wetland area. The limits of the temporary access road as shown on the plans shall not be exceeded. Work is not to be performed outside of the Limit of Construction as shown on the plans. Detailed working drawings shall be furnished in accordance with Subsection 105.04 of the Standard Specifications. Complete design calculations of the temporary access road shall be included and shall be stamped and signed by a Professional Engineer licensed in the State of Delaware. The temporary access road shall be designed to account for the loadings anticipated by the Contractor which may include cranes, earth moving equipment, and delivery trucks. In addition, the working drawings shall incorporate all proposed staging, material storage, laydown areas, and anticipated equipment movements throughout the length of the access road. Methods for fueling and servicing equipment within wetlands shall be shown, including methods for spill containment.

The working drawings shall include the existing topography of the area as described in the contract Project Notes.

After the Department's approval, the working drawings and calculations as described herein will be submitted by the Department to the USACE and the DNREC for review and approval. Review by the USACE and the DNREC shall require thirty (30) calendar days.

Install erosion and sediment control devices as indicated on the plans and as directed by the Engineer. Construction of the temporary access road shall include provisions for protecting the existing wetland to prevent any contamination from the access road from entering the wetland. The access road shall also include provisions for the conveyance of permanent or intermittent streams underneath the road. Temporary diversion(s) and or temporary pipe(s) placed for this purpose shall be sized to convey a two year storm event and shall include adequate scour protection to prevent erosion of the stream channel during construction. Temporary diversion(s) and or temporary pipe(s) shown on the plans provide the minimum hydraulic capacity and any alternatives shall be equal or larger in size.

Clear only the trees and vegetation directly in conflict with access and with proposed construction. These trees and limits of clearing shall be flagged prior to beginning the clearing operation and approval for clearing must be obtained from the Engineer prior to commencement of clearing operations. During tree removal, the contractor will not be allowed to enter wetlands with wheeled or tracked equipment. All trees shall be cut by manual methods and all felled trees shall be removed by use of a winch or other similar equipment or manually as approved by the Engineer. Trees shall be cut as close to the existing ground as possible. No stump removal will be permitted. This requirement applies only to those trees in conflict with access roads to bridge pier areas and in conflict with access roads across wetlands outside the mainline roadway of the contract. It is not intended for mainline roadway construction or permanent elements associated with the bridge. The Contractor shall minimize disturbances to the existing wetland root mat system in the areas affected by the temporary access road.

The total thickness of the temporary access road and the need for crane matting will be at the discretion of the Contractor based on the type of equipment he proposes to use. Stability of the access

road is also the responsibility of the Contractor and any failures and/or resulting equipment damage will be the sole and complete responsibility of the Contractor.

Install geotextile fabric on existing ground. Geotextile fabric shall be used to separate all materials used to construct the Wetland Access Road, Type II from the wetland surface. Geotextile fabric shall be installed with enough excess material to ensure wetland soils remain separated from temporary access materials during settlement and compaction, especially around stumps. Concurrently construct Wetland Access Road, Type II beginning in uplands and proceeding in stages as necessary to ensure that heavy equipment is operated from the constructed and stable temporary surface. As access road construction progresses, install temporary pipes and other stream diversion measures as indicated on the plans.

Install wooden mats if necessary to support proposed equipment.

Continual maintenance and stability of the access road and associated stream diversion devices by the Contractor during the construction will be incidental to this item. No construction equipment utilized to construct the temporary access road will be permitted outside the limits of the road. The Contractor shall design the wetland access road such that the working surface of the wetland access road is above the above the 2 year storm water surface elevation. The 2 year storm water surface shall account for the wetland access road and temporary pipe(s) and diversions effect on the storm water surface elevation.

The Contractor shall have the responsibility of monitoring weather forecasts for rain events and shall inspect the diversion systems for damage, pipe joint separation, etc in order to minimize impacts to the work area during storms.

The temporary access road shall be removed in its entirety upon completion of the construction activities that necessitated the access road. After the roadway is no longer needed, carefully remove and dispose of all materials including geotextile fabric and stream diversion devices. Removal operations must be performed such that heavy equipment can be operated from the constructed and stable temporary surface. All wetland areas disturbed by the construction shall be restored using low ground pressure equipment to their original pre-construction condition including elevations, and re-seeded in accordance with the approved permit, as noted in the plans, or as may be directed by the Engineer. Erosion and Sediment Control devices shall not be removed until the Engineer and Erosion and Sediment Control inspector have provided final acceptance of all plantings. Upon removal of Erosion and Sediment Control devices, stabilize all areas disturbed by the process immediately.

Method of Measurement:

The item will be paid on a lump sum basis. No separate measurement will be made.

Basis of Payment:

Wetland Access Road, Type II will be paid at the lump sum price bid per designated location, which price shall be full compensation for all engineering, testing, and shop drawing preparation, as well as furnishing all materials, labor, tools, equipment, and incidentals necessary to construct and maintain temporary roads for the purpose of accessing wetlands with construction equipment. Payment includes all engineering, testing, and working drawing preparation, as well as furnishing, installation and maintenance of fill, geotextile fabric, R-4 rip-rap, Del. Number 1 Stone, Del. Number 57 Stone, temporary pipes, temporary stream diversions, clearing of necessary trees, wooden mats as necessary, erosion control measures, any seeding or planting and any other materials specified on the Plans. Payment shall also be full compensation for the proper removal of all materials, restoration of the wetland site to original grades, and the seeding and planting at the conclusion of the work.

The Contractor is required to submit, as part of the bid proposal, his estimated breakdown of all items and quantities involved, and the dollar value assigned to these respective items and quantities, for each lump sum Wetland Access Road, Type II bid per location. Failure of the Contractor to include any necessary work items or quantities in his breakdown will not relieve the Contractor of his responsibility to perform all work required by these specifications. No additional compensation will be considered as a result of the contractor's failure to include any necessary items in his breakdown or his failure to accurately estimate the quantities required to perform the work required by these specifications.

The Contractor may submit to the Engineer after the contract has been awarded a Value Engineering Proposal(s) (VEP) for modifying the Wetland Access Road, Type II for construction of structures in designated wetland areas as per section 104.12 of the Standard Specifications. All plan and specifications changes or other requirements of the contract for the purpose of reducing the cost of construction or otherwise modifying the access and restoration requirements will require written approval by the USACE and DNREC. No consideration will be given for delays or additional compensation as a result of processing the VEP to the USACE and DNREC or for the rejection of the VEP or modification. The Contractor is required to prepare the bid proposal as per the Wetland Access Road, Type II described by this specification.

4/22/13

202515 - COMPACTING INSITU MATERIAL

Description:

Compacting in situ material shall consist of pregrading and compacting in-place soils which conform to the requirements of subsection 209.03 and 209.03A for use as a component of the pavement section to the depth specified on the plans and/or Subsection 209.03 and 209.03C for use as a footing subgrade.

Construction Methods:

Borrow Type A:

The in-place soils, after being tested by DelDOT and found to be in conformance with the requirements of Borrow, Type A for the depth specified shall be initially graded to an elevation sufficiently above (approx. 2-inches) the planned top elevation of Borrow, Type A to provide an acceptable surface elevation when properly compacted.

Following the initial grading operations, the in-place soils shall be scarified, plowed, or otherwise acceptably loosened for a depth of 4 to 6 inches unless otherwise directed by the Engineer. The in-place soils shall then be compacted with a sheepsfoot roller commencing at the edges of the Borrow, Type A and progressing toward the center. Compaction shall continue until the roller acceptably "walks out" of the soil. Compaction tests to evaluate the lower portion of the Borrow, Type A shall then be made by the Department. Providing acceptable compaction of the lower portion is obtained, the remaining Borrow, Type A shall be graded and rolled with an approved smooth steel wheel roller, or approved alternate, until this portion of the Borrow, Type A has been acceptably compacted.

Borrow, Type A for the depth specified shall be compacted to 95% of the maximum dry density determined as outlined in Subsection 202.17 of the Standard Specifications. If an adjustment of the moisture content is necessary to obtain the required compaction, water shall be incorporated as directed by the Engineer.

Borrow Type C:

The in-place soils, after being tested by DelDOT and found to be in conformance with the requirements of Borrow, Type C, shall be initially graded to an elevation sufficiently above (approx. 2 inches) the planned bottom of footing.

Following the initial grading operations, the in-place soils shall be compacted with a sheepsfoot roller to densify the lower portion of the subgrade soils to the satisfaction of the Engineer. Compaction tests to evaluate the lower portion of the subgrade shall be made by the Department. The footing area shall then be regraded and the upper portion of subgrade soils compacted with a vibratory steel-wheel roller. Compaction tests to evaluate this portion of the subgrade shall be made by the Department.

Subgrade shall be compacted to 95% of the maximum dry density determined, as outlined in Subsection 202.17 of the Standard Specifications. If an adjustment of the moisture content is necessary to obtain the required compaction, water shall be incorporated as directed by the Engineer.

Method of Measurement:

The quantity of compacting in situ material to be paid under this item shall be the number of square yards within the lines and grades shown on the plans and accepted by the Engineer.

Basis of Payment:

The quantity of compacting in situ material, as measured above, shall be paid at the contract unit bid price per Square Yard for compacting of in situ material, which price and payment shall be full compensation for furnishing all labor, tools, equipment, etc. for preparation, grading, scarification, moisture adjustment, blending, compaction, and other incidentals necessary to complete the item.

202555 - SUBSOIL TILLAGE

Description:

Subsoil Tillage shall consist of conducting deep tillage in areas designated on the plans or as directed by the Engineer. Unless indicated on the plans, the depth of tillage shall be twenty-four inches vertical.

Materials:

The subsoiler used in the work shall be specially designed for subsoil tillage. All subsoilers and tractors utilized are subject to approval by the Department. Within thirty days, the Contractor shall supply the Department with the name and model number of the subsoiler and tractor, and the subsoiler and tractor manufacturer's guidelines related to equipment size, power and drawbar pounds pull. Plows or disks shall not be utilized for this work.

The subsoiler shall have a minimum net weight of 6500 pounds. Unless specified on the plans, the subsoiler shall have the capability of operating with a minimum of five steel shanks, and the distance between adjacent shanks shall not exceed thirty (30) inches. Unless specified on the plans or directed by the Engineer, the maximum number of shanks as designed for the subsoiler shall be utilized when conducting this work. Each steel shank shall have the minimum dimensions of one and one-half inches by seven and one-half inches by thirty inches (1½ x 7½ x 30). Larger shanks are acceptable. The minimum vertical tillage depth shall be twenty-four (24) inches as measured by field performance, as determined solely by the Engineer. Each shank shall be equipped with replaceable steel points.

A crawler-tracked tractor shall be utilized for the subsoiling operations. The tractor shall conform to the subsoiler and tractor manufacturer's recommendations as to minimum size, power and drawbar pounds pull for the subsoiler with reference to specified tillage depth, soil texture and soil conditions. The tractor shall have the hydraulic lines and characteristics necessary for proper operation of the subsoiler as designed and recommended by the manufacturer. It shall be the Contractor's responsibility to ensure that all equipment possesses sufficient power and is of appropriate design and weight distribution to complete the subsoiling operations.

Construction Methods:

Subsoil tillage shall be performed within the areas shown on the plans. Unless directed by the Engineer or indicated on the plans, the subsoiling operation shall be conducted in two series of passes, with the second series of passes being made perpendicular to the first series or as directed by the Engineer. The distance between parallel passes of the same series shall not exceed the distance between the individual shanks. Unless directed by the Engineer, the subsoiler shall be operated at a speed of four to five (4-5) miles per hour. If shown on the plans, the subsoil tillage shall be conducted during the specified period. Commencement of the subsoiling operations shall begin within seven (7) days of the direction by the Engineer and completed within fourteen (14) days.

Method of Measurement:

The quantity of Subsoil Tillage will be measured by the number of square yards accepted to the limits shown on the Plans, conforming to all the requirements of these specifications, complete and accepted.

Basis of Payment:

The item Subsoil Tillage will be paid for at the Contract unit price per square yard and accepted, which price and payment shall constitute full compensation for all labor, equipment, tools and incidentals necessary to complete the work.

7/20/15

211521 – ABANDONMENT OF WELLS

Description:

This work shall consist of furnishing equipment, materials, and labor to seal geotechnical monitoring wells previously installed within the limits of the construction included in this contract. This item shall only be used when specified in the Contract Documents or as directed by the Department. The wells to be removed in this contract are designated on the Construction Plans. The location of the wells shown on the drawings is approximate and must be verified by the Contractor.

Submittals:

(a) Master Well Driller's Certificate. Twenty (20) working days prior to abandoning the monitoring well the Contractor will submit to the Department the Master Well Driller's Certificate for review.

(b) Abandoned Well Report. When the well has been abandoned, the person abandoning it, shall notify the Approving Authority of this action by completing an Abandoned Well Report form provided by the Approving Authority. This report shall be submitted not later than 30 days after abandonment of the well or test hole. A copy of the Abandoned Well Report and the transmittal shall be submitted to the Engineer within 30 days after abandonment.

Materials:

Materials for well sealing including concrete, Portland cement grout, sodium-based bentonite clay grout, and other materials approved by the Department shall be in accordance with the Delaware Regulations Governing the Construction and Use of Wells, 1997.

Drill cuttings, clay, silt, sand, gravel, and crusher run are considered fill material and may only be used in the abandonment of wells in accordance with Section 9.03 of the Regulations.

Portland cement grout and sodium-base bentonite clay grout shall meet the requirements of 4.07(J) (1) and (2) of the Regulations.

Construction Methods:

Abandonment of Wells shall be in accordance with the Delaware Regulations Governing the Construction and Use of Wells, 1997. Prior to the well abandonment, the Contractor shall verify the location, diameter, depth, and condition of the well and the type of construction. Well abandonment shall be performed by a master well driller licensed by the Delaware State Board of Well Drillers.

Method of Measurement:

Abandonment of Wells will be measured per Each well abandoned, including sealing the monitoring well and furnishing all material, labor, equipment, tools, and incidentals necessary to complete the work.

Basis of Payment:

Abandonment of Wells will be paid for at the Contract unit price per Each well abandoned. The payment will be full compensation for furnishing and sealing the monitoring well and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

7/10/12

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NOT FOR BIDDING
AUGUST 2015

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 yd² (325 m²). For small areas, the Contractor may request to have a test strip waived. This request shall be submitted to the Engineer for review.

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

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

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

Method of Measurement:

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

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

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

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

Basis of Payment:

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

304501 - PERMEABLE TREATED BASE, 4"

Description:

This work consists of furnishing all materials and constructing permeable treated base on a prepared subbase in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the Plans or established by the Engineer. This base course shall consist of a mixture of graded, crushed aggregate and a binder material of asphalt cement or portland cement. Unless otherwise shown on the Plans, the Contractor may use either asphalt cement or portland cement as the base course binder, after obtaining approval of the Engineer.

Materials:

Written approval of all materials shall be obtained prior to delivery. Samples of each source shall be submitted as directed by the Engineer. Materials and their use shall conform to the following requirements.

A. Aggregate - The aggregate shall be comprised of clean, hard, durable crushed stone meeting the requirements of AASHTO M43, size number 57, and AASHTO M283, Class B. Adherent coating on aggregate after the initial dry sieving on 3 mils (75 µm) sieve shall not exceed 0.5 percent when tested when in accordance with the requirements of AASHTO T11 - Determining the minus 3 mils (75 µm) sieve fraction by washing.

B. Asphalt Cement - The asphalt for the permeable treated base shall be AC-20 viscosity grade paving asphalt conforming to the requirements of AASHTO M226 Table 2 and Sections 823.02 of the Standard Specifications. In addition, an approved heatstable anti-strip additive conforming to the requirements of Section 829 of the Standard Specifications shall be added to all asphalt cement used in the production of permeable base treated with asphalt.

C. Portland Cement - Portland cement used as the binder for the permeable base shall be Type I or Type II conforming to the requirements of Section 801 of the Standard Specifications. In addition, a membrane curing compound shall be used in conjunction with the portland cement treated aggregate base and shall conform to AASHTO M148, Type 2, Class A - White Pigmented Wax Base Curing Compound. Other curing methods may be used if approved by the Engineer.

Proportioning Stabilized Mixtures - The Contractor shall submit or shall have his source of supply submit, for the Engineers approval, a job mix for the asphalt treated base mixture (Permeable Asphalt Treated Base) in accordance with Section 823.19 or a mix design for the portland cement treated base (Permeable Cement Treated Base). The composition of the mixture shall be within the requirements specified herein and shall produce a stable mix having a minimum coefficient of permeability of 2950 ft/day (900 m/day) determined by the falling head or constant head test method. Coefficient of permeability data shall be submitted with job mix/mix design information to the Materials and Research Section.

Permeable Asphalt Treated Base - Permeable asphalt treated base shall be a hot, plant-mixture of paving grade asphalt cement with an anti-strip adhesive and #57 crushed aggregate within the following mixture requirements:

A. Gradation Band

Sieve Size	1.5" (37.5 mm)	1" (25 mm)	1/2" (12.5 mm)	3/16" (4.75 mm)	3/32" (2.36 mm)	3 mils (75 µm)
%Passing	100	95-100	25-60	0-10	0-5	0-2

The asphalt cement shall be 2%-2.5% AC-20 by weight of the total mix. The target temperature of the mix leaving the mixer shall be established by the Materials and Research Section on the basis of laboratory tests. A target temperature of 250 F (121 C) + 41 F (5 C) is typical. The aggregate for the mixture shall be dried and heated to the required temperature but not to exceed 325 F (163 C). Flames used for drying and heating shall be properly adjusted to avoid damage to the aggregate and to avoid soot on the aggregate. The temperature of the aggregates as introduced into the mixer shall not exceed a temperature which causes segregation of the asphalt and aggregate during transportation. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

B. Testing Methods - The following standards shall be used to test the qualities of the mixture:

AASHTO T164, Method A - Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

AASHTO T166 - Bulk Specific Gravity of Compacted Bituminous Mixtures.

AASHTO T209 - Maximum Specific Gravity of Bituminous Paving Mixtures.

AASHTO T269 - Percent Air Voids in Compacted Bituminous Mixtures.

Samples of the actual mixture in use will be taken as many times daily as required by the Engineer and the mixture must be maintained uniform throughout the project within the above tolerances. Should the mix produced not meet the above requirements or project field performance needs, changes in the mix design or mixing procedure shall be make immediately in a manner approved by the Engineer. Mixing of permeable asphalt treated base shall be in accordance with Section 401 of the Standard Specifications.

Permeable Cement Treated Base - Permeable cement treated base shall consist of a mixture of portland cement, #57 crushed aggregate and water. Portland cement content shall be 8.3 lb/ft³ ± .37 lb/ft³ (133 +/- 6 kg per cubic meter). The mixture shall have a minimum water/cement ratio to provide for 100% cement paste coverage of the aggregate material without significant runoff during hauling and sufficient workability during placement to provide a uniform texture without loss of the required void system. However, a maximum water/cement ratio shall not exceed 0.40. An air entraining admixture will not be required for this mixture.

Mixing shall be in accordance with the requirements of Section 812 and shall be accomplished through an approved central mix concrete plant, unless otherwise permitted by the Engineer.

Construction Methods:

The permeable treated base course shall be transported to the project for placement in accordance with the appropriate requirements of Sections 401 or 812 of the Standard Specifications. Equipment used for placement shall be tracked, self propelled pavers, spreaders or other combinations of equipment which will place the stabilized mix at a uniform thickness without segregation. Placement by use of graders or dozers will not be permitted.

Permeable treated base course shall not be placed when weather or surface conditions are such that material can not be properly handled, compacted or finished. Permeable treated base course shall be placed only when the ambient temperature is above 36 F (2 C) and shall not be placed on any frozen surface. Permeable cement treated base shall be subject to the temperature limitations of Section 501.04.

Permeable treated base shall not be placed until the surface upon which it is to be placed has been approved by the Engineer. Preparation shall include provision for directing surface drainage away from the base to prevent contamination from surface runoff in the event of rainfall.

Following placement of the permeable asphalt treated base to be specified line, grade, and thickness by a bituminous paver conforming to the requirements of Section 401 of the Standard Specifications or other approved equipment, rolling shall then begin when the paving mat has cooled sufficiently to support the weight of a 4 to 9.9 tons (3.6 to 9 metric ton) steel wheel tandem roller. Mat temperature at time of initial rolling shall be between 149 F (65 C) and 176 F (80 C), unless otherwise directed. The purpose of the rolling is to compact the base sufficiently to support the weight of the equipment that will place the next layer of pavement. The compacted base is to be porous, so that water will drain through it. The base is not to be compacted to the point that it is not free draining or that the aggregate is crushed. No rubbertired or vibratory rollers shall be permitted on the permeable asphalt treated base.

Permeable cement treated base shall be delivered to the project in such a manner that a uniform, adequate supply is available for the placing equipment. An approved mechanical spreader or slipform paver conforming to the requirements of Section 502, or other approved spreading equipment, shall be used to place the base course. Screed or plate vibrators shall be used to consolidate the base course to a consistent finish across the width of placement. If, in the opinion of the Engineer, the placing equipment does not provide adequate consolidation, the base course shall be further compacted with one to three passes on an 7.9 - 9.9 tons (7.2 - 9 metric ton) steel-wheeled roller, or to the satisfaction of the Engineer. The base course shall not be vibrated or compacted to the point that it is not free draining or the aggregate is crushed. Necessary hand spreading shall be performed using square-faced shovels. After initial set of the base course, or when directed by the Engineer, a white pigmented, wax base concrete curing compound shall be applied to the base course surface at a rate not to exceed 151 square feet per gallon (3.7 square meters per liter) and in accordance with the requirements of Section 501.11 of the Standard Specifications.

When necessary to form a transverse joint between old and new permeable treated base or between successive day's work, the joint shall be made by placing a bulk head or by cutting back the base as necessary to provide a full-depth vertical face. Regardless of the method of joint construction, a satisfactory riding surface shall be maintained.

To avoid longitudinal cold joints, all adjoining permeable treated base shall be placed to the plan width within 30 minutes after the final compaction of the initial spread.

No traffic, construction or otherwise, shall be allowed to travel on the permeable treated base. The only exception will be for the paving train equipment necessary to place the next layer of pavement as directed by the Engineer. The Contractor shall be required to complete, protect, and maintain all permeable treated base courses during extended periods of construction inactivity such as those associated with adverse weather conditions or any other extended work interruptions.

All permeable treated base placed during any one construction season shall be covered with P.C.C. Pavement and adjoining shoulder Hot-Mix Bituminous Asphalt Paving by the end of the construction season. Any permeable treated base which has not been paved over at the end of the construction season must be entirely covered with polyethylene film meeting the requirements of AASHTO M171. The film

shall be firmly anchored and lapped a minimum of 18" (450 mm). The film will be maintained by the Contractor to insure coverage of the permeable treated base until removal is authorized by the Engineer just prior to the commencement of paving operations.

Any permeable treated base that becomes damaged for any reason shall be removed and replaced as directed by the Engineer with no additional cost to the Department.

Tolerances:

A. Thickness: The thickness of the permeable treated base shall be within +/- 1/2" (12 mm) of the plan thickness and shall be determined from the field measurements taken through the permeable treated base at intervals not exceeding 500' (150 linear meters) per lane or shoulder width, or as directed by the Engineer. Measurements shall be made to the nearest 1/5" (3 mm). If the measured thickness is not within the specified thickness tolerance, additional measurements shall be made at intervals not to exceed 50' (15 m) forward and backward until at least two consecutive measurements in each direction are within tolerance. When directed by the Engineer, areas represented by measurements exceeding the specified tolerance shall be removed and reconstructed at the Contractor's expense. Sections to be removed shall include the full lane or shoulder width and not less than the total length of base course deficient in thickness or as directed by the Engineer. When permitted by the Engineer, low areas may be filled with the next pavement course in the same operation in which that pavement is placed at no cost to the Department. Removal of high areas exceeding the specified tolerance by grading, milling or grinding to achieve plan thickness will not be permitted.

The specified tolerance allowance does not relieve the Contractor of the responsibility of placing the permeable treated base at the elevation necessary to place the next pavement course at plan thickness and plan elevation. The Contractor shall establish the plane of elevation of the completed Permeable Treated Base through surveyed elevation measurements at 26' (8 m) intervals along lane lines and at breaks in cross-slope. The cost of surveying is to be included in the unit cost bid for Construction Engineering. Nominal adjustments to final pavement elevation will be permitted by the Engineer, however, deviation in final pavement cross-slope greater than +/- 0.1% will not be permitted.

B. Surface: The surface smoothness of the permeable treated base course shall be subject to the requirements of Subsection 401.13 for Bituminous Base Courses: Lower Courses. These requirements shall apply to permeable treated base constructed with either asphalt cement or portland cement.

Method of Measurement:

The quantity of permeable treated base will be measured as the actual number of square yards (square meters) of surface area at the specified thickness completed and accepted according to Plans and cross-section. Material 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.

Basis of Payment:

The quantity of permeable treated base will be paid for at the Contract unit price per square yard (square meter). Price and payment will constitute full compensation for furnishing all materials, mixing, hauling, and compacting all materials for production and construction of an asphalt treated or cement treated permeable base, and for required protection of placed materials, removal and replacement of any

damaged or contaminated permeable treated base, and for all labor, equipment, tools, and incidentals necessary to complete the work.

2/13/03

304502 - SOIL CEMENT BASE COURSE 6"
304506 - PORTLAND CEMENT

Description:

This work consists of preparing a foundation and constructing a mixture of soil and Portland Cement base in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross-sections shown on the Plans or established by the Engineer.

Materials:

Portland Cement: Portland cement shall meet the requirements and tests of the Standard Specifications for Portland Cement, AASHTO M 85, Type I or Type II and shall be approved prior to use.

Water: The water shall be free from minerals or organic substances deleterious to the soil cement and shall meet the requirements of Section 803.

Soil: The soil for the soil cement base course shall consist of borrow material which meets the requirements of Section 209, Borrow Type D. The borrow material must be tested and approved prior to use. Any material retained on a 3 (75 mm) sieve and other unsuitable material such as roots, vegetation, etc., shall be removed by acceptable methods prior to use. The maximum density and optimum moisture will be determined by AASHTO T 99, Method C, Modified. Maximum density and optimum moisture values will be determined at 1/2 hour time increments up to a maximum of 2 hours after addition of cement to the mixture. Field density determinations will be made in accordance with AASHTO T 238 or other approved methods.

Asphalt: The asphalt used as a curing film for the soil cement base course shall be RC 70, RC 250, RS 1 or RS 2 meeting the requirements of AASHTO M 81 and M 140 respectively and shall be approved prior to use.

Preconstruction:

It shall be the Contractor's responsibility to notify the Materials and Research Section of Department at least 30 calendar days prior to the anticipated processing date in order to determine the required proportions of cement and water for the soil cement mixture. This notification shall be made after a stockpile of soil has been formed of material representative of the approved source to the satisfaction of the Engineer.

Construction:

Mixing of the soil, cement and water shall be accomplished by the Central Mix method.

A) **Central Mixing Plants:** The plant may be either a batch or continuous flow type equipped with batching or metering devices designed to regulate the specified quantities of the respective materials and which has been inspected and approved prior to use. The plant shall be of a design that will produce a thorough mixture of soil, cement, and water of proper proportions. The mixer shall be in an approved mechanical condition and shall have a capacity of at least 99 tons (90 metric tons) per hour. Approval shall not be granted for use of a mix

plant that permits added water to come in contact with the cement before the cement has been mixed with the soil. All controls shall be synchronized so that the water, soil, and cement feeds start and stop simultaneously. The cement shall be fed automatically and uniformly. The soil must be fed in a manner which will insure as even a flow as possible. The plant shall maintain an adequate and acceptable cement storage, an approved stockpile of soil, and an adequate water supply. The Contractor shall be required to demonstrate that the plant is capable of producing a uniform mixture of soil, cement, and water prior to approval and use.

B) **Field Laboratory:** The Contractor and/or producer shall provide suitable quarters at central mixing plants for the purpose of housing laboratory testing equipment. The quarters shall be approximately 8 L x 8 W x 8 H (2.4 m L x 2.4 m W x 2.4 m H) with a work counter approximately 8 L x 2 W (2.4 m L x 0.6 m W), or other acceptable dimensions. The quarters shall be entirely enclosed, water and dust proofed, and shall be provided with electricity, water, storage, screened windows and an entrance with satisfactory locks. The field laboratory shall also be air conditioned and heated. The quarters shall be located convenient to the plant. The quarters will be considered part of the central mixing plant and no additional compensation will be made.

C) **Mixing:** Before any soil is processed through the plant, it shall be uniform in texture and tested for conformance to specifications, and approved.

The percentage of moisture in the soil, at the time of cement application, shall not exceed the quantity that will permit a uniform and intimate mixture of soil and cement during the mixing operations, and it shall not exceed the specified optimum moisture content for the soil cement mixture.

Mixing operations shall not start when the soil or the foundation soils, on which the mixture is to be placed, are frozen.

The method of calibrating the mixing plant to ensure adequate cement flow shall be the responsibility of the Contractor. Plant calibrations shall be performed daily or as necessary to produce a soil-cement mixture at the design cement content and within a tolerance of +0.5%.

The air temperature shall be at least 39 F (4 C). in the shade and rising prior to the start of mixing operations.

D) **Cement Content:** The cement content for the soil-cement mixture shall be the percentage of cement on a dry-weight basis of soil required to produce a compressive strength of 500 psi (3450 kPa) minimum at 7 days when tested in accordance with ASTM D 1633, "Compressive Strength of Molded Soil-Cement Cylinders." A cement content of 7%±1% by weight is anticipated; however, the actual design cement content to achieve the specified 500 psi (3450 kPa) 7-day strength will be established by the Department.

Cement content shall be checked during soil cement operations by the Department on a random basis, in an effort to insure proper compliance with mix design specifications. Cement content shall be determined in accordance with ASTM D 2901, "Cement Content of Freshly Mixed Soil-Cement."

E) **Hauling:** The mixture shall be hauled to the roadway in vehicles free of foreign material and covered to protect the mixture from loss of moisture.

F) **Spreading and Finishing:** The foundation material shall be in a moist condition and free of water puddles prior to the spreading operation. The mixture shall be placed in a uniform layer by an approved spreader. The layer of soil cement shall be uniform in thickness and surface contour. The thickness will be such that the mixture when compacted will conform to the tolerances of the required grades and cross sections. Dumping of the mixture in piles or windrows on the foundation material shall not be permitted without the prior approval of the Engineer. Not more than 30 minutes shall elapse between the placement of soil cement in adjacent lanes, unless forms are used to construct longitudinal joints. In lieu of using forms, the Contractor may submit an alternate method of construction and protection of the longitudinal joints. Any alternate method must be approved prior to use. After the mixture has been compacted, the surface of the soil cement shall be shaped, if necessary, to the lines, grades, and cross sections given on the Plans. Final grading shall be performed by use of an autograder controlled by a stringline and an electronic guidance system or an approved equal. The surface shall be smoothly and uniformly compacted to the specified density. The surface material shall be maintained within two (2) percentage points of the specified optimum moisture content during finishing operations.

Surface compacting and finishing may be varied as necessary to produce a smooth, dense surface, free of compaction planes, cracks, ridges, or loose material.

G) **Compaction:** Prior to the beginning of compaction, the mixture shall be in a loose condition at sufficient thickness to achieve the required Plan thickness. At the beginning of compaction the percentage of moisture in the mixture shall be within 2 percentage points of the specified optimum moisture content or at a moisture content which will not cause an unstable condition in the soil cement mixture. If, due to rain, the average moisture content exceeds the tolerances given above, the entire section shall be corrected, at the Contractor's expense, by removal and replacement. The loose mixture shall, within 2 hours from the time mixed, be uniformly compacted to not less than 97% of the maximum dry density. Material used to determine the maximum dry density shall be sampled at the completion of compaction or within the above time limit, whichever occurs first. Field density tests shall be performed on each day's construction. During compaction operations, shaping may be required to obtain uniform compaction and the required grade and cross section. Not more than 60 minutes shall elapse between the start of mixing and the start of compaction of the soil cement mixtures. Any mixture of soil, cement, and water that has been spread and not been compacted shall not be left undisturbed for more than 30 minutes.

H) **Construction Joints**: The end of each completed section shall be cut back to a point where it meets the line, grade, crown, and specified quality of soil cement mixture and shall be trimmed to a vertical face at right angles to the centerline of roadway for the full width and depth. The trimmed vertical face shall be protected until compacting operations begin on the adjacent section. The use of a wooden bulkhead to construct a true vertical face and cross section shall be required by the Engineer.

I) **Protection and Cover**: After the soil cement mixture has been completed as specified herein, it shall be protected against drying by applying RC 70, RC 250, RS 1, or RS 2 asphalt at the minimum rate of .02 gallons per square foot (0.68 liters per square meter). Just prior to the application of asphalt the soil cement shall be broomed free of all loose and foreign material, and sufficient water added with pressurized distributing equipment to fill the surface voids only. The finished soil cement shall be kept moist until the asphalt is applied. This asphalt shall be applied within 24 hours following the finished operation or as soon as weather conditions permit.

The asphaltic curing film shall be maintained by the Contractor until the mixture is protected by a subsequent course.

A water cure may be used in lieu of the asphalt if approved by the Engineer. The water cure shall be applied within two hours after compaction and acceptance of any portion of the soil cement. The water cure shall be applied every two hours unless otherwise directed by the Engineer. The water cure shall be applied for a minimum period of 120 hours or until the soil cement has cured to the satisfaction of the Engineer.

A white pigmented curing compound may be used in lieu of the asphalt if approved by the Engineer. The material shall conform to the requirements of Subsection 501.11. The material shall be applied at a rate not to exceed 147 square feet per gallon (3.6 square meters per liter).

Any finished portion of the soil cement base course adjacent to construction which is traveled on by equipment used in constructing an adjoining section shall be protected in such a manner as to prevent equipment from marring or damaging the completed work.

At any time when the air temperature may be expected to reach the freezing point during the day or night, sufficient protection shall be given the soil cement to prevent its freezing for 7 days after compacting.

Tolerances:

A) **Thickness**: The thickness of the soil cement mixture shall be within 1/2 (12.5 mm) of the Plan thickness and shall be determined from the average of a set of measurements taken through holes made through the finished soil cement mixture at intervals not to exceed 500 (150 linear meters) per lane. A set of measurements consists of three holes spaced 5 (1.5 m) apart in a triangular pattern with the thickness measured to the nearest 1/4 (5 mm). Measurements will be made immediately following the finishing operation.

If the average thickness shown by a set of measurements is not within the tolerances specified, additional sets of measurements shall be made at 25 (7.5 m) intervals forward and backward until at least two consecutive sets of measurements in each direction are within the tolerance specified. Areas represented by averages exceeding the tolerances specified shall be required to be reconstructed at the Contractor's expense.

B) **Surface:** The surface smoothness of the soil cement base course mixture during and after the compaction and finishing operations shall be tested with a 10 (3 m) straightedge. Cross slopes shall be tested using the straightedge laid perpendicular to the centerline. Longitudinal slopes shall be tested using the straightedge laid parallel to the centerline. Any irregularities greater than ± 1/2 (12 mm) shall be corrected or removed and replaced at the direction of the Engineer and at the Contractor's expense. The 10 (3 m) straightedge shall be provided by the Contractor.

C) **Density:** Any portion of the soil cement base course which show less than 97% of the maximum dry density shall be required to be removed and replaced at the Contractors expense.

D) **Time Limitations:** Soil cement base course in areas where time limitations were not adhered to shall be required to be reconstructed at the Contractor's expense.

The completed sections shall not be used by the Contractor as a haul road or by any other associated construction traffic.

Only construction equipment necessary for placement of the "Permeable Treated Base" or other overlaying pavement courses shall be allowed on completed soil cement sections. This traffic shall only be allowed on the completed sections provided the soil cement has hardened to a minimum of 500 psi (3450 kPa) compressive strength or has cured for 7 days.

Maintenance:

The Contractor shall be required within the limits of his/her Contract, to maintain the entire soil cement base course in good condition from the time he/she first starts work until all work has been completed and the soil cement base course is covered with the next subsequent paving material. Maintenance shall include immediate repairs of any defects that may occur either before or after the cement is applied, this work shall be done by the Contractor at his/her own expense, and repeated as often as may be necessary to keep the area continuously intact until the placement and acceptance of the materials covering the soil cement. Faulty work shall be remedied by replacing the material for the full depth of treatment rather than adding a thin layer of soil cement to the completed work.

The Contractor shall also be required to complete, protect and, maintain all soil cement sections during the winter shut down period or other extended periods of time caused by unsuitable weather.

Method of Measurement:

The quantity of soil cement base course will be measured as the number of square yard (meters) completed and accepted.

The quantity of cement will be measured as the number of tons of cement used in the completed and accepted soil cement base course not to exceed in the proportion of the mix for payment purposes more than 10 percent of the theoretical design percentage. The theoretical design percentage of the cement shall be determined by the Department using the PCA short cut method on actual soils used to complete the work. A conversion factor indicating the number of pounds (kilograms) of cement per square yard (meter) of soil cement base course will be determined by the Department based on the approved job mix formula.

The quantity of borrow type D will be measured as the number of cubic feet (meters) of borrow type D used in the completed and accepted soil cement base course. A conversion factor indicating the number of cubic yard (meters) of borrow type D per square yard (meter) of soil cement base course will be determined by the Department based on the approved job mix formula.

Basis of Payment:

The quantity of soil cement base course will be paid for at the Contract unit price per square yard (meter). Price and payment will constitute full compensation for preparing the foundation, mixing, spreading, compacting, water, asphalt used as curing film and all labor, tools, equipment and incidentals necessary to complete the work.

The quantity of cement will be paid for at the Contract unit price per ton. Price and payment will constitute full compensation for furnishing the cement, for storage and for all labor, equipment, tools and incidentals required up to the incorporation of the cement in the soil cement mixture.

The quantity of borrow type D will be paid under a separate item of this Contract.

No payment for soil cement base course, cement or borrow type D will be made prior to final acceptance of the in-place material.

2/13/03

401504 - BITUMINOUS CONCRETE, TYPE C LEVELING COURSE
401508 - BITUMINOUS CONCRETE, TYPE B LEVELING COURSE

Description:

This work consists of furnishing and placing a bituminous concrete, type C or type B, leveling course, at locations approved by the Engineer.

Materials:

The superpave type C and type B bituminous concrete used for leveling shall have the same gyration and asphalt performance grade requirements as the lift to be placed immediately above it.

A nominal maximum aggregate size of 4.75 mm shall be used for the leveling course.

Construction Methods:

Construction methods shall be in accordance with Section 401 of the Standard Specifications and the superpave bituminous concrete specifications found elsewhere in these Special Provisions.

Leveling course will be placed as directed by the Engineer. If the Engineer determines lines and grades are necessary, they will be provided by the Department.

Method of Measurement and Basis of Payment:

The method of measurement and basis of payment shall be in accordance with Subsections 401.35 and 401.40 of the Standard Specifications.

10/25/2013

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.

Appenidx 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)
401802 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 64-22 (CARBONATE STONE)

401803 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 70-22 (CARBONATE STONE)
401804 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22 (CARBONATE STONE)
401805 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 70-22 (CARBONATE STONE)

401806 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 76-22 (CARBONATE STONE)
401807 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22 (CARBONATE STONE)
401808 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 76-22 (CARBONATE STONE)

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

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

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

401818 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 115 GYRATIONS, PG 64-22
401819 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22
401820 - BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 205 GYRATIONS, PG 64-22

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

401826 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 64-22, (NON-CARBONATE STONE)
401827 -BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22, (NON-CARBONATE STONE)
401828 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 64-22, (NON-CARBONATE STONE)

401829 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 115 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)
401830 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)
401831 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 205 GYRATIONS, PG 70-22, (NON-CARBONATE STONE)

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

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

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

401840 - THIN BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22

.01 Description:

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

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

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

.02 Materials:

Use materials conforming to standard specifications 823.

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

a) **Asphalt Binder:**

Meet the requirements of Superpave performance-grade asphalt binder, as referenced in the Plans, according to M 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:

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

The proposed JMF shall include the following:

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

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

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

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

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

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

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

10/29/2014

601506 - MAINTENANCE OF STREAM FLOW

Description:

The Contractor shall be responsible for maintaining the stream flow within the contract limits of the project at all times during the duration of the contract. Diversion of the stream flow is intended to minimize erosion and sediment transport and permit construction under dry site conditions. The devices and methods used for diversion and maintenance of the stream flow shall be in accordance with those described in these Special Provisions together with the notes and details shown on the Plans and as directed by the Engineer. Alternative plans to provide for stream flow during construction shall be subject to the approval of the Engineer. Any such alternate plans shall provide sufficient detail to demonstrate the adequacy of the materials, methods, and equipment to the satisfaction of Engineer. The plan shall be prepared on standard Department tracings and be signed and sealed by professional engineer licensed to practice in the State of Delaware. After the devices have served their purpose, they shall become the property of the Contractor and shall be removed promptly from the project site at the Contractor's expense.

The "Maintenance of Stream Flow" shall include diversion through both pumping and installation of a temporary steel carrier pipe, together with all incidental equipment, materials, and labor necessary to divert the stream flow, allow the construction of the culvert and appurtenances, and restore the area to the preconstruction lines and grades except as provided for by the plans.

The Contractor is charged with the responsibility of obtaining complete knowledge and compliance with the "Location and Environmental Requirements" contained in these Special Provisions.

Materials and Construction Methods:

All materials and equipment used for diversion of the stream flow shall be approved by the Engineer.

Pumping of the stream flow shall be scheduled in advance to the maximum extent possible to insure that the base flow can be pumped around the work area. The Contractor shall install and test the sand bag dike and pump system to demonstrate its effectiveness to the satisfaction of the Engineer prior to any disturbance of the existing culvert structure. This should include provisions for sediment and erosion control at the discharge point of the pump in accordance with State of Delaware regulations.

The Contractor shall provide a detailed work plan and any necessary calculations for the steel pipe and associated timber supports. The plan(s) shall be prepared on standard Department tracings and both the plan and the calculations shall be signed and sealed by professional engineer licensed to practice in Delaware. The plan shall be approved by the Engineer prior to the start of construction or ordering of materials.

Sand bags used for this item shall be jute or woven polyester or polypropylene mesh resistant to ultra-violent radiation, and of sufficient strength to contain sand without failure or leakage. The size of the sack shall be approximately 16" x 25" measured inside the seam when the sack is laid flat and each sack will be filled with one cubic foot of unwashed sand.

The Contractor shall submit sample of sacks of the type proposed to be used in the work for prior approval. The sacks will be filled with unwashed sand and placed at the location(s) in accordance with the details and/or as directed. Impervious sheeting used for the sand bag dike construction shall be of a type and thickness approved by the Engineer.

Method of Measurement:

The amount of "Maintenance of Stream Flow" will not be measured. The work shall be paid for on a "lump sum" basis.

Basis of Payment:

"Maintenance of Stream Flow" as provided for above will be paid for on a "lump sum" basis which price and payment shall be full compensation for all sand bags; impervious sheeting; pumps; pumping; steel pipe; timber support; welding and cutting of pipe; minor excavation for excavation for installation; maintenance, removal, and disposal of stream diversion devices; together with all labor, equipment, tools, and incidentals necessary to complete the work. There will be no separate payment for sand bags or steel pipe associated with this work.

601514 - RAILROAD AT GRADE CROSSING

Description:

The work under this section shall consist of constructing or improving at-grade crossings of freight tracks to provide access to the project.

Submittals:

Prepare plan of crossing construction / improvement and submit to Norfolk Southern Railroad's or CSXT's Division Superintendent for review and approval. Submittals shall occur a minimum of 60 days prior to the expected date of construction. No construction shall occur until written approval in received and provided to the Engineer.

Construction Methods:

Construct or improve existing at-grade crossings in accordance with Norfolk Southern Standard Crossing Plans 7-5 and 7-5A, below, except that full depth asphalt will replace the "Compacted NS Standard Sub-Ballast" between the rails.

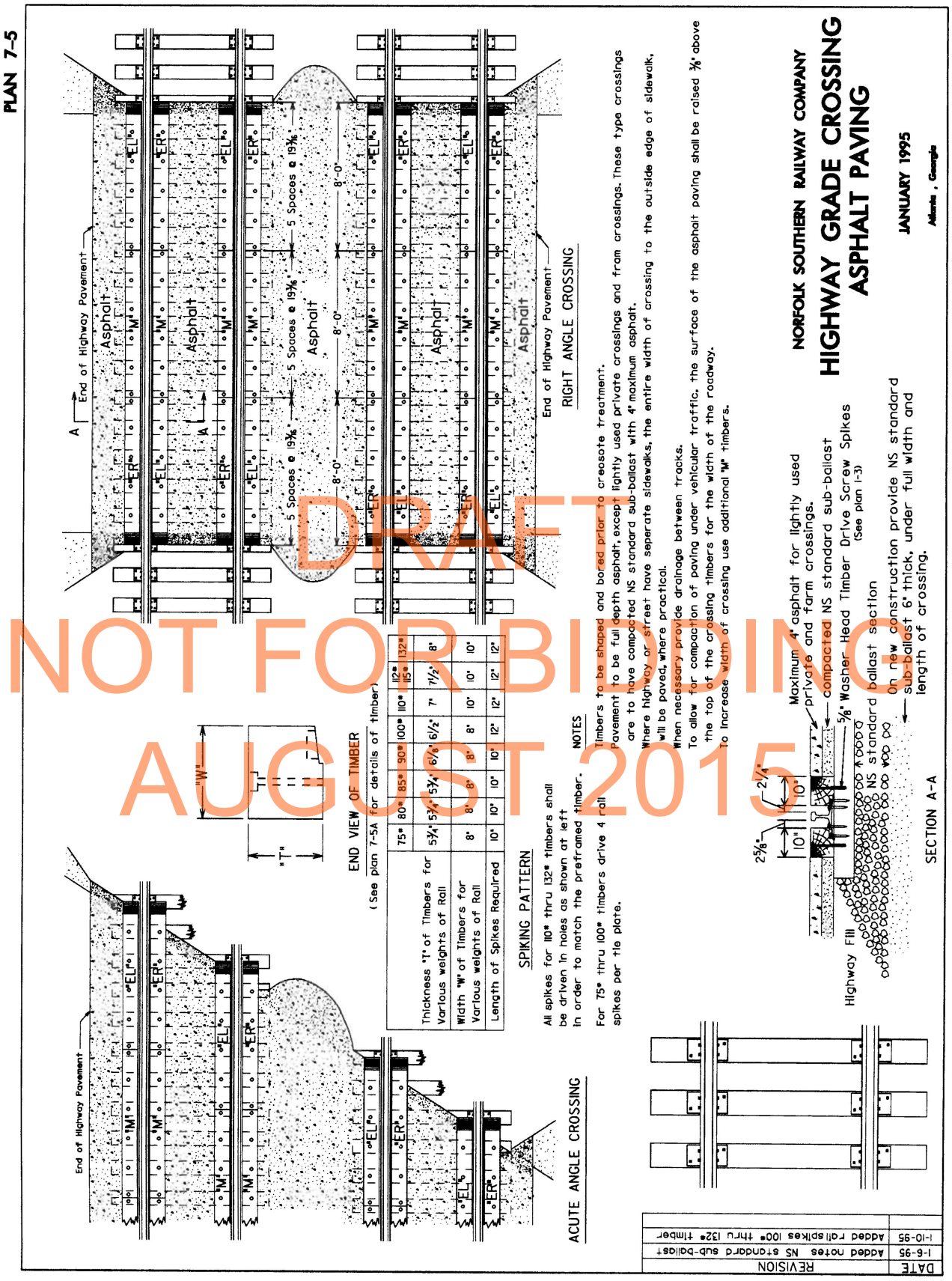
Method of Measurement:

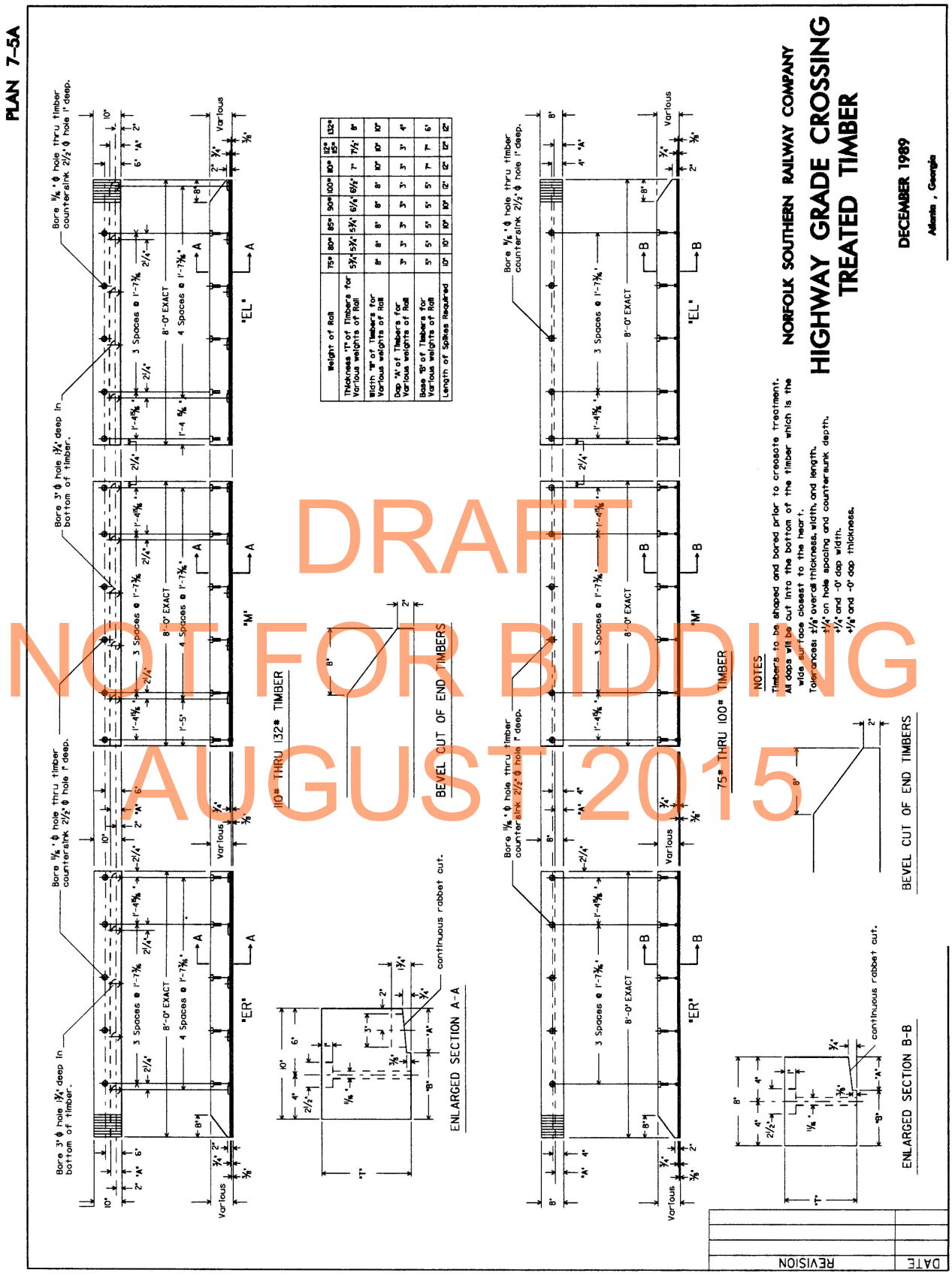
The quantity of Bid Item 601514 "Railroad At Grade Crossing" will be measured on a linear foot basis.

Basis of Payment:

Bid Item 601514 "Railroad At Grade Crossing" will be paid for at the Contract unit price per linear foot. Price and payment will constitute full compensation for furnishing, hauling, and installing materials, including timber ties, asphalt, graded aggregate base, spikes, geotextile, excavation, backfilling, and compacting; and for all labor, equipment, tools, and incidentals required to complete the work.

11/16/10





602501 - HIGH MOLECULAR WEIGHT METHACRYLATE SEALER

Description/Materials:

A. Furnish a sealer that consists of a wax-free low odor, high molecular weight methacrylate prime coat. The prime coat shall be a resin that has a maximum volatile content of 30 percent when tested in accordance with ASTM designation D 2369 prior to adding initiator. The resin must also conform to following:

High Molecular Weight Methacrylate (HMWM) Resin		
Property	**Requirement**	**Test Method**
Viscosity* (Brookfield RVT with UL adapter, 50 RPM at 77ºF)	0.025 Pa s, maximum	ASTM D 2196
Specific Gravity* (at 77ºF)	0.90, minimum	ASTM D 1475
Flash Point* (Degrees C)	10	ASTM D 3278
Vapor Pressure* (mm Hg at 77ºF)	1.0	ASTM D 323
Tack Free Time (minutes at 77ºF)	400 min. maximum	ASTM C 679
PCC Saturated Surface-Dry Bond Strength (MPa at 24 hrs at 70±1ºF)	0.5 psi minimum	

*Tested prior to adding initiator

B. The prime coat promoter/initiator shall consist of a metal drier and peroxide. If supplied separately from the resin, at no time mix the metal drier directly with the peroxide. Store the containers in a manner that will not allow leakage or spillage from one material to contact the containers or material of the other.
NOTE: Mixing the metal drier directly with the peroxide will result in a violent exothermic reaction.

C. Submit samples of the materials to the Materials and Research section at least sixty (60) days prior to the application. Ship all components in strong, substantial containers that bear the manufacturer's label specifying the date of manufacture, batch number, brand name, quantity, and date of expiration or shelf life. In addition, the mixing ratio shall be printed on the label of at least one of the system components. If bulk resin is to be used, notify the Engineer in writing 10 days prior to the delivery of the bulk resin to the job site. Bulk resin is any resin that is stored in containers in excess of 55 gallons.

D. Surface Preparation and application rate per manufacturer's recommendations. Do not permit sealer to pond in rumble strips. Apply a continuous width of 20-inches centered on the rumble strips in accordance with the notes and details on the Plans and as directed by the Engineer.

E. Apply course sand per manufacturer's recommendations. Remove excess sand prior to opening to traffic

Method of Measurement:

The quantity of "High Molecular Weight Methacrylate Sealer" will not be measured.

Basis of Payment:

No payment for High Molecular Weight Methacrylate Sealer will be made. Methacrylate Sealer is incidental to 760015 - Rumble Strip, Shallow Depth 3/8"

7/21/15

602506 - PRECAST CONCRETE CULVERT (L.S.)
602522 - PRECAST CONCRETE CULVERT (L.F.)

Description:

This work consists of furnishing, fabricating, and constructing complete in place the precast reinforced concrete culvert(s) and other associated precast structures (footings, wingwalls, parapets, etc.) as specified on the Plans, as described herein and as directed by the Engineer.

Materials:

1. Concrete

   Concrete shall conform to Section 812 of the Standard Specifications except as amended herein. Minimum 28 days strength for precast concrete shall be 5000 psi (35 MPa). The Contractor shall develop his own concrete mix design, according to ACI 211.1-81, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, which shall be submitted to the Engineer for approval. The cement content shall not be less than 700 lb. per cubic yard (415 kg per cubic meter). Portland Cement shall be Type I or Type II (ASTM C 150). In a salt water environmental Type II Cement shall be used.

2. Reinforcing Steel

   Reinforcing steel shall meet the requirements of AASHTO M 31/M 31M, Grade 60 (Grade 400) (AASHTO M 31); and shall be protected with fusion bonded epoxy meeting the requirements of Section 604 of the Standard Specifications.

3. Backfill

   Borrow Type "B" and/or Borrow Type "C" as required by the plans shall conform to Section 209 of the Standard Specifications.

Design:

The precast reinforced concrete culvert design shall be in accordance with the design specification noted in the Plans. The loading shall be AASHTO HL93 or Delaware Legal Load, whichever governs. The allowable soil bearing pressure shall be as shown on the Plans. The Contractor shall submit design calculations and load ratings for HS20-44 and Delaware legal loads using BRASS program if structural dimensions differ from the Plans; and shop drawings showing all pertinent dimensions or reinforcement, reinforcement size and location to the Engineer for approval. The calculations shall be certified by a registered Professional Engineer in the State of Delaware.

Fabrication Plant:

The fabrication plant for precast concrete culvert shall be a National Precast Concrete Association (NPCA) certified plant and pre-approved from the Department.

Fabrication:

1. General

All materials, equipment, processes of manufacture, and the finished sections, including handling, storage, and transportation, shall be subject to inspection and approval. Any defective construction, which may adversely affect the strength or performance of a section, shall be cause for rejection. Rejected sections shall be replaced at no expense to the Department.

2. Forms

The forms used shall be sufficiently rigid and accurate to maintain the culvert dimensions within the tolerances hereinafter specified. The culverts forms shall be matched so that the internal dimensions from one precast section to the next adjacent section shall not vary by more than 1/2" (13 mm). They shall be well constructed, carefully aligned, substantial and firm, securely braced and fastened together, sufficiently tight to prevent leakage of mortar, and strong enough to withstand the action of mechanical vibrators. All the casting surfaces shall be of a smooth material.

Form ties shall be either the threaded type or the snap-off type, so that no form wires or metal pieces will be left at the surface of the finished concrete. Corners and angles shall be mitered or rounded.

Joints between panel forms shall be made smooth and tight.

3. Curing

The culvert shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less. Any one of the following methods of curing or combinations thereof shall be used for culvert sections:

Steam Curing - The culvert sections may be low pressure, steam-cured by a system that will maintain a moist atmosphere.

Water Curing - The culvert sections may be water cured by any method that will keep the sections moist.

Forms Left in Place - An accelerated overnight cure accomplished through the use of an external heat source may be used, provided moisture loss from exposed surfaces is minimized.

The maximum temperature increase or decrease shall be 40 F (22 C) per hour. The initial application of the heat shall be two hours after the final placement of concrete to allow the initial set to take place.

4. Testing Requirements

Test Specimen - Concrete compressive strength shall be determined from compression tests made on cylinders. Acceptance of the concrete culvert sections with respect to compressive strength will be determined on a basis of production lots. A production lot is defined as a group of culvert sections representing 10 culvert sections or a single day's production, whichever is less.

During the production of the culvert sections, 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 4" x 8" or as specified by the Engineer 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 culvert sections 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.

Acceptability by Cylinder Tests - The compressive strength of the concrete for each production lot as previously defined is acceptable when the compressive strength is equal to or greater than the design concrete strength.

When the compressive strength of any production lot is less than the design concrete strength, the production lot shall be rejected. The rejection shall prevail unless the manufacturer, at his/her own expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed within the culvert sections of the production lot are acceptable. If the evidence consists of tests made on cores taken from the culvert sections within the production lot, the cores shall be obtained and tested in accordance with the requirements of AASHTO T 24. The core holes shall be plugged and sealed by the manufacturer in a manner such that the culvert section will meet all of the test requirements of this Special Provision. Culvert sections so sealed shall be considered satisfactory for use.

5. Tolerances

Internal Dimensions - The internal dimension shall vary not more than -0"/+1/4" (-0 mm/+25 mm) from the design dimensions.

Top Slab and Wall Thickness - The top slab and wall thickness shall not be less than the design dimensions by more than 5 percent. A thickness more than that required shall not be cause for rejection.

Length of Opposite Surfaces - Variations in laying lengths of two opposite surfaces of the culvert sections shall not be more than 1/8"/foot (10 mm/m) of internal span, with a maximum of 5/8" (16 mm) for all sizes through 7' (2100 mm) internal span, and a maximum of 3/4" (19 mm) for internal spans greater than 7' (2100 mm).

Length of Section - The under run in length shall not be more than 1/8"/foot (10 mm/m) of length with a maximum of 1/2" (13 mm) in any box section.

Position of Reinforcement - The maximum variation in the position of the reinforcement shall be ±3/8" (± 10 mm), except the cover over the reinforcement for the external surface of the top slab shall not be less than 2" (50 mm) for earth covers less than 3' (.9 m). The above tolerances or cover requirements do not apply to mating surfaces of the joint.

Area of Reinforcement - The areas of steel reinforcement shall be the design steel areas per linear foot (linear meter). Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM specification for that type of reinforcement.

Construction Methods:

The foundation on which the footings are to be placed shall be a layer of the type of coarse aggregate as specified on the Plans. The bedding areas on which the coarse aggregate will be placed shall be approved

by the Engineer. Coarse aggregate shall be carefully placed and tamped to form a solid, unyielding mass with the exposed surface conforming to the form and dimensions shown on the Plans.

Precast sections shall be assembled in accordance with the recommendations of the manufacturer and as approved by the Engineer in the field. The culvert sections shall be so formed that when they are laid together they will make a continuous line of culverts with a smooth interior free of appreciable irregularities, and compatible with the permissible tolerances of this Special Provision.

Care shall be exercised to insure proper matching and aligning of joints of adjacent sections. The joints shall consist of mortar filled shear keyways. The keyway surfaces shall be given a medium abrasive grit blast, 2000 psi (14 MPa) waterblast or a thorough wire brushing at the plant within four days prior to leaving the plant. Mortar for the keyway shall be a non-shrinking, non-metallic mortar having a minimum compressive strength at 28 days of 5000 psi (35 MPa). Before applying the mortar, the surfaces shall be clean of all dirt, dust, and other foreign matter. The surfaces shall be wetted, but no free water shall be allowed to remain in the keyway. The mortar shall be prepared, placed, and cured in accordance with the manufacturers recommendations.

The joint exterior shall be covered with a minimum of a 9" (225 mm) wide wrap centered on the joint. The external wrap shall be as per ASTM C-877. Care shall be exercised to keep the joint wrap in its proper location during backfilling.

The section length shall not exceed that which permits lifting, moving, and placing of the section without any bending, distortion, or stress being induced therein. Devices or holes shall be permitted in each culvert section for the purpose of handling. However, not more than four holes may be cast or drilled in each section. The holes shall be tapered unless drilled, and before backfilling, the tapered holes shall be filled with portland cement mortar, or with precast concrete plugs which shall be secured with portland cement mortar or other approved adhesive. Drilled holes shall be filled with portland cement mortar. Holes shall be covered on the exterior with the joint wrap material previously specified. This wrap shall have a minimum length and width of 9" (225 mm).

No construction equipment except for compaction shall be permitted to pass over the culvert until the fill height has reached the bottom of the pavement subbase. Hauling of materials over the culvert shall be limited as directed, and in no case shall legal load limits specified in Section 105.12 of the Standard Specifications be exceeded unless permitted in writing.

Method of Measurement:

The quantity of item 602506 - Precast Concrete Culvert will not be measured.

The quantity of item 602522 - Precast Concrete Culvert will be measured as the number of linear feet (linear meters) of Precast Concrete Culvert installed and accepted.

Basis of Payment:

The quantity of Precast Concrete Culvert will be paid for at the Contract lump sum price for item 602506 and/or at the Contract unit price per linear foot (linear meter) for item 602522. Price and payment will constitute full compensation for furnishing all materials related to the precast units, designing, fabricating and installing the units on site for all labor, tools, equipment and necessary incidentals to complete the work. Price and payment will also constitute full compensation for all materials, labor, tools, equipment and incidentals necessary to construct structures associated with the culvert (footings, wingwalls,

parapets, etc.) as specified on the Plans. Excavation, backfill, backfilling, and coarse aggregate will be paid separately under their respective bid items of this contract.

06/30/2010

602507 - CONCRETE ENCASEMENT

Description:

This work consists of furnishing all materials, and constructing concrete encasement around the existing or proposed sanitary sewer, electric/telephone duct pipe and/or water main pipes as applicable to the Contract in accordance with the locations, notes and details shown on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Before starting any work, the Contractor shall inform the Owner of the Utility Company in accordance with the applicable requirements of Subsection 105.09 of the Standard Specifications. All concrete shall conform to the requirements of Section 812, Class B (3,000 PSI min.), and excavation and backfill for pipe trenches shall conform to the requirements of Section 208 of the Standard Specifications. Bar reinforcement if used as shown in details on the plans, shall conform to the requirements of Section 603 or 604 as applicable. The trench shall be excavated to the required width and depth as shown on the Plans and as directed by the Engineer. Before the concrete is to be placed, the pipe to be encased shall be thoroughly cleaned and sides of trench shall be dampened.

Method of Measurement:

The quantity of concrete encasement will be measured as the number of cubic yards (cubic meters) of concrete encasement placed and accepted. In computing the concrete volume for payment, the dimensions used shall be those shown on the Plans, or as ordered in writing by the Engineer.

Basis of Payment:

The quantity of concrete encasement will be paid for at the Contract unit price per cubic yard (cubic meter). Price and payment shall constitute full compensation for excavation, backfilling and backfill, compaction, bricks/concrete blocks or wood used for supporting the pipe as per details, bar reinforcement is used, concrete around the pipe and for all labor, equipment, tools, and incidentals necessary to complete the work.

2/20/09

602556 - PRECAST P.C.C. ARCH

Description:

This work consists of preparing structural design calculations and shop drawings; furnishing, fabricating, and constructing complete in place the Precast Portland Cement Concrete Arch (Precast P.C.C., Arch) and other associated precast structures (wingwalls, headwalls, etc.) as specified on the Plans, as described herein and as directed by the Engineer.

Materials:

1. Concrete

   Concrete shall conform to Section 812 of the Standard Specifications except as amended herein. Minimum 28 days strength for precast concrete shall be 5000 psi (35 MPa). The Contractor shall develop his own concrete mix design, according to ACI 211.1-81, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, which shall be submitted to the Engineer for approval. The cement content shall not be less than 700 lb. per cubic yard (415 kg per cubic meter). Portland Cement shall be Type I or Type II (ASTM C 150). In a salt water environment Type II Cement shall be used.

2. Reinforcing Steel

   Reinforcing steel shall meet the requirements of AASHTO M 31/M 31M, Grade 60 (Grade 400); and shall be protected with fusion bonded epoxy meeting the requirements of Section 604 of the Standard Specifications. All chair supports and similar accessories shall be plastic, rubber tipped or protected with fusion bonded epoxy.

3. Hardware

   All connection hardware shall be hot-dipped galvanized.

4. Joint Sealing Compound

   Use preformed closed cell polyethylene joint filler conforming to ASTM D3204, Type I.

5. Closed-Cell Neoprene Sponge

   Use elastomer conforming to ASTM D1056, Type 2, Class C.

6. Joint Wrap

   The external wrap shall be as per ASTM C-877.

7. Post-Tensioning Strands

   Use ½" (12.7 mm) diameter, 7 wire, uncoated, low-relaxation strands for unbonded post-tensioning conforming to AASHTO M203, Grade 270 (Grade 1860). Encase strands in polymer sheathing. Use corrosion inhibitor recommended by the manufacturer between the strand and sheathing. Provide

anchorages, bearing devices, fittings and couplings as shown on the plans and as specified by the tendon manufacturer.

8. Polymer Sheathing

Provide polypropylene, cell classification PP 210 B55542, per ASTM D4101 or polyethylene, high density, Type II, per ASTM D 3350 and ASTM D1248.

9. Duct Sheathing

Use corrugated, rigid or semi-rigid type, galvanized steel sheathing or high corrugated polypropylene ducts conforming to the requirements of ASTM D 4101 with a cell classification range of PP0340B14541 to PP0340B67884. Resin shall contain antioxidants with a minimum Oxidation Induction Time (OIT) according to ASTM D 3895 of not less than 20 minutes.

10. Select Backfill

Select backfill shall be furnished granular material that provides the parameters provided in the Precast P.C.C. Arch manufacturer's design calculations. Regardless of the specific select backfill that the manufacturer requires, this material shall be furnished, at a minimum to the limits shown on the plans. The Contractor shall furnish the Engineer with a Certificate of Compliance certifying that the select backfill materials comply with the Precast P.C.C. Arch manufacturer's requirements.

Design:

The Precast P.C.C. Arch design shall be in accordance with the Delaware Department of Transportation "Bridge Design Manual", and the latest edition and the AASHTO LRFD Bridge Design Specifications, 7th edition including all interims at the time of advertisement and the requirements on the Plans. The loading shall be AASHTO HL-93 or Delaware Legal Load, whichever governs. The assumed arch and wingwall footing reactions are as shown on the Plans. If the Contractor's proposed arch and wingwall footing reactions do not match those shown, the footings shall be revised by the Contractor to support those loads as required by design, and may include a change in the size and detailing of the footings to support the proposed arch and wingwalls. The Contractor shall submit load ratings for HL-93 design load and Delaware legal loads, in accordance with the DelDOT Bridge Design Manual. Shop drawings showing all pertinent dimensions, reinforcement, reinforcement size and reinforcement location shall be submitted to the Engineer for approval. All calculations shall be certified by a registered Professional Engineer in the State of Delaware.

Fabrication Plant:

The fabrication plant for Precast P.C.C. Arch shall be a National Precast Concrete Association (NPCA) certified plant and pre-approved from the Department.

Fabrication:

1. General

All materials, equipment, processes of manufacture, and the finished sections, including handling, storage, and transportation, shall be subject to inspection and approval. Any defective construction, which may adversely affect the strength or performance of a section, shall be cause for rejection. Rejected sections shall be replaced at no additional expense to the Department.

2. Forms

The forms used shall be sufficiently rigid and accurate to maintain the culvert dimensions within the tolerances hereinafter specified. The arch forms shall be matched so that the internal dimensions from one precast section to the next adjacent section shall not vary by more than 1/2" (13 mm). They shall be well constructed, carefully aligned, substantial and firm, securely braced and fastened together, sufficiently tight to prevent leakage of mortar, and strong enough to withstand the action of mechanical vibrators. All the casting surfaces shall be of a smooth material.

Form ties shall be either the threaded type or the snap-off type, so that no form wires or metal pieces will be left at the surface of the finished concrete. Corners and angles shall be mitered or rounded.

Joints between panel forms shall be made smooth and tight.

3. Curing

The precast arch shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less. Any one of the following methods of curing or combinations thereof shall be used for culvert sections:

Steam Curing - The culvert sections may be low pressure, steam-cured by a system that will maintain a moist atmosphere.

Water Curing - The culvert sections may be water cured by any method that will keep the sections moist.

Forms Left in Place - An accelerated overnight cure accomplished through the use of an external heat source may be used, provided moisture loss from exposed surfaces is minimized.
The maximum temperature increase or decrease shall be 40° F (22° C) per hour. The initial application of the heat shall be two hours after the final placement of concrete to allow the initial set to take place.

4. Testing Requirements

Test Specimen - Concrete compressive strength shall be determined from compression tests made on cylinders. Acceptance of the arch sections with respect to compressive strength will be determined on a basis of production lots. A production lot is defined as a group of culvert sections representing 10 arch sections or a single day's production, whichever is less.

During the production of the arch sections, 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 4" x 8" or as specified by the Engineer 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 arch sections 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.

Acceptability by Cylinder Tests - The compressive strength of the concrete for each production lot as previously defined is acceptable when the compressive strength of the production lot is equal to or greater than the design concrete strength.

When the compressive strength of any production lot is less than the design concrete strength, the production lot shall be rejected. The rejection shall prevail unless the manufacturer, at his/her own expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed within the arch sections of the production lot are acceptable. If the evidence consists of tests made on cores taken from the culvert sections within the production lot, the cores shall be obtained and tested in accordance with the requirements of AASHTO T 24. The core holes shall be plugged and sealed by the manufacturer in a manner such that the culvert section shall meet all of the test requirements of this Special Provision. Arch sections so sealed shall be considered satisfactory for use.

5. Tolerances

Internal Dimensions - The internal dimension shall vary not more than -0"/+1/4" (-0 mm/+25 mm) from the design dimensions.

Top Slab and Wall Thickness - The top slab and wall thickness shall not be less than the design dimensions by more than 5 percent. A thickness more than that required shall not be cause for rejection.

Length of Opposite Surfaces - Variations in laying lengths of two opposite surfaces of the culvert sections shall not be more than 1/8"/foot (10 mm/m) of internal span, with a maximum of 5/8" (16 mm) for all sizes through 7' (2100 mm) internal span, and a maximum of 3/4" (19 mm) for internal spans greater than 7' (2100 mm).

Length of Section - The under run in length shall not be more than 1/8"/foot (10 mm/m) of length with a maximum of 1/2" (13 mm) in any box section.

Position of Reinforcement – Clear cover shall be 2" minimum except as noted or detailed on the Plans. The maximum variation in the position of the reinforcement shall be ±3/8" (± 10 mm), except the cover over the reinforcement for the external surface of the top slab shall not be less than 2" (50 mm) for earth covers less than 3' (.9 m). The above tolerances or cover requirements do not apply to mating surfaces of the joint.

Area of Reinforcement - The areas of steel reinforcement shall be the design steel areas per linear foot (linear meter). Steel reinforcing areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM specification for that type of reinforcement.

Construction Methods:

The foundation on which the footings are to be placed shall be a layer of the type of coarse aggregate as specified on the Plans. The bedding areas on which the coarse aggregate will be placed shall be approved by the Engineer. Coarse aggregate shall be carefully placed and tamped to form a solid, unyielding mass with the exposed surface conforming to the form and dimensions shown on the Plans.

Precast sections shall be assembled in accordance with the recommendations of the manufacturer and as approved by the Engineer in the field. The arch sections shall be so formed that when they are laid together they will make a continuous line of arches with a smooth interior free of appreciable irregularities, and compatible with the permissible tolerances of this Special Provision.

Care shall be exercised to insure proper matching and aligning of joints of adjacent sections. The joints shall consist of mortar filled shear keyways. The keyway surfaces shall be given a medium abrasive grit blast, 2000 psi (14 MPa) waterblast or a thorough wire brushing at the plant within four days prior to

leaving the plant. Mortar for the keyway shall be a non-shrinking, non-metallic mortar having a minimum compressive strength at 28 days of 5000 psi (35 MPa). Before applying the mortar, the surfaces shall be clean of all dirt, dust, and other foreign matter. The surfaces shall be wetted, but no free water shall be allowed to remain in the keyway. The mortar shall be prepared, placed, and cured in accordance with the manufacturer's recommendations.

The joint exterior shall be covered with a minimum of a 9" (225 mm) wide wrap centered on the joint. Care shall be exercised to keep the joint wrap in its proper location during backfilling.

The section length shall not exceed that which permits lifting, moving, and placing of the section without any bending, distortion, or stress being induced therein. Devices or holes shall be permitted in each culvert section for the purpose of handling. However, not more than four holes may be cast or drilled in each section. The holes shall be tapered unless drilled, and before backfilling, the tapered holes shall be filled with portland cement mortar, or with precast concrete plugs which shall be secured with portland cement mortar or other approved adhesive. Drilled holes shall be filled with portland cement mortar. Holes shall be covered on the exterior with the joint wrap material previously specified. This wrap shall have a minimum length and width of 9" (225 mm), or 2" beyond any edge, whichever is greater.

Place and compact select backfill to the limits shown on the Plans and in conformance with the Precast P.C.C, Arch manufacturer's recommendations. No construction equipment except for compaction shall be permitted to pass over the culvert until the fill height has reached the bottom of the pavement subbase. Hauling of materials over the culvert shall be limited as directed, and in no case shall legal load limits specified in Section 105.12 of the Standard Specifications be exceeded unless permitted in writing.

Method of Measurement:

The quantity of item 602556 - Precast P.C.C. Arch will not be measured.

Basis of Payment:

The quantity of Precast P.C.C. Arch will be paid for at the Contract lump sum price for item 602556. Price and payment will constitute full compensation for furnishing all materials related to the precast units; designing, preparing shop drawings, fabricating and installing the units on site, furnishing select backfill and backfilling; and for all labor, tools, and equipment and necessary incidentals to complete the work. Price and payment will also constitute full compensation for all materials, labor, tools, equipment and incidentals necessary to construct structures associated with the arch (wingwalls, headwalls, etc.) as specified on the Plans. If the footing design and detailing is revised by the Contractor, costs associated with this revision, including preparing the design calculations and any increase in material will be incidental to the Contract lump sum price for Item 602556.

7/20/15

602772 - MECHANICALLY STABILIZED EARTH WALLS

Description:

This work shall consist of the design, furnishing all materials, fabrication and construction of mechanically stabilized earth (MSE) retaining walls in accordance with the AASHTO definitions of mechanically stabilized earth walls employing tensile reinforcements in the soil mass. The MSE retaining wall shall be constructed in conformance with these specifications and to the lines, grades, and dimensions shown on the Plans or as established by the Engineer. Acceptance of a proprietary MSE 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.

Design Requirements:

The MSE retaining wall shall be designed in conformance with the AASHTO LRFD Bridge Design Specifications, 7th Edition including all current Interims at the time of advertisement and the requirements specified on the Plans.

The following additional specific design requirements shall be met by the developed plans:

a. All retaining wall components shall be designed for a minimum service life of 100 years.

b. Completed walls shall have a concrete facing with a finish or aesthetic treatment as described herein or noted on the plans.

The design of the internal stability of the MSE wall shall be the responsibility of the wall manufacturer. Determining the minimum length of reinforcing elements, as set forth herein, shall be the responsibility of the Contractor.

The Contractor will submit Shop Drawings in accordance with the requirements of Section 105 of the Standard Specifications bearing the fabricator's or supplier's title block and design calculations sealed by a professional engineer registered in the State of Delaware for review and approval by the Engineer at least 4 weeks before work is to begin. Shop Drawings and design calculations shall include the following:

(a) Existing ground elevations that have been verified by the Contractor for each location involving construction wholly or partially in original ground.

(b) Layout of wall that will effectively retain the earth but not less in height or length than that shown for the wall system in the Plans.

(c) Complete design calculations substantiating that the proposed design satisfies the design parameters in the Plans and in the special provisions.

(d) Complete details of all elements required for the proper construction of the system, including complete material specifications.

(e) Complete plans, details and a description of the means and methods to repair or replace MSE wall elements that are damaged during construction, that are damaged after acceptance of the work and to address loss of backfill behind the walls. These plans, details and descriptions

should define how to determine if a damaged MSE wall element can be repaired or when the element would need to be replaced and assume that traffic is to continue operating on any adjacent and supported facilities.

No work or ordering of materials shall commence until approval of the working drawings has been given by the Engineer. Acceptance of the Contractor's working drawings shall not relieve the Contractor of his responsibility under the contract for the successful completion of the work. All work pertaining to Working Drawings for MSE retaining walls shall be done at no additional cost to the Department.

Internal Stability: The internal stability of a mechanically stabilized earth structure shall be the responsibility of the wall supplier. Internal stability issues include, but are not limited to, pullout (or geotechnical) failure of the soil reinforcing elements, tensile failure of the soil reinforcing elements, failure of panel/reinforcement connections, failure through the backfill material within the reinforced mass, and failure along a reinforcing element surface within the reinforced soil mass.

Sliding, overturning, and bearing capacity shall be evaluated by the wall supplier. The allowable bearing capacity at the MSE walls shall be determined by the Contractor and submitted for approval by the Engineer.

Failure Plane: The so-called failure plane shall be taken as coincident with the locus of the points of maximum tensile force which separates the reinforced mass into an active zone between the face of the wall and the line of maximum tensile forces, and a resistant zone behind the maximum tensile forces line. The location of the so-called failure plane shall be adjusted, where necessary, to account for the effects of significant externally applied loads, such as those due to a bridge abutment footing supported directly on the mechanically stabilized backfill or due to the placement of construction equipment and any lifted loads.

Panel/Reinforcement Connections: All connections shall be positive structural connections subject to the galvanizing and metal loss rates, for metal reinforcing elements, and allowable tensile stresses given in Stresses in Reinforcing Elements. The structural adequacy and pullout capacity of the connections shall be demonstrated by test data from pullout and flexural tests on full size panels in which all connections are loaded simultaneously. The test data shall be provided by the manufacturer.

Drainage: Drainage shall be as designed by the Contractor or as directed by the Engineer. Internal and external drainage shall be evaluated for all structures to prevent saturation of the backfill or to intercept any surface flows containing aggressive elements such as de-icing salts. Internal drainage of the mechanically stabilized backfill shall be considered where the anticipated rate of surface infiltration due to precipitation exceeds the vertical permeability of the backfill material.

Length of Reinforcing Elements: The length of the reinforcing elements shall be constant over the entire height of any wall section. The minimum reinforcement length shall be as shown on the plans and not less than eight (8) feet in accordance with AASHTO. In addition, the length of the reinforcing elements shall be sufficient to satisfy all the design criteria with respect to both internal and external stability.

Stresses in Reinforcing Elements: The reinforcing elements shall be designed to have a minimum design life of 100 years with all material and other resistance factors intact at the end of the design life of the mechanically stabilized earth structure.

Unless otherwise approved by the Engineer, the following metal loss rates shall be used in determining the useful area of metal soil reinforcement remaining at the end of the nominal service life:

Loss of Galvanizing (first 2 years): 0.58 mil./year

Loss of Galvanizing (2 years - depletion):	0.16 mil./year
Carbon steel (after zinc depletion):	0.47 mil./year

The allowable tensile stress in the longitudinal wires of the mesh reinforcing elements shall not exceed fifty-five (55) percent of the nominal yield stress of the steel, provided that the yield stress does not exceed 65 kips/sq.in. The maximum tension in any reinforcing element shall not exceed the product of the maximum allowable tensile stress and the area of steel remaining at the end of the nominal service life.

Stresses at Panel/Reinforcement Connections. The horizontal earth pressure used to design the connections and facing panels shall be equal to the maximum horizontal stress computed at each reinforcement level, but in no case shall it be less than eighty-five (85) percent of the maximum horizontal pressure. In the case of rigid panel/reinforcement connections the allowable stress in the reinforcement at the connection shall be reduced to allow for bending stresses induced in the connection due to relative vertical movement between the facing panels and the reinforced backfill.

Internal Horizontal Stresses: For MSE wall systems with quasi-inextensible reinforcing elements, the horizontal stress at each reinforcement level shall be computed by multiplying the corresponding vertical stress by an earth pressure coefficient, K. The vertical stress shall be computed using a layer-by-layer approach following Meyerhof's analysis for eccentrically loaded footings; i.e., the resulting vertical stress at any reinforcement level is a function of the vertical stress due to the self weight of the overlying backfill material and the increase in vertical stress due to the overturning effects of the lateral load from the random fill retained by the mass of reinforced backfill.

The value of the earth pressure coefficient, K, shall be assumed equal to the at-rest (K_o) value at the top of the wall decreasing linearly to the Rankine active value (K_a) at a depth of 20 feet. At depths in excess of 20 feet, the value of K shall be taken as K_a. For normally consolidated soils, $K_o = 1\text{-}\sin \nu$, where ν is the angle of shearing resistance of the backfill material. For typical values of ν, K_o may be assumed equal to $1.5K_a$.

Pullout Resistance (Anchorage) Factors: Non-dimensional anchorage factors (denoted as A_c) as determined by laboratory or field pullout tests on reinforcing elements shall be based on the interpreted failure load at a maximum displacement of three-quarters (3/4) of an inch. The anchorage factor, A_c, shall be computed from the expression:

$$A_c = (\text{Load at 3/4-inch displacement})/p_v dbN$$

where p_v = vertical stress (due to self weight of backfill only) at the reinforcement level, d = diameter of transverse wires, b = width of transverse wires for a 6-inch spacing of longitudinal wires, N = number of transverse wires.

The spacing between transverse wires shall not be less than six (6) inches. The non-dimensional anchorage factor shall be assumed to decrease linearly from 40 at the top of the wall to 15 at a depth of 20 feet. At depths greater than 20 feet the anchorage factor shall be taken equal to 15.

Architectural Treatment

All walls within the contract shall have the same shape and sized panels except as necessary to maintain grade and length. All panels shall be equal in planar dimensions recommended at 5 feet vertical by 10 feet horizontal. The final dimensions need to be coordinated with the Manufacturer and the site-specific geometric constraints (if any). The color and final finish of the concrete panels shall match the

adjacent concrete structures and in accordance with the applicable aesthetic guidelines for this project. Panels shall be in a stacked bond pattern with horizontal joints staggered one-half the height of the panel.

Retaining Walls longer than 80 feet shall have a rectangular panel pilaster. Abutment faces in a single parallel line greater than 80 feet do not require pilasters. Pilasters shall be placed at each abutment corner and then at equal intervals along the wall (approximately 80 foot intervals). The abutment corner shall split the panel evenly. The pilaster panel shall be flush with the remaining wall. In addition to the requirements by the Manufacturer (if any), the following aesthetic guidelines are recommended:

- The width of the pilasters shall be 4 feet.

All wall panels shall have a fractured granite finish. The contractor shall submit sample drawings of a typical wall elevation along with details of the typical and pilaster panel. The contractor shall submit a sample panel for approval by the engineer before panel fabrication can begin.

Materials:

The Contractor shall make arrangements to purchase or manufacture the concrete facing panels, reinforcing mesh or strips, attachment devices, and all other necessary components. Materials not conforming to this section of the specifications shall not be used without written consent from the Engineer.

Steel Reinforcing Mesh. Reinforcing mesh shall be shop fabricated of cold drawn steel wire conforming to the minimum requirements of ASTM A 82 and shall be welded into the finished mesh fabric in accordance with ASTM A 185. Galvanization shall be applied after the mesh is fabricated and conform to the minimum requirements of ASTM A 123.

Steel Reinforcing Strips. Reinforcing strips shall conform to the physical and mechanical properties of ASTM A 572, Grade 65 steel. Galvanizing shall conform to the minimum requirements of AASHTO M111 (ASTM A 123).

Steel Connectors. Connectors/Abutment Anchors shall be fabricated from cold drawn steel wire conforming to the minimum requirements of ASTM A 82. Pins shall be fabricated from ASTM A 36 steel. Connectors and pins shall be galvanized to conform to the minimum requirements of ASTM A 123.

Structural Geosythetics shall be made of polypropylene, select high density polyethylene or high-tenacity polyester fibers having a cross-section sufficient to permit significant mechanical interlock with the soil/backfill. Use geosynthetics having a high tensile modulus in relation to the soil/backfill. Use geosynthetics having high resistance to deformation under sustained long term design load while in service and resistant to ultraviolet degradation, to damage under normal construction practices and to all forms of biological or chemical degradation normally encountered in the material being reinforced.

Store the geosynthetics in conditions above 20°F and not greater than 140°F. Prevent mud, wet cement, epoxy, and like materials from coming into contact with and affixing to the goesynthetic material. Rolled geosynthetic may be laid flat or stood on end for storage. Cover the geosynthetic and protect from sunlight prior to placement in the wall system.

Carefully inspect all reinforcement, steel and geosynthetics to ensure they are the proper size and free from defects that may impair their strength and durability.

Filter Fabric (Separation/Retention Fabric). Where required by design, filter fabric shall be placed behind the facing units. Filter fabric shall be woven polypropylene fabric, meeting the requirements of M

288 for a Class I geotextile having an Ultraviolet Stability of 70% strength retention after 500 hours as tested by ASTM D 4355. Slit film geotextile shall not be allowed.

Bond Breaker. 6 mil polyethelyne sheeting, 30-pound asphalt saturated felt, or otherwise stated in the plans, Bond breakers shall be chemically inert and resistant to oils, gasoline, solvents, and primer, if required. The bond breaker shall not stain or adhere to the sealant.

Compressible Foam. Closed Cell Polyethylene foam, non-absorbent, waterproof, meeting the requirements of ASTM D 3204 Type 1. (Density ASTM D-1622, Strength ASTM D-1623, Absorption ASTM C-509)

Temporary Support of Embankment. The contractor shall submit to the engineer for approval the anticipated means of Temporary Support of Embankment during the quarantine. The means and methods are to be determined by the contractor. Non-galvanized, welded wire wall is an acceptable means of temporary support.

Pile Casing. Permanent, protective cylindrical shape, installed by placing at the proposed pile locations as depicted in the plans. Casing shall be at least 2-inches larger in diameter than the widest pile dimension, unless stated otherwise in the plans. Casing may be corrugated or smooth pipe able to withstand the anticipated construction pressures without deforming. Casing shall remain free of debris until pile is driven into its permanent position.

Casing Backfill Shall be sand in accordance with Section 756 of the Standard Specifications or an aggregate, as specified on the plans and small enough to pass the smallest dimension between the permanent pile and casing. The backfill does not need to be compacted. Backfill shall be placed to the proposed bottom of pile cap elevation as shown on the plans.

Backfill. Multiple types of backfill may be required for the construction of the MSE walls. All backfill material used in the structure volume shall be free draining, reasonably free from organic or otherwise deleterious materials and shall be as specified on the plans. Metallurgical slag and stone dust are not acceptable backfill materials. Placement limits are shown on the plans. The material requirements for each backfill type are as follows:

Select Backfill. Select backfill shall conform to the following gradation limits as determined by AASHTO T-27 (ASTM D-422):

Sieve Size	Percent Passing
3 inches (75 mm)	100%
¾ inch (18 mm)	20% to 100%
No. 40 (425 m)	0% to 60%
No. 200 (75 m)	0% to 10%

In addition, the select backfill material shall conform to the following requirements:

a) Plasticity Index: The Plasticity Index (P.I.), as determined by AASHTO T- 90 (ASTM D-4318), shall not exceed 6.

b) The material shall be substantially free of shale or other soft, poor durability particles. Testing in accordance with AASHTO T-104 shall be performed to verify a magnesium sulfate soundness loss of less than 30% after four (4) cycles.

c) Electrochemical Requirements - The backfill materials shall meet the following criteria:

Requirements	Test Methods
Resistivity >3,000 ohm-cm	AASHTO T-288-91
pH 5-10	AASHTO T-289-91
Chlorides <100 parts per million	AASHTO T-291-91
Sulfates <200 parts per million	AASHTO T-290-91
Organic Content <1%	AASHTO T-267-86

If the resistivity is greater than or equal to 5000 ohm-cm, the chloride and sulfates requirements may be waived.

d) The material shall exhibit an angle of internal friction of not less than 34 degrees as determined by the standard direct shear test (AASHTO T-236) on the portion finer than the No. 10 sieve and compacted to 95% of AASHTO T-99 Method C or D (oversized correction) at optimum moisture content.

DelDOT No. 57 Stone. Free draining stone conforming to DelDOT No. 57 stone or approved equal shall be placed to an elevation if specified in the plans of the MSE embankment. DelDOT No. 57 Stone shall not be used when abutment piles are driven after placement of backfill and construction of MSE walls.

The Contractor shall furnish to the Engineer a Certificate of Compliance certifying that the backfill materials comply with this section of the specifications prior to backfill placement. A copy of all test results performed by the Contractor, which are necessary to assure compliance with the specifications, shall also be furnished to the Engineer. Backfill not conforming to this specification shall not be used without the written consent of both the Engineer and the wall supplier.

Concrete: Concrete shall conform to the requirements of Section 602 of the Specifications.

Construction:

The selected MSE wall manufacturer shall provide a representative on site at the outset of the wall construction and periodically throughout construction of the wall and at the direction of the Engineer. The wall manufacturer's representative shall be present at a pre-construction conference to provide an overview of the wall system and a detailed construction procedure to the contractor and the Engineer.

Wall Excavation. Excavation shall be in accordance with the requirements of the DelDOT specifications and in reasonably close conformity with the limits shown on the Plans. Temporary excavation support as required shall be the responsibility of the Contractor. The base of the excavation shall be completed to within +/- 3 inches of the staked elevations unless otherwise directed by the Engineer.

Foundation Preparation. The foundation for the structure shall be graded level for a width 1 foot beyond the length of the reinforcement elements or as shown on the Plans. Prior to wall construction, the foundation shall be test-rolled under the observation of the Engineer in accordance with Section 202.02. Any unsuitable foundation material as determined by the Engineer shall be excavated to the determined depth and replaced with Borrow Type B, conforming to Section 209, and shall be compacted in accordance with Backfill Placement as described below.

At each panel foundation level, a precast reinforced or a cast-in-place unreinforced concrete leveling pad of the type shown on the plans shall be provided.

Installation of Casing. Casing shall be placed at the ground surface after all excavation has taken place and shall be long enough to extend through the MSE embankment fill plus 1-one additional foot. Casing shall be centered at the location of each pile as shown in the plans. Casing shall be plumb in its final position. MSE reinforcing straps shall be adjusted to avoid conflicts with pile casing.

Wall Erection. The wall system components shall be constructed in accordance with the wall system supplier's recommendations and construction manual. The wall shall be constructed vertical and within the specified tolerances. The overall vertical tolerance of the wall and the horizontal alignment tolerance shall not exceed 3/4-inch per 10 feet. Bulging in the vertical or horizontal direction shall be limited to 2 inches as measured from the theoretical wall line. The Engineer shall be notified of any bulging areas that exceed this limit.

Filter Fabric (Separation/Retention Fabric). Where a Filter Fabric (Separation/Retention Fabric) is shown on the plans to be placed along the MSE wall joints, the fabric shall extend a minimum twelve inches on either side of the wall joint. Filter Fabric overlaps shall be a minimum of twelve inches and shall be overlapped so that the fabric on top is pointing downward. An adhesive approved by the Engineer shall be used to fasten the fabric to the back of the wall and along all overlaps. In addition, a continuous layer of the filter fabric shall be placed along the back of all MSE walls from the bottom of the footer to the top of the wall in a vertical orientation. Bury the bottom and top of the filter fabric a minimum of twelve inches into the backfill behind the wall. Overlaps between adjacent vertical strips of the filter fabric shall be a minimum of twelve inches and along all overlaps an adhesive approved by the Engineer shall be used to fasten the fabric to the wall and the overlapping fabric to the underlying fabric. Slits in this filter fabric to attach the reinforcing strips shall be minimal and adhesive shall be used to secure the slit fabric to the back of the wall.

Backfill Placement. Backfill placement shall closely follow erection of each course of concrete facing units. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the facing. Any wall materials that become damaged or disturbed during backfill placement shall be removed and replaced at the Contractor's expense or corrected as directed by the Engineer. The Engineer will be the sole authority as to the acceptability of any repairs to damaged wall materials. Any misalignment or distortion of the wall elements due to placement of backfill outside the limits of this specification shall be corrected as directed by the Engineer.

Backfill within the zone of soil reinforcements shall be compacted to 95% of the laboratory determined maximum dry density and optimum moisture content, as determined by AASHTO T 99, by at least four (4) passes of a heavy roller having a minimum dynamic force of 20 tons impact per vibration and a minimum frequency of 16 hertz.

The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. The water content of the wall backfill shall not deviate from the optimum water content by more than 2%. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift.

The maximum lift thickness after compaction shall not exceed 8 inches regardless of the vertical spacing between layers of soil reinforcements. The Contractor shall decrease this lift thickness as required to obtain the specified density.

Prior to placement of the soil reinforcements, the backfill elevation after compaction within the zone of soil reinforcements shall be 2 inches above the connection elevation from a point approximately 24 inches behind the facing to the free end of the soil reinforcements unless otherwise shown on the Plans.

Compaction within 3 feet of the facing shall be achieved by at least three (3) passes of a lightweight mechanical tamper, roller or vibratory system. Care shall be exercised in the compaction process to avoid misalignment of the facing. Heavy compaction equipment shall not be used to compact backfill within 3 feet of the wall face. At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing to 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.

Leveling Pad. The concrete leveling pad at the concrete facing shall be unreinforced and constructed to the elevation and width shown on the Plans. The leveling pad shall be constructed on compacted, drained subgrade. Leveling pad shall be embedded a minimum of 36" from finish grade to the bottom of the leveling pad.

Utilities. The contractor shall accommodate the passage of utilities, including drainage inlets and pipes, through the reinforced embankment material or MSE wall if shown on the plans. The soil reinforcements shall be placed to permit the installation and operation of, and access to, the utilities constructed within the embankment while satisfying the design requirements of the MSE wall. The MSE wall manufacturer shall provide a construction sequence for installation of utilities within the reinforced embankment which does not jeopardize the integrity and stability of the reinforced soil mass.

Obstructions in the Reinforced Soil Zone. Where settlement platforms, foundation elements, etc., interfere with the soil reinforcement, specific methods for field installation must be developed and presented on the shop drawings. The design of the MSE Wall near the obstruction shall be modified using one of the following alternatives:

1. Design reinforcing layers to carry additional loads that would have been carried by reinforcing layers that were partially or fully severed in order to install the obstruction.
2. Place a structural frame around the obstruction capable of carrying the load from the reinforcement in front of the obstruction to reinforcement connected to the structural frame behind the obstruction.
3. If discrete strips are used splay the reinforcement around the obstruction.

Moment Slab and Barrier. The moment slab and barrier shall be constructed according to the details shown on the plans.

Toe protection. The toe of the wall shall be embedded in accordance with the Plans and shall be protected as required for the life of the structure to avoid undermining the wall face.

Method of Measurement:

The quantity of Mechanically Stabilized Earth Walls will not be measured.

Basis of Payment:

The payment will be full compensation for all components of the MSE Wall, ~~footer~~ leveling pad and coping and shall include full compensation for designing, development of shop drawings, fabricating, furnishing, excavating, backfilling, furnishing backfill material, pile casing, casing backfill, installing, testing and for all materials, labor, tools, equipment, and incidentals necessary to complete the installation in conformance with the plans and Specifications.

Excavation of unsuitable material, below the bottom of the leveling pad, will be measured and paid for as described under Standard Specification 207.07, Table 207-A and backfilling with Borrow Type B will

be measured and paid for under Item 209002. The concrete and reinforcement for the moment slab and barrier will be measured separately and will be paid for as a separate item(s) as indicated in the plans.

NOTE:

When more than one MSE Wall is required at a location, the Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each MSE Wall, the sum of which is to equal the lump sum price bid. The required breakdown of the Lump Sum price is shown on a breakout sheet attached to the proposal.

The Department reserves the right to delete from the Contract the furnishing and installing of one or more of the MSE walls listed. The lump sum to be paid will be adjusted in accordance with the Contractor's unit prices as required above. In the event that an increase or decrease in the area of the wall elevation is required, the increase or decrease in the lump sum bid shall equal the increased or decreased area multiplied by the lump sum price divided by the original elevation area. The “original elevation area” shall include the below-grade area of the concrete fascia but does not include the concrete footer. There will be no extra compensation to the Contractor if such additions and/or deletions are made beyond this adjustment.

7/21/15

605500 - CANTILEVER SIGN SUPPORT AND FOUNDATION

Description:

This work shall consist of furnishing, preparation of Shop Drawings, 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 API5L, 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 709 (AASHTO M 270), Grade 36 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 709 (AASHTO M 270), 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 55. The anchor bolts shall be hot dip galvanized as per ASTM Specification A 153 (AASHTO M 232), Class C.

(d) U-Bolts - ASTM A449, Type 1. Galvanize u-bolt assembly.

(e) U-Bolt Nuts - AASHTO M293.

(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 field verify sign and structure clearances prior to acceptance of shop drawings. Provide field verified cross-sections to Engineer for acceptance.

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 AASHTO/AWS D1.1.

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 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 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.

(c) Alternate Construction Methods.

The Contractor may propose alternative methods to prevent caving and control ground water. Such proposals, accompanied by supporting technical data, shall be submitted to the Engineer for review and approval.

(d) Material Reuse or Disposal.

Reuse excavated material if possible. Otherwise, dispose of offsite in accordance with federal, state, and local environmental regulations and as directed by the Engineer.

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.

The Contractor is responsible for providing the necessary equipment for checking the dimensions,alignment, and cleanliness of each shaft excavation prior to concrete placement.

The vertical alignment of the excavation shall not vary by more than 1-inch per 3-foot of depth. The maximum allowable variation at the top of the excavation is 3-inches in any direction.

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. In the case that any shaft is determined unacceptable, the Contractor is to submit a plan for remediation to the Engineer for approval. All labor, calculations, drawings or other documentation and materials required to perform remediation are at no cost or time impacts to the Department.

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, 3rd Edition with interims at the time of advertisement.

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).

(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 "Cantilever Sign Support And Foundation," 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. No separate payment will be made for excavation of any material / obstruction encountered or for the use of special tools.

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 605500 - Cantilever Sign Support And Foundation 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 Contractors unit prices as required above. There will be no extra compensation if such additions and/or deletions are made.

7/20/15

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.

10/23/01

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 (Grade 250) or Grade 50 (Grade 345) or Grade 50W (Grade 345W), unless specified otherwise on the Plans. All steel of the joint system shall be painted with the 3 coat urethane paint system with a minimum total thickness of 9 mils (225 µm), and all screws shall be stainless steel ASTM A276, Type 304.

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

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

ASTM Standard	Physical Properties	Performance Requirements
	max. 7 days @ 14 F (-10 C)	+15 points Durometer (Type A)

Construction Methods:

Installation of the prefabricated expansion joint system, to include strip seal, steel extrusion and application of adhesives, shall be in accordance with the manufacturer's written recommendations and instructions and as specified herein. Special tools for insertion of seals shall be provided by the manufacturer as may be required. The Contractor shall make arrangements for a technical representative of the manufacturer to be available for advice and inspection during construction of strip seals to ensure satisfactory installation. The strip seal shall be furnished in one piece for the full length of the joint.

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

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

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

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

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

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

Method of Measurement:

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

Basis of Payment:

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

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

7/20/15

605581 - ELASTOMERIC BEARING PADS

Description:

This work consists of furnishing of all materials and necessary labor to fabricate, assemble, construct and install elastomeric bearing pads of the size(s) specified on the Plans, including sole plates, elastomeric bearing pads, steel shim plates, masonry plates, fabric bearing pads, anchor bolts, nonhardening caulking compound, elastic joint sealer, plate washers and heavy hex nuts as specified on the Plans and in accordance with these Specifications. This item is only for use on bridges with steel girders.

Materials:

The bearings shall conform to the requirements of Section 826 of the Standard Specifications, Section 18 of the AASHTO LRFD Bridge Construction Specifications, 3rd Edition including all interims at the time of advertisement and as specified on the Plans.

Construction Methods:

The bearings shall be stored under cover on a platform above the ground surface. The bearings shall be protected from damage at all times and when placed shall be dry, clean, free of dirt, oil, grease or other foreign substances.

The masonry plates shall be installed on single thickness preformed fabric bearing pads placed on surfaces conforming to the requirements of Subsection 602.17 of the Standard Specifications.

Anchor bolts shall be cast in place. A temporary casting template shall be used to ensure the anchor bolts are properly aligned and plumb.

The bearings shall be installed in accordance with the requirements of Section 605 of the Standard Specifications, Section 18 of the AASHTO LRFD Bridge Construction Specifications, 3rd Edition including all interims at the time of advertisement and as specified on the plans and herein.

Method of Measurement:

The quantity of elastomeric bearing pads will be measured as the actual number installed and accepted.

Basis of Payment:

The quantity of elastomeric bearing pads will be paid for at the Contract unit price bid per each. Price and payment will constitute full compensation for fabricating, assembling, furnishing, constructing, installing, and shop and field painting the bearings and for all materials, labor, tools, equipment and incidentals required to complete this work.

7/20/15

614500 - DUCTILE IRON PIPE 4"
614501 - DUCTILE IRON PIPE 6"
614502 - DUCTILE IRON PIPE 8"
614503 - DUCTILE IRON PIPE 10"
614504 - DUCTILE IRON PIPE 12"
614568 - DUCTILE IRON PIPE 14"
614581 - DUCTILE IRON PIPE, 15"
614580 - DUCTILE IRON PIPE, 30"
614588 - DUCTILE IRON PIPE, 18"
614764 - DUCTILE IRON PIPE, 36"

Description:

This work consists of furnishing and installing ductile iron pipe, of the specified size(s) as storm sewer in accordance with the locations, notes and details shown on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Ductile iron pipes, and fittings shall conform to the notes and details on the Plans and applicable requirements of ANSI/AWWA with most recent revisions.

The construction methods shall conform to the applicable requirements of Section 614 of Standard Specifications and notes on the Plans.

Method of Measurement:

The quantity of ductile iron pipe will be measured as the number of linear feet (linear meters) of each size of pipe placed and accepted, measured from end of pipe to end of pipe.

Basis of Payment:

The quantity of ductile iron pipe will be paid for at the Contract unit price bid per linear foot (linear meter) for each size of pipe. Price and payment will constitute full compensation for furnishing, hauling and installing the pipe, for all cribbing, shoring and sheeting, for all pipe connections and attachments, for all labor, tools, equipment and incidentals to make a safe and operational system.

For pipe under 24" (600 mm) internal diameter, the excavation, Class C bedding, backfill and backfilling shall be included in the unit bid price of the pipe. For pipe of internal diameter 600 mm and over, payment for excavation and backfill shall be made in accordance with Section 208.

Payment for excavation and replacement of unsuitable material encountered in the bottom of the trench will be provided for under Section 208.

4/22/13

614665 - DUCTILE IRON PIPE CLASS 52, CEMENT LINED, 24"

Description:

This work consists of furnishing and installing cement lined ductile iron pipe as sanitary sewer in accordance with the locations, notes and details shown on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Ductile iron pipe and fittings shall conform to the notes and details on the Plans and applicable requirements of ANSI/AWWA with most recent revisions.

Ductile Iron Pipe shall be centrifugally cast, and all pipe and fittings shall conform to the applicable specifications of ANSI/AWWA C151/A21.51 and shall be Class 52. Pipe joints shall be Mechanical or rubber gasketed push-on type. Rubber gasketed joints shall conform to ANSI/AWWA C111/A21.11-95. A double thickness cement mortar lining shall be provided in accordance with ANSI/AWWA C104/A21.4.

The construction methods shall conform to the applicable requirements of Section 614 of Standard Specifications and notes on the Plans.

Method of Measurement:

The quantity of ductile iron pipe will be measured as the number of linear feet (linear meters) of pipe placed and accepted, measured from end of pipe to end of pipe.

Basis of Payment:

The quantity of ductile iron pipe will be paid for at the Contract unit price bid per linear foot (linear meter) of pipe. Price and payment will constitute full compensation for furnishing, hauling and installing the pipe, for all cribbing, shoring and sheeting, for all pipe connections and attachments, for all labor, tools, equipment and incidentals to make a safe and operational system.

Excavation, Class C bedding, backfill and backfilling shall be included in the unit bid price of the pipe.

Payment for excavation and replacement of unsuitable material encountered in the bottom of the trench will be provided for under Section 208.

2/12/10

619501 - PRODUCTION PILE RESTRIKE
619502 - TEST PILE RESTRIKE

Description:

Under certain pile driving conditions it may become necessary to restrike various production piles and test piles, of the sizes and type called for by the Contract, in order to verify the pile capacities. Some of the pile driving conditions that could result in the need for pile restrikes include; bearing capacities are not achieved by the initial driving, Contract Plans for driving based on tip elevation (bearing achieved by freeze), and dynamic analysis procedures require extended waiting times for restrike.

Note: These Special Provisions replace Subsection 619.14 of the Standard Specifications.

Procedure:

All test piles shall be restruck and dynamically tested by the Contractor. The Engineer may direct the Contractor to restrike selected production piles to verify capacities.

The Engineer will attempt to schedule the pile restrike so as to cause minimal, if any, delay to the overall driving operation.

Prior to restrike, the Contractor shall mark the pile in 1-inch increments for the first 1-foot and 1-foot increments thereafter. The piles restrikes shall be in accordance with the plans.

All restrikes shall be performed using the same pile hammer, helmet, and 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 25 blows of the hammer at full stroke at locations other than the piles to be restruck.

The elevation of the top of the pile shall be established prior to performing the restrike.

The hammer shall be carefully lowered and positioned on the pile. The hammer shall restrike the pile 20 blows at the required stroke height.

The hammer shall be removed from the pile, and the new top of the pile elevation shall be established.

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 two (2) calendar days and perform additional restrikes at no additional cost to the Engineer or The Department until the pile driving system operates properly through a complete continuous restrike procedure.

Method of Measurement/Basis of Payment:

Production Pile Restrike:

This item shall be measured and paid for on a per each basis and payment will constitute full compensation for performing restrikes of selected production piles. The Engineer will work jointly with the

Contractor to establish a sequencing of production pile restrikes to minimize impact to the Contractor's driving schedule. Any perceived mobilization costs, set-up costs, delay costs, etc. anticipated by the Contractor shall be incidental to the price for this item.

Payment for "Production Pile Restrikes" shall be made at the fixed price of $500.00 Each if it is requested by the Department within five (5) working days of the completion of the initial driving of the pile to be restruck. Payment for “Production Pile Restrikes” with requested restrike wait time exceeding five (5) working days will be made at the fixed price of $500.00 Each for each working day exceeded, starting on the sixth day, in addition to the fixed price of $500.00 Each. An example of this case would be, if the Engineer directs a production pile restrike to be performed six (6) working days following the completion of the initial driving, two (2) unit will be paid. Similarly, if the restrike is ordered to be performed eight (8) working days following the completion of the initial driving, four (4) units will be paid. No payment will be made for additional days if the Contractor elects to wait longer to perform the restrike than the time frame as directed by the Engineer. Any overlapping days due to multiple production piles will be paid for only one day.

Test Pile Restrike:

This item will be measured on an Each Day basis. Test pile restrikes will not be paid for under this item unless the restrike waiting time is greater than five (5) working days following the completion of the initial driving. All test pile restrikes requested by the Department within the first five (5) working days following the completion of the initial driving shall be incidental to the installation of the test pile. An example of this case would be, if the Engineer directs a test pile restrike to be performed six (6) working days following the completion of the initial driving, one (1) unit will be paid. Similarly, if the restrike is ordered to be performed eight (8) working days following the completion of the initial driving, three (3) units will be paid. No payment will be made for additional days if the Contractor elects to wait longer to perform the restrike than the time frame as directed by the Engineer.

Payment for "Test Pile Restrike" on test piles with requested restrike wait time exceeding five (5) working days will be made at the fixed price of $1,000.00 per Each Day. Any overlapping days due to multiple test piles will be paid for only one day.

Price and payment will constitute full compensation for all equipment, labor and materials necessary to perform a Test Pile Restrike as described above. Also included in the payment is the cost of any idle equipment, labor, etc. during the prescribed waiting period between initial driving and performance of the restrike.

11/23/11

619519 –DYNAMIC PILE TESTING BY CONTRACTOR
619539 – SIGNAL MATCHING ANALYSIS BY CONTRACTOR

Description:

This item shall consist of furnishing all materials, equipment, access, reporting of results, and qualified personnel necessary to perform all wave equation analysis, high-strain dynamic testing and signal matching, 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.

High-strain dynamic testing and signal matching shall be performed on all test piles for the entire duration of the test pile installation, re-strikes, and as indicated in the Plans.

The Contractor shall notify the Engineer of the proposed pile driving schedule at least two working days prior to driving piles at any location where high-strain dynamic testing will be conducted.

Submittals:

The Contractor shall engage the services of a specialty subcontractor, the Dynamic Testing Consultant (DTC), experienced in high-strain dynamic monitoring of driven piles to perform dynamic testing and signal matching analysis and to evaluate and report results to the Department. The Dynamic Testing Consultant shall have at least five (5) years of documented experience in the performance and interpretation of dynamic pile testing, including dynamic pile testing on open ended pipe piles. The Dynamic Testing Consultant'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, including pipe piles. All projects submitted as evidence of experience shall include the client and owner, points of contact, and a description of the pile type. 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 Dynamic Testing Consultant shall be selected by the Contractor and submitted at the pre-construction meeting for approval by the Department.

a. Qualifying Experience

The Contractor shall submit proof of three or more projects of similar size and complexity where the DTC and personnel assigned to this project have successfully performed similar services and analyses within the last three years. The Contractor shall present the following information for each project listed as a reference at or prior to any preconstruction meetings:

1. Project Name, Location, Project Description, and Completion Date.

2. Surface and Subsurface Conditions.

3. Type and number of instruments installed.

4. Installation equipment and techniques utilized when applicable.

5. Provide names, current phone numbers, and current business addresses for the owner/designer, geotechnical consultant, and contract manager.

b. Wave Equation Analysis

The Contractor shall submit the completed Pile and Driving Equipment data form to the Department 30 to 45-days before mobilization to the site. The wave equation analysis of the proposed driving system shall be submitted to the Department at least 10-days prior to driving of the piles. The results of the wave equation analysis using the GRLWEAP program or other software approved by the Department shall be submitted in a bound report for review and approval. The wave equation analysis shall be performed at each test pile location and for each test pile type and driving equipment. Approval of the proposed driving system by the Department will be based on DelDOT Standard Specifications for Road and Bridge Construction, 2001, Section 619.09, Bearing Values.

c. Reports

The Dynamic Testing Consultant shall direct the progress of the testing work and shall obtain and record the test data. The Dynamic Testing Consultant shall prepare a daily field report summarizing the high-strain dynamic test results and pile driving data. At a minimum, the daily report shall include the calculated driving stresses, transferred energy, and estimated pile capacity at the time of testing. Pile driving logs shall be included with the submittal. Variations from previous trends in the dynamic test data shall also be noted. Daily field reports shall be faxed or transmitted electronically to the Engineer within 24-hours of the end of the shift.

The Dynamic Testing Consultant shall prepare a written report presenting the results of the 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.

Signal matching analyses shall be performed for all initial drives and restrikes of dynamically tested piles. A minimum of one (1) signal matching analysis shall be performed for a representative blow near the end of each initial drive and a minimum of one (1) representative blows shall be analyzed towards the beginning of the restrike.

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 signal matching analyses including, but not limited to, pile driving log, 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 Department. The Contractor is to develop the driving criteria for the production piles based on the results of the high strain dynamic testing with signal matching analysis. The Contractor shall submit the driving criteria for review and approval of the Engineer prior to ordering and installing production piles. The driving criteria shall be summarized in the format provided by the Engineer after award of the contract.

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

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 maintain a stock of at least four working accelerometers and strain transducers at the job site whenever high-strain testing is being performed. All repair or replacement costs shall be performed at no additional cost to the Engineer or The Department.

The Contractor shall provide the Engineer and The Department 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.

The Dynamic Testing Consultant 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 or The Department. 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 in accordance with the Plans. 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 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 the Department 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 as indicated on the plans or directed by the Department shall be dynamically tested by the Contractor. Dynamic testing of production piles shall be at the request of the Department based on actual field conditions.

Method of Measurement:

High-Strain Dynamic Pile Testing by Contractor authorized and found acceptable by the Department will be measured 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.

Signal Matching Analysis will be measured for at the Contract unit price per each.

Basis of Payment:

Payment for High-Strain Dynamic Pile Testing by Contractor authorized and found acceptable by the Department will be made at the Contract unit price per Each for Item 619519. Payment for Signal Matching Analysis by Contractor and found acceptable by the Engineer will be made at the Contract unit price per Each for Item 619539. The payment will also be full compensation for preparing the preconstruction wave equation analyses, and preparation of reports.

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 Engineer and the Department.

708512 – DRAINAGE INLET, SPECIAL I
708513 – DRAINAGE INLET, SPECIAL II
708514 – DRAINAGE INLET, SPECIAL III
708515 – DRAINAGE INLET, SPECIAL IV
708516 – DRAINAGE INLET, SPECIAL V
708517 – DRAINAGE INLET, SPECIAL VI
708518 – DRAINAGE INLET, SPECIAL VII
708653 – DRAINAGE INLET, SPECIAL VIII
708654 – DRAINAGE INLET, SPECIAL IX
708655 – DRAINAGE INLET, SPECIAL X
708656 – DRAINAGE INLET, SPECIAL XI
708657 – DRAINAGE INLET, SPECIAL XII

Description:

This work consists of furnishing and placing a reinforced concrete drainage inlet at the locations shown on the Plans.

Materials:

Materials shall conform to the requirements of Section 611, 612, 708, 812 and 824 of the Standard Specifications.

Construction Methods:

Special inlets shall be placed in conformance with the requirements of Sections 602 and 708 of the Standard Specifications, and with the details, dimensions, and notes as shown in the details found in the Plans and at the location shown on the Plans.

Method of Measurement:

The quantity of inlets will be measured as the actual number of each type installed and accepted. Inlet and outlet pipe will not be measured under this item, but will be measured with the adjoining pipe under the appropriate item for the size and type of pipe installed.

Basis of Payment:

The quantity of inlets will be measured and paid for at the Contract unit price per each, installed and accepted. Price and payment will constitute full compensation for furnishing, hauling, and installing all materials, including concrete and bar reinforcement, any necessary fittings, frames, and grates; for excavating, backfill, backfilling, compacting, roadway patching materials, roadway patching, and disposing of surplus materials; for cribbing, shoring, and sheeting; and for all labor, equipment, tools, and incidentals required to complete the work. If rock is encountered, rock excavation will be paid under Section 206.

Inlet and outlet pipe will be paid for under the appropriate item for the size and type of pipe installed.

9/16/10

DRAFT
NOT FOR BIDDING
AUGUST 2015

708582 – MANHOLE, SPECIAL I
708596 - MANHOLE, SPECIAL II
708597 - MANHOLE, SPECIAL III
708598 - MANHOLE, SPECIAL IV

Description:

This work consists of furnishing materials and constructing a manhole as specified on the Plans, and as directed by the Engineer. It includes connecting to new and/or existing pipe(s), concrete masonry, reinforcing and forms, all in conformity with the details on the Plans and these Specifications.

Materials and Construction Methods:

Materials and construction of the manhole shall conform to the applicable subsections of Section 708 of the Standard Specifications. Concrete shall conform to Class A, Section 812, of the Standard Specifications. Bar reinforcement shall conform to Sections 603 and 604 of the Standard Specifications.

Method of Measurement:

The quantity of special manholes will be measured as the actual number of manholes constructed, complete in place and accepted.

Basis of Payment:

The quantity of special manholes will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing and placing materials, including bar reinforcement, removal of portions of existing pipe, frame and grate and/or cover, and for all labor, equipment, tools, and incidentals necessary to complete this item. The excavation and backfilling for the special manhole shall be made under the item 207000 of this contract. The furnishing and placing of the #57 stone base shall be made under the item 302012 of this contract. The furnishing of Borrow Type C for structure backfill shall be made under the item 210000 of this contract.

708583 - PERSONNEL GRATE FOR PIPE INLET

Description:

This work consists of furnishing all materials, fabricating, delivering and constructing personnel grates for pipe inlets in accordance with the Standard Details, at locations as shown on the Plans, as directed by the Engineer and as required by these Special Provisions.

Materials:

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

Working drawings shall be submitted in accordance with Subsection 105.04.

Construction Methods:

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

Method of Measurement:

The number of inlet grates to be paid for under this item shall be the actual number of inlet grates installed and accepted.

Basis of Payment:

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

8/23/10

708658 – DRAINAGE INLETS, MODIFIED
708659 – DRAINAGE MANHOLES, MODIFIED
617518 – DRAINAGE HEADWALLS, MODIFIED

Description:

This work consists of furnishing all materials and constructing modified drainage inlets, manholes, and headwalls in accordance with locations, notes, details on Plans and as directed by the Engineer.

Materials and Construction Methods:

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

The Contractor shall submit detail drawings showing the details for fabrications of the panels and support connections for prior approval.

Alternate cast-in-place and precast drainage structure alternatives may be permitted but require an alternate design submission for review and approval by the Engineer. Alternate design submissions, including complete design calculations and drawings, shall meet the requirements of Sections 105.04

Alternate designs shall be in accordance with the current edition of AASHTO LRFD Bridge Design Specifications with interims and shall meet the following minimum requirements:

- Minimum Unit Weight of Soil and Soil Surcharge = 125 pounds per cubic foot
- Minimum Submerged Unit Weight of Soil = 70 pounds per cubic foot
- Minimum Unit Weight of Reinforced Concrete = 150 pounds per cubic foot
- Maximum Soil Friction Angle = 30 degrees
- Water is present to the top of the roadway
- Lateral soil pressures are At-Rest
- Live Load shall be HL-93
- For inlet and manhole boxes, Live Load surcharge shall be determined assuming box is a retaining wall with the traffic against the back face of the wall
- Design for Strength
- Design for Service
- Design for Temperature and Shrinkage
- Design for Shear
- Check Fatigue (Top Slabs Only)
- Check Maximum and Minimum Reinforcement Limitations
- Check development of reinforcement.
- Wall Sections act as simple spans between corners
- Bottom 3’ of wall acts as cantilever
- Bottom Slabs acts 1-way as a simple span
- Walls are solid
- Full Live Load
- Soil Reaction is uniform
- No water is in basin

Contractor alternates, as well as review time by the Department, will not justify a delay in the progress schedule. All costs involved in preparing plan revision documents for changes proposed by the Contractor shall be the responsibility of the Contractor.

Basis of Payment:

The quantity of drainage inlets, drainage manholes, and drainage headwalls will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for furnishing and placing all materials, including any necessary fittings, metal frames, gratings, covers, top units, and hoods; for fabricating and erecting the structure(s) at designated location(s), including concrete and reinforcing bars; for excavating, backfill, backfilling, compacting, disposing of surplus materials; and for all labor, equipment, tools, and incidentals required to complete the work. If rock is encountered, rock excavation will be paid under Section 206.

Inlet and outlet pipe will be paid for under the appropriate Section for the size and type of pipe installed.

NOTE:

When more than one structure is required, the Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each drainage inlet, drainage manhole, or drainage headwall, the sum of which to equal the lump sum price bid. The breakout sheet attached to the proposal shows all items proposed for this item. The complete breakout sheet shall be attached to the Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the Bid Proposal being declared non-responsive and rejected.

The Department reserves the right to delete from the Contract, construction of one or more drainage structure(s), and the lump sum price to be paid will be reduced in accordance with the Contractor's itemized bid price list for that individual drainage structure. There shall be no extra compensation to the Contractor if such deletion is made.

3/14/11

708664 - CONVERTING EXISTING JUNCTION BOX TO CATCH BASIN

Description:

This work consist of furnishing all materials and constructing a catch basin from an existing junction box in accordance with the locations, notes and details shown 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 708 of the Standard Specifications, and as specified on the Plans.

Portland Cement Concrete shall meet the requirements of Class B, Section 812 of the Standard Specifications.

Method of Measurement:

The quantity of junction boxes converted to catch basins will be measured as the number of junction boxes converted to catch basins and accepted.

Basis of Payment:

The quantity of junction boxes converted to catch basins will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for constructing the catch basins from the existing junction box, for all materials including reinforcing steel, frames & grates, cover slabs, top units and for all labor, equipment, tools, and incidentals necessary to complete the item. The cost for salvaging shall be included in the unit price bid for the item.

11/14/12

712521 - RIPRAP, SPECIAL

Description:

The item shall consist of hauling and placing riprap as required by the Contract in accordance with these Specifications and in reasonably close conformity with the lines, grades, dimensions, and locations shown on the Plans or established by the Engineer. The item shall also include excavation, furnishing and placing of geotextiles, removal of unsuitable material, backfill, embankment, and clearing and grubbing as may be required to complete the work as indicated on the Plans, or as directed.

Materials:

Stone for riprap shall be obtained from The Greenbank Mill Associates, Inc., 500 Greenbank Road, Wilmington, DE 19808, contact person: Tony Shahan, Executive Director, (302)999-9001. The riprap selected from this source shall be well graded from the smallest size of 3" to the largest size of 18". The gradation of the riprap shall be controlled by visual inspection.

Geotextile for riprap shall be Mirafi 700X or Erosion 1, by Synthetic Industries, or Exxon GTF 400E or Poly-Filter X by Carthage Mills or TerrsTex Ep by WEBTEC, Inc. or an approved equal.

Construction Methods:

Riprap shall be placed in accordance with the "Riprap" detail (including depth of riprap) as shown on the Plans and as described here in these Special Provisions.

The area shall be excavated to the required placement depth. The area for placement of the geotextile and riprap shall be in a relatively smooth condition, free from large stone, vegetation, debris, and areas of soft material. Preparation of the area may include but is not limited to excavation, removal of unsuitable material, backfilling, placing embankment, and clearing and grubbing.

The geotextile shall be placed on the prepared area in a loose and unstretched condition to minimize tearing and shifting. The adjacent edges of the fabric shall be joined with a lock-type or chain-type stitch folded seam or overlapped a minimum of one foot, if permitted. The overlap direction shall be upstream over downstream and upslope over downslope. The fabric shall be anchored in place by securing pins or other acceptable methods. The fabric shall be covered as soon as possible so that it is not exposed for more than two weeks.

The riprap shall be carefully placed on the geotextile to produce an even distribution of pieces, with a minimum of voids and without tearing the geotextile. The riprap shall be placed to the full-course thickness in a manner which will prevent segregation of stone sizes and which will prevent displacement of underlying material. If necessary, individual stones shall be rearranged to insure a uniform distribution.

Method of Measurement:

The number of square yards of Riprap to be paid for this item shall be the number of square yards of riprap complete in place and accepted, as determined by computations based on field measurements taken on and along the completed finished surfaces (no horizontal projection) and the specified placement thickness for the class.

Basis of Payment:

The number of Square Yards of riprap, measured and as provided above, shall be paid for at the Contract unit price for "Riprap, Special", as required by the Contract, which price and payment shall constitute full compensation for the excavation and preparation of bedding areas if applicable, for hauling and placing all materials including geotextile fabric and stones, and for all labor, equipment, tools and incidentals necessary to complete the work.

712528 - ROCK, SPECIAL

Description:

This work consists of furnishing and installing large rocks in accordance with notes and details on the Plans, these specifications and directions from the Engineer.

Materials:

The rocks shall conform to the notes and details on the Plans and applicable requirements of Subsection 712.04 of the Standard Specifications.

Construction Methods:

The rocks shall be installed in accordance with notes and details on the Plans.

Method of Measurement:

The quantity of rock, special will be measured as the actual number of tons of rock placed and accepted. The weight will be determined as specified in Subsection 109.01 of the Standard Specifications.

Basis of Payment:

The quantity of rock, special will be paid for at the Contract unit price per ton. Price and payment will constitute full compensation for furnishing and installing all materials, excavating, disposal of excess material and for all labor, equipment, tools, and incidentals required to complete the work.

3/6/00

712531 - CHANNEL BED FILL

Description:

Furnish and place Channel Bed Fill to the limits specified in the construction plan set.

Materials:

Provide aggregate material meeting the following requirements:

Provide natural, rounded, unwashed and uncrushed aggregate material meeting the gradation of Table 1 when tested in accordance with AASHTO T-11 and T-27.

a. Aggregate material meeting this requirement may be located within the excavation area of the project. The Contractor may salvage this material at his/her discretion by separating and stockpiling the material meeting the requirements of Table 1 and Notes 1&2.
b. Angular quarried aggregate is unacceptable.
c. The cost of salvaging and stockpiling existing material and removing excess stockpiled material is incidental to 712531 – Channel Bed Fill.

Table 1

Percent Passing	Light [3]	Medium [4]	Heavy
5-inch	100	90-100 [1]	Gradation to be noted on plan sheets
1-inch	100 [1]	0-20[2]	
3/4-inch	30-70		
3/8-inch	0-10 [2]		

Notes:
[1] Salvaged materials may contain material exceeding this size and be acceptable.
[2] Salvaged materials may contain up to 20% passing the 3/8-inch sieve but not to exceed 10% passing the #200 sieve when tested in accordance with T-11.
[3] Unless noted otherwise on plan sheets, Light gradation shall be used in locations in Sussex County
[4] Unless noted otherwise on plan sheets, Medium gradation shall be used in locations in Kent and New Castle Counties.

Method of Measurement:

Quantity of Channel Bed Fill will be measured by cubic yards of material acceptably placed.

Basis of Payment:

The quantity of Channel Bed Fill will be paid for at the Contract unit price per cubic yard. Price and Payment will constitute full compensation for all labor, equipment, and other incidentals required to salvage, stockpile, maintain, furnish, haul, place, and remove and dispose of all material necessary to complete the work.

Excavation of existing streambed material will be paid under its respective item.

4/10/12

DRAFT
NOT FOR BIDDING
AUGUST 2015

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

715502 - TEMPORARY DRAINAGE PIPE, 30"
715503 - TEMPORARY DRAINAGE PIPE, 48"
715505 - TEMPORARY DRAINAGE PIPE, 15"
715506 - TEMPORARY DRAINAGE PIPE, 24"
715507 - TEMPORARY DRAINAGE PIPE, 36"
715508 - TEMPORARY DRAINAGE PIPE, 18"
715510 - TEMPORARY DRAINAGE PIPE, 12"
715515 - TEMPORARY DRAINAGE PIPE, 60"

Description:

This work consists of furnishing, installing, and disposing of temporary drainage pipe and end sections in accordance with the locations and elevation shown on the Plans and as directed by the Engineer.

Materials:

Pipe, fittings, and end sections initially furnished under this section shall be as noted on the Plans. If material is not specified on the Plans, the Contractor may use either Corrugated Polyethylene Pipe meeting the requirements of AASHTO M 294 or reinforced concrete pipe meeting the requirements of Section 612 of the Standard Specifications, or corrugated metal pipe meeting the requirements of Sections 614 of the Standard Specifications and as noted on the Plans. End sections and fittings shall be the same material as the pipe.

The pipe provided shall have a connection systems with all necessary gaskets, sealers, clamps, etc. required to produce water tight joints.

Construction Methods:

Temporary pipe is to be placed in accordance with Standard Specification Section 208 except that in order to maintain drainage during embankment construction, it will be necessary to install the temporary pipe prior to placement of the fill.

The temporary pipes shall be installed with leak resistant joints. The Contractor shall be responsible for the repair of leaks and damage caused by such leaks.

Temporary pipe is to be backfilled utilizing suitable excavated material or material being used for construction of the embankment over the pipe.

Required compaction shall be 95% or more of the laboratory maximum density.

The Contractor shall be responsible for placing sufficient embankment over the temporary pipe prior to crossing the area with any substantial loads. Any pipe damaged due to excessive loading must be excavated, replaced and backfilled by the Contractor at his/her expense. In areas of multiple pipes, sufficient separation of the pipes shall be maintained in order that proper compaction around all pipes can be performed.

If pipes are not to be covered with fill, they shall be securely anchored to prevent movement under use.

In order to maintain stream flow at all times, it will be necessary to offset the temporary pipe location from the permanent pipe location. Necessary diversion of ditches to align the flow through the temporary pipe and then back through the permanent pipe shall also be performed under this item.

When pipe is no longer needed it shall be removed and the resulting trench shall be backfilled. Where under final roadway the backfill material shall conform to the requirements of Borrow Type C. When water is present Borrow Type B shall be used for backfill up to 12" (300 mm) above the elevation of the water.

Method of Measurement:

The quantity of temporary drainage pipe will be measured as the actual number of linear feet (linear meters) of pipe installed and accepted, measured end to end including any fittings, end sections, couplings or connecting bands which will not be measured or paid for separately.

Basis of Payment:

The quantity of temporary drainage pipe will be paid for at the Contract unit price per linear foot (linear meter). Price and payment will constitute full compensation for furnishing, hauling, and installing the pipe, fitting, and end sections, for all cribbing, shoring and sheeting, and for all materials including couplings or connecting bands, labor, equipment, tools, and incidentals necessary to complete the work. Also included in this item is the excavation, backfill, and backfilling necessary to install the pipe, remove the pipe, and fill the empty trench.

If pipes are not covered with fill, this item will include all cost for securely anchoring the pipes and all cost for complete removal of such anchoring system.

Following its removal, the temporary pipe, fittings, and end sections will be eligible for reuse at other location(s) of this Contract if approved by the Engineer and desired by the Contractor. The Engineer shall be the sole authority in determining the acceptability of the pipe, fittings, and end sections for reuse. If approved, any reuse of temporary pipe, fittings, and end sections will again be paid as if the pipe was new. All provisions outlined in this specification will apply to both new and reused pipes.

After final use of the pipes, fittings, and end sections, they shall become the Contractor's property and shall be removed from the project. However, the Contractor may use these pipes, fittings, and end sections for similar work on this job at different locations(s) or on different jobs if found to be in good condition as determined by the Engineer.

10/25/01

720557 - PERMANENT P.C.C. PRECAST BARRIER - TOLL BOOTHS

Description:

The work consists of furnishing all labor and materials in order to provide the required Portland Cement Precast Concrete Barrier protection as shown on the Plans and as described in these Specifications. Nothing shown or omitted from these documents shall constitute a waiver to perform work required by the intent of the project and all work shall be completed in a professional manner. No extra compensation shall be paid for such omission, but they shall be included and made part of this bid.

Materials and Construction Methods:

Reinforcing Steel for all precast concrete shall comply with the requirements of ASTM Designation A615, latest edition, for new billet steel having a minimum yield strength of 60,000 psi unless otherwise shown or noted.

Welded wire fabric shall comply with the provisions of ASTM Designation A185 and A497, latest editions.

Epoxy protective paint shall be FX-64 Epoxy Protective Coating as manufactured by Fox Industries, Inc., Baltimore, Maryland, Sikagard 62 as manufactured by Sika Corporation, King of Prussia, PA., or approved equal.

Structural steel channels shall conform to ASTM A-36.

Concrete - Concrete shall have a 28-day yield strength of 5,000 psi with an air content of 6%. Refer to Section 812 of the Standard Specifications.

Holes shall first be cut in the concrete pavement and crusher run added as required at proper locations to accommodate the steel channels as shown on the Plans. The concrete surface on which the barrier will rest shall be cleaned thoroughly of all grease and dirt. The holes shall then be filled with an approved non- shrink grout. The non-shrink grout shall be spread evenly over the entire surface area on which the barrier will sit, and the barrier set in place while non-shrink grout is still in plastic state.

Basis of Payment:

The number of P.C.C. Precast Barriers measured as provided above shall be paid for at the contract unit price per Each, for "Permanent P.C.C. Precast Barrier-Toll Booths", which price and payment shall be full compensation for furnishing hauling and installing the barriers, for all materials, labor, equipment, tools and incidentals including reinforcing steel, steel channels, joint materials, approved non-shrink grout and epoxy paint, as called for on the Plans and as specified herein, and as necessary to complete the work to the satisfaction of the Engineer.

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

Description:

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

Materials:

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

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

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

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

Construction Methods:

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

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

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

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

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

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

Method of Measurement:

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

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

Basis of Payment:

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

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

4/7/11

720626 - CONCRETE SINGLE FACE BARRIER, TYPE 1
720627 - CONCRETE SINGLE FACE BARRIER, TYPE 2
720628 - CONCRETE SINGLE FACE BARRIER, TYPE 3
720629 - CONCRETE BIFURCATED CONCRETE MEDIAN BARRIER

Description:

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

Materials:

Material shall conform to the requirements listed on the Plans, and as noted herein. Portland cement concrete shall be 4,500 psi minimum and shall conform to the material requirements of Class A, Section 812, Portland Cement Concrete of the Standard Specifications.

Bar reinforcement shall be epoxy coated meeting the requirements Section 604 Grade 60.

Construction Methods:

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

The Contractor shall have the option of constructing the permanent safety barriers by selecting Cast-In-Place or Slip-form methods. The Contractor shall submit his/her plans for the selected method to the Department's Materials and Research Section for approval. In case of selecting the Slip-form method, the Contractor shall be able to demonstrate his/her ability to successfully accomplish the item by his/her past involvement in doing such work.

Contraction joints at a maximum of 10-ft. intervals are required regardless of construction method. Spacing of footing control joints shall be a maximum of 10 feet and align with the control joints in the barrier. Slip-form plans shall show the sawing of 1 ½" deep contraction joints at a maximum of 10-ft. intervals. The Contractor shall saw joints to ensure crack-free concrete. Any cracking due to the Contractor's operations will be repaired at no additional cost to the Department.

Method of Measurement:

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

Basis of Payment:

The quantity of Portland cement safety barrier will be paid for at the Contract unit price per linear foot for each type of barrier. Price and payment will constitute full compensation for all material, formwork, sawing of joints, reinforcement bars, preformed expansion joint filler, PVC drain pipe, perforated PVC drain pipe, geotextile, Delaware No. 57 stone, excavation and concrete all complete in place and accepted, for all

labor, equipment, tools and incidentals necessary to complete the work. Payment for excavation and the P.C.C. footer portion of the barrier are included in this item.

7/20/15

727552 – RESOURCE PROTECTION FENCE

Description:

This work consists of furnishing all materials, erecting resource protection fence at location(s) as noted on the Plans or as directed, relocating if required and maintaining/repairing during the construction period. The resource protection fence shall be removed and disposed of after no longer required as determined by the Engineer.

Materials:

A. Submit source of supply for all fencing materials including the posts for approval by the Engineer prior to installation.

B. *Resource Protection Fence:*
   1. 4' (1.2 m) high, U.V. stabilized high visibility orange, high density polyethylene.
   2. Standard mesh opening size of approximately 1 1/2" (38 mm).

C. *Fence Post:*
   1. Length sufficient for 18" (450 mm) embedment in the ground.
      a. Oak wood, a minimum of 2" (50 mm) square.
      b. T-Section steel 1.25" x 1.00" (32 mm x 25 mm).
   2. If the fence is to be installed on bituminous and/or concrete surface, use posts that can be anchored by placing sand bags at their base without damaging pavement.

D. *Bottom Rail Edging:*
   1. If the fence is to be installed along a pedestrian sidewalk, provide bottom rail edging of wood or metal for cane detection.

E. *Protection Signs:*
   1. Protection signs shall be provided by the Engineer and installed by the Contractor. The Contractor shall pick up the signs from the DelDOT sign shop and deliver to the project without any damage to the materials.

Construction Methods:

A. The Contractor shall stakeout the location of the resource protection fence for approval by the Engineer prior to installation. Resource protection fence shall be installed by hand. Grubbing shall not be permitted for the installation of resource protection fence. Where clearing is necessary for fence installation, vegetation shall be cut flush with the ground. Vegetation disturbance shall be kept to a minimum when installing resource protection fence.

B. Space posts no more than 10' (3 meters).
   1. Alternate spacing may be approved only if specified by the fence manufacturer.

C. Use 8" (200 mm) self-locking nylon safety ties for securing the fence to the post.

D. Signs shall be located along the fence facing the construction work area. Signs shall be located no more than 100 feet apart and a minimum of two signs shall be installed along a continuous fence segment. The top and bottom of the signs shall be secured to the top of the fence posts with 8" (200 mm) self-locking nylon safety ties using the existing holes in the sign.

E. Near streams, resource protection fence shall be installed so as not to interfere with base flow. If necessary, a gap in the fencing shall be created such that the resource protection fence terminates at the top of bank on both the right and left stream banks.

F. Install bottom rail edging for cane detection must be at least 6 inches above the surface of the sidewalk or pathway, with the bottom of the edging a maximum of 2.5 inches above the surface.

G. Maintain, repair, or replace resource protection fence as necessary when damaged, missing, or worn out.

H. The resource protection fence shall be removed when the Engineer determines that it is no longer required, typically at the very end of the construction contract. Removal of the resource protection fence shall be done by hand and vegetation disturbance shall be kept to a minimum. Removal shall be incidental to the item. Signs shall be salvaged and returned to the DelDOT sign shop. All other fencing materials shall be disposed of by the Contractor.

Method of Measurement:

The quantity of resource protection fence will be measured as the actual number of linear feet (meters) of resource protection fence furnished, installed and accepted.

Basis of Payment:

The quantity of resource protection fence will be paid for at the Contract unit price per linear foot (meter). Price and payment will constitute full compensation for furnishing, placing, maintaining, clearing, pick-up and delivery of sign materials, salvaging and drop-off of sign materials, removal and disposal of the fence and related accessories, furnishing all labor, equipment, tools and all incidentals necessary to complete the work. Stolen or damaged resource protection fencing and signs shall be replaced at the Contractor's expense.

7/20/15

732505 - SOIL COMPOSTING

Description:

Soil Composting shall consist of the addition of Composted Sewage Sludge (CSS) to the soil as designated on the Plans, accompanying details, or as directed by the Engineer.

Materials:

CSS (marketed as FER-TIL-GRO) shall be used as soil composting material. This material shall be obtained from .

Construction Methods:

Trucks used for hauling of the material from the source to the placement site shall be covered with tarp and appropriate measures shall be taken to prevent any leakage or spillage of the material. During hauling operations, the trucks shall not be overloaded in order to prevent spillage. Measures shall be also taken to control odor and dust during haulage.

The Contractor, at all times, shall exercise all practicable and reasonable measures to prevent leakage/spillage during transportation. If hauling operations resulted in any leaking/spilling of CSS to the road surface, the Contractor shall immediately clean the road surface.

If temporary stockpiling of the material is required prior to placement, the Contractor shall locate an area for stockpiling as directed by the Engineer. Temporary stockpile area shall be graded flat and polyethylene sheeting with a minimum thickness of 10 mils shall be placed prior to stockpiling. Stockpiled material shall be covered with polyethylene sheeting with a minimum thickness of 10 mils. Dead weights shall be placed on the sheeting on stockpile. The Contractor shall exercise adequate measures to prevent any run-off or run-on from and to the CSS stockpile as required and as directed by the Engineer.

CSS shall be placed evenly throughout the area designated on Plans as Soil Composting to a thickness of 1 inch. Subsequent to placement, the Contractor shall measure the thickness of CSS at a frequency of 1 per 1,000 square feet of placement. The Contractor shall mix CSS with top 6 inches of soil by discing. Prior to discing, the thickness of CSS of any location shall not be less than 0.8 inches or greater than 1.2 inches. The equipment and methods adopted for placing the material shall be subject to the approval of the Engineer. Subsequent to mixing, the Contractor shall grade the area flat. Any excess material shall be disposed of as directed by the Engineer.

Polyethylene sheeting used for temporary stockpile shall be disposed of off-site and the area shall be restored as directed by the Engineer.

Method of Measurement:

The quantity of Soil Composting to be paid for under this section shall be the cubic yardage of soil composting material placed to the limits shown on Plans conforming with all the requirements of these specifications, complete and accepted. The yardage shall be measured based on the actual area of placement

up to the limits shown on Plans and the actual thickness of material up to the thickness specified measured subsequent to placement of CSS prior to mixing with soil.

This item also includes any other work specified on Plans as incidental to this item.

Basis of Payment:

Soil Composting shall be paid for at the Contract unit price per cubic yard bid for Section 732505 - Soil Composting, which price and payment shall be full compensation for all labor, equipment, tools and incidentals necessary to complete the work and all other work indicated on the Plans as being incidental to this item.

735501 - HERBICIDE APPLICATION, NOXIOUS WEEDS

Description:

This work consists of furnishing and applying the herbicides to vegetation on the soil surface as directed by the Engineer.

Materials:

The herbicide (s) for treatment shall be selected by the contractor. Labels and Material Safety Data Sheets for the selected materials shall be submitted to thr Engineer 30 days prior to application.

Construction Methods:

All herbicides shall be applied in accordance with the EPA approved label. The herbicides shall not be applied within six (6) hours of rainfall.

Method of Measurement:

The quantity of herbicide application will be measured by the acre (hectare) of surface area treated with herbicide material.

Basis of Payment:

The quantity of herbicide application will be paid for at the Contract price per acre (hectare). Price and payment will constitute full compensation for furnishing all materials, applying the herbicide in aqueous solution, for all labor, equipment, tools, and incidentals to complete the work.

7/20/15

737503 - BEDDING FOR REFORESTATION

Description:

Bedding For Reforestation shall consist of the construction of raised planting beds and planting mounds for reforestation projects as designated on the plans, accompanying details, or as directed by the Engineer.

Materials:

All bedding harrows and tractors utilized are subject to approval by the Department. Within thirty days of the award of the contract, the Contractor shall supply the Department the name and model number of the bedding harrow and tractor, and the harrow and tractor manufacturer's guidelines related to equipment size, power and drawbar pull. The width of the hourglass roller and the overall width of the tractor, as measured from outside track to outside track, shall be included with this information.

The planting beds shall be constructed utilizing a heavy-duty bedding harrow. The bedding harrow shall have a minimum net weight of 3,500 pounds. Unless specified on the plans, the bedding harrow shall have a maximum disc cut width of no more than 8 feet and a minimum disc cut width of 6 feet. The bedding harrow shall have a hourglass roller with a maximum width of no more than 8 feet and a minimum width of 6.5 feet. The bedding harrow used shall be the Series T1R, TRBR or TRBW, Heavy-Duty Bedding Harrows, as manufactured by Rome Industries, Inc., Cedartown, Georgia, or Model BH-6 as manufactured by Marden Manufacturing Company, Inc., Auburndale, Florida, or an approved equivalent.

The discing tool shall possess a minimum of six disc blades each with a minimum diameter of 30 inches and a minimum disc thickness of 0.5 inches. Each disc blade shall be a cutout (notched) blade. It is the Contractor's responsibility to insure that the discing operation, discing width and disc sizes employed provides sufficient soil for the mounding operation, and that the resulting mounds are compacted by the hourglass roller.

A crawler tracked tractor shall be utilized for the bedding operations. The tractor shall conform to the bedding harrow and tractor manufacturer's recommendations as to minimum size, power and drawbar pull at the bedding harrow's full weight (roller water filled) for the on-site soil conditions. The tractor shall have the hydraulic lines and characteristics necessary for proper operation of the bedding harrow as designed and recommended by the manufacturer of the bedding harrow. During mounding operations, the hourglass roller shall be filled with water to the maximum capacity of the roller. It shall be the Contractor's responsibility to ensure that all equipment possess sufficient power and is of appropriate design and weight distribution to complete the construction of the mounds.

Unless specified on the plans, the bedding for the reforestation shall be conducted in irregular patterns and not in straight rows. When irregular bed patterns are constructed, the width of the tractor utilized shall not exceed the width of the hourglass roller. Whenever possible, the widest allowable roller should be utilized. When directed by the Engineer, the tractor shall be a Caterpillar D4 Series, Komatsu D3_ Series, or an approved equivalent.

Depending on field conditions and the presence of clayey soils, as solely determined by the Engineer, the Engineer may direct the Contractor to disc/plow the area to be bedded with a heavy-duty disc or a deep

tillage subsoiler prior to the actual bedding operations. The use and operation of a heavy-duty disc or subsoiler shall be incidental to this item and no additional compensation shall be made by the Department. It is the Contractor's responsibility to ensure that the equipment possess sufficient power and is of appropriate design and weight distribution to work in wet soils.

Construction Methods:

The bedding shall be performed within the areas shown on the plans. The bedding pattern shall be random over the entire area except for the final bedding patterns shown on the plans. This random bedding pattern requirement mandates that the harrow repeatedly cross over newly made beds. The tractor equipment shall have sufficient power to conduct these crossing operations efficiently, as solely determined by the Engineer. The final bedding configuration shall be an irregular pattern and as shown on the plans and as directed by the Engineer. The Contractor shall pass the bedding harrow over the entire area designated for bedding at least twice prior to the final bedding runs. Final bedding runs shall consist of two parallel rows of the bedding harrow adjacent to each other in order to form a channel. (The bed height developed shall be a minimum of 12 inches as measured from the top of the mound to the bottom of the adjacent side furrows.)

The harrow shall be operated at a speed directed by the Engineer which shall be between 2 and 6 miles per hour. The construction of the planting beds shall occur during the specified work window, as shown on the plans or as directed by the Engineer. Commencement of the bedding operations shall begin within 7 days of the direction by the Engineer.

Method of Measurement:

The quantity of Bedding for Reforestation to be paid for under this section shall be the number of square yards of beds placed to the limits shown on plans measured as the horizontal plan surface area of the vertical projection of the limits and measured once at the end of bedding operations, conforming with all the requirements of these specifications, complete and accepted.

This item also include any other work specified on plans as incidental to this item.

Basis of Payment:

Bedding for Reforestation shall be paid for at the contract unit price per square yard bid for Section 737503, Bedding for Reforestation, which price and payment shall be full compensation for all labor, equipment, tools and incidentals necessary to complete the work and all other work indicated on the plans as being incidental to this item.

737523 - PLANTINGS

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

Subsection 737.07 Peat Moss and Peat Humus.

Add the following:

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

Subsection 737.10 Stakes, Guys, and Related Materials.

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

Subsection 737.16 Planting.

Delete paragraph (d).

Add the following:

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

Section 737.17 Plant Establishment.

Delete this subsection in its entirety and add the following:

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

All planting areas shall be kept free of weeds and grass during the life of the Contract. The Contractor may utilize a pre- or post-emergent herbicide to control such grass and broadleaf weeds incidental to the cost of planting and be totally responsible for the proper use and placement of any such herbicide. As requested in writing by the Engineer, the Contractor shall be responsible to weed within all plant beds and within the saucer limits of individual plants, beginning 10 calendar days after the date of notification. The

Contractor shall prune and apply insecticides or fungicides as required, repair or replace stakes and guy wires, tighten guy cable or wire and repair plant saucer washouts when and as specified by the Engineer.

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

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

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

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

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

Subsection 737.18 Method of Measurement.

Delete the paragraph in its entirety and insert the following:

The quantity of planting will not be measured.

Subsection 737.19 Basis of Payment.

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

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

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

The Department reserves the right to delete from the Contract the furnishing and installing of one or more of the species and/or sizes listed and the right to add or subtract from the quantity of each species and size listed. The lump sum to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation to the Contractor if such additions and/or deletion are made.

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

5/11/05

744500 - CONDUIT JUNCTION WELL, TYPE 6, PRECAST POLYMER CONCRETE
744506 - CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE
744507 - CONDUIT JUNCTION WELL, TYPE 8, PRECAST POLYMER CONCRETE
744508 - CONDUIT JUNCTION WELL, TYPE 9, PRECAST POLYMER CONCRETE
744509 - CONDUIT JUNCTION WELL, TYPE 10, PRECAST POLYMER CONCRETE
744520 - CONDUIT JUNCTION WELL, TYPE 1, PRECAST CONCRETE
744523 - CONDUIT JUNCTION WELL, TYPE 4, PRECAST CONCRETE
744524 - CONDUIT JUNCTION WELL, TYPE 5, PRECAST CONCRETE
744530 - CONDUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/POLYMER LID-FRAME
744531 - CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/POLYMER LID-FRAME
744532 - CONDUIT JUNCTION WELL, TYPE 15, PRECAST CONCRETE/POLYMER LID-FRAME

Description:

This work consists of supplying, constructing and installing conduit junction wells as shown on the applicable Plan Sheets or Standard Construction details

Materials:

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

Castings shall conform to Section 708.05 of the Standard Specifications.

Frames and lids shall be in accordance with Sections 708 and 744 of the Standard Specifications.

All required hardware and wire for Bonding and Grounding as shown on the Standard Construction or applicable Plan details.

Types 6, 7, 8 and 10 are precast polymer concrete stackable boxes with no base.

Precast polymer concrete is reinforced by heavy-weave fiberglass with a compressive strength of 9,000-15,000 psi, impact energy of 30-72 ft. lbs. and a tensile strength of 800-1,100 psi. Precast polymer concrete should be tested according to the requirements of ASTM Method D-543, Section 7, Procedure 1 for chemical resistance.

All precast polymer concrete covers shall be the heavy-duty type with a design load of 15,000 lbs. over a 10" square. The coefficient of friction should be greater than 0.5. The precast polymer concrete cover logo shall bear the inscription "DelDOT" (Types 6, 8, and 10) or "DelDOT TRAFFIC FIBER OPTICS" (Type 7).

Types 11, 14, and 15 are precast polymer frame and lids installed on a precast concrete base. Precast polymer concrete frame and lids shall be the heavy-duty nonconductive type with a design load of 15,000 lbs. over a 10" square. The coefficient of friction should be greater than 0.5. The precast polymer concrete lid logo shall bear the inscription "DelDOT ELECTRIC"(Types 11, 14, and 15)

Construction Methods:

The conduit junction well shall conform to the dimensions shown on the Standard Construction or applicable Plan Details, or on the manufacturer's specifications and shall be built so as to ensure that the cast iron frame and lid or polymer concrete box and cover are set level with the surrounding surface when constructed within pavement, sidewalks, pedestrian curb ramps, etc., and set above grade and graded to drain away from the junction well when constructed in unpaved areas. More than one conduit may extend into the well and shall conform to the dimensions shown on the applicable plan sheets or Standard Construction Details. A stone base shall be built for all types of junction wells. Grounding and bonding of the units shall be performed as shown on the plans or Standard Construction details.

Method of Measurement:

The quantity of junction wells shall be the actual number of conduit junction wells by type, that are supplied, constructed, complete in place, and accepted, including cast iron frames and lids with grounding lugs, precast polymer concrete frame and covers, or precast polymer concrete covers, stone base, bonding, grounding, and splicing if required. Frames and lids or precast polymer concrete covers must be installed prior to acceptance of this item.

Payment for all conduits extending into the junction well shall be included in the items for conduit installation.

The length of ALL conduits within a junction well shall conform to the Standard Construction or applicable Plan Details or as directed by Engineer. Payment for cutting existing conduit as directed by Engineer, where a junction well is replaced with a larger type of junction well is included in the bid price. The removal and replacement of cables within the conduits to be shortened shall be handled under other items of this contract.

Basis of Payment:

Payment for conduit junction wells as measured above shall be made at the Contract unit price per each junction well of the type indicated, completely installed and constructed, including excavation, backfilling, and stone base. Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

2/29/12

745500 - GALVANIZED CONDUIT IN/ON STRUCTURE, 1"
745501 - GALVANIZED CONDUIT IN/ON STRUCTURE, 1 1/2"
745502 - GALVANIZED CONDUIT IN/ON STRUCTURE, 2 1/2"
745505 - GALVANIZED CONDUIT IN/ON STRUCTURE, 3"
745506 - GALVANIZED CONDUIT IN/ON STRUCTURE, 2"
745516 - GALVANIZED CONDUIT IN/ON STRUCTURE, 4"

Description:

This work consists of furnishing all materials and installing rigid galvanized steel conduits of the specified size(s) in/on structures in accordance with the notes and details on the Plans and as directed by the Engineer.

Materials:

The materials shall conform to the requirements of Subsection 745.02 of the Standard Specifications.

Construction Methods:

Install conduit in accordance with the details shown on the Plans, with conduit connections made as required in Subsection 745.03.

Method of Measurement:

The quantity of galvanized conduit will be measured in linear feet (meters) of conduit, complete in place and accepted. Measurement will be made along the conduit.

Basis of Payment:

The quantity of galvanized conduit will be paid for at the Contract unit price per linear foot (meter) for the size used. Price and payment will constitute full compensation for furnishing and installing the conduit and hangers and all materials, labor, equipment, tools and incidentals necessary, including coupling for attachment of conduit, to complete the work.

8/15/05

745520 - SUPPLY OF 4" SCHEDULE 40 HDPE CONDUIT
745521 - SUPPLY OF 4" SDR-13.5 HDPE CONDUIT
745522 - SUPPLY OF 3" SCHEDULE 80 PVC CONDUIT
745523 - SUPPLY OF 4" SCHEDULE 40 PVC CONDUIT
745524 - SUPPLY OF 4" SCHEDULE 80 PVC CONDUIT
745525 - SUPPLY OF 4" GALVANIZED STEEL CONDUIT
745526 - SUPPLY OF 3" GALVANIZED STEEL CONDUIT
745527 - SUPPLY OF 2 1/2" GALVANIZED STEEL CONDUIT
745528 - SUPPLY OF 2" GALVANIZED STEEL CONDUIT
745529 - SUPPLY OF 1 1/2" GALVANIZED STEEL CONDUIT
745530 - SUPPLY OF 1" GALVANIZED STEEL CONDUIT
745531 - SUPPLY OF 3/4" GALVANIZED STEEL CONDUIT
745532 - SUPPLY OF 3" SCHEDULE 40 PVC CONDUIT
745533 - SUPPLY OF 2 1/2" SCHEDULE 40 PVC CONDUIT
745534 - SUPPLY OF 2" SCHEDULE 40 PVC CONDUIT
745535 - SUPPLY OF 1 1/2" SCHEDULE 40 PVC CONDUIT
745536 - SUPPLY OF 3/4" ALUMINUM RIGID CONDUIT
745537 - SUPPLY OF 3/4" FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT
745538 - SUPPLY OF 1 1/2" FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT
745539 - SUPPLY OF 2" NONMETALLIC POLE RISER SHIELD
745540 - SUPPLY OF 3" NONMETALLIC POLE RISER SHIELD
745541 - SUPPLY OF 4" NONMETALLIC POLE RISER SHIELD
745577 - SUPPLY OF 3" SDR-13.5 HDPE CONDUIT
745579 - SUPPLY OF 2 ½" SCHEDULE 80 PVC CONDUIT
745580 - SUPPLY OF 1" FLEXIBLE METALLIC-LIQUID TIGHT CONDUIT
745581 - SUPPLY OF 2" SCHEDULE 80 PVC CONDUIT
745582 - SUPPLY OF 5" SCHEDULE 40 PVC CONDUIT

Description:

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

Materials:

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

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

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

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

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

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

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

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

Method of Measurement:

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

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

Basis of Payment:

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

1/9/13

745542 - INSTALLATION OF CONDUIT UNDER EXISTING PAVEMENT - DIRECTIONAL BORE
745543 - INSTALLATION OF CONDUIT UNDER EXISTING PAVEMENT - OPEN CUT
745544 - INSTALLATION OF CONDUIT IN UNPAVED TRENCH
745545 - INSTALLATION OF CONDUIT ON WOOD POLE
745546 - INSTALLATION OF CONDUIT ON STRUCTURE
745547 - INSTALLATION OF ADDITIONAL CONDUITS IN TRENCH OR OPEN CUT PAVEMENT
745548 - INSTALLATION OF ADDITIONAL CONDUITS IN DIRECTIONAL BORE

Description:

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

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

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

Materials:

Weatherhead for galvanized or PVC conduit.
Insulated grounding bushing with knockouts.
Condulets for conduit sizes.
Anchors.
One hole conduit hangers: Steel City Series 6H or 6H-B, Grainger Industrial Supply Item # 6XCXX, Dale Electric Supply Co.- Conduit Hangers, Arlington Industries - Pipe Hangers Series 2000 or 2200, Raco/Hubbell Inc. - Conduit Hangers or Approved Equal.
End caps.
LONG sweep sections for conduit sizes.

Construction Methods:

The Department has the right to reject any installation method proposed for a given work site. PVC shall not be installed under existing pavement unless it is on a continuous roll or with the Engineer's written approval.

Conduit installed underground shall be installed in a straight line between terminal points. In straight runs, junction well spacing shall be no more than 900 feet (275 m) for fiber optic conduit or no more than 300 feet (90 m) for copper conduit, or as directed by the Engineer. If bends are required during installation, they must be sweeping bends. The Engineer will be consulted before any bends are installed to ensure that the proper arc is provided.

Conduit shall have a minimum cover as measured from the finished grade of 24 inches (600 mm) and a maximum cover of 48 inches (1.2 m).

The opening shall be filled half way with the cover material, and tamped down firmly before filling in the remainder of the opening. Additional lifts shall be used as required to install the warning tape at the specified depth. All cover material shall be free of rocks, debris, vegetation or other deleterious material that may damage the conduit. An underground utility warning tape shall be installed as specified in this section and the remainder of the fill shall be added, tamping down the top layer.

Conduit not terminated to a base or in a junction well shall be terminated 2 feet (600 mm) beyond the edge of the pavement unless otherwise directed by the Engineer, and properly capped. Tape is NOT an approved method. Conduit shall not extend more than 3 inches (75 mm) inside a junction well. See Standard Construction Details for typical methods of termination.

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

The color of the warning tape identifying fiber optic cable should be bright orange (preferably AULCC orange), and shall read "WARNING - OPTICAL CABLE" or other wording approved by the Engineer that conveys the same message. The color of the tape identifying all other cables shall be bright red, and shall read "WARNING—BURIED ELECTRIC BELOW" or other wording approved by the Engineer that conveys the same message.

Using conduit tools, rigid metallic conduit shall be cut, reamed, and threaded. The thread length shall be as necessary to ensure that the sections of conduits when screwed into a coupling and tightened correctly will butt together and the joint will be watertight.

A three-piece threaded union, as approved by the Engineer, shall be used to join two threaded lengths of conduit in the case where a standard coupling will not work. A threaded union shall not be used in a conduit run that is to be driven. **At no time is a threadless coupling or a split-bolt coupling to be used for direct buried conduit.**

All lengths of HDPE conduit shall be connected with irreversible fusion couplings. Mechanical and removable couplings will not be accepted.

All lengths of PVC conduit shall be connected by one conduit end fitting inside the flared end of the other conduit section. If this is not possible, then a coupling may be used. Regardless of how connection is made, all joints shall be sealed with the appropriate epoxy to ensure that the two conduit pieces bond to one another to form a solid waterproof link.

Using conduit tools, the conduit shall be cut and prepared. If approved by the Engineer, a coupler module may be used where conduit segments do not align properly to allow the flared end of one conduit segment to mate with the normal end of the other segment.

Sealed end caps (with knockouts if empty) shall be placed on the ends of all conduits by after compressed air has been used to clear all foreign matter.

If not already pre-installed by the manufacturer, a polyester or polypropylene pulling rope or tape (fish wire) with a minimum rated strength of 1250 pounds (5560 N) shall be installed in each conduit for future use. In instances where the Contractor installs the cable, the fish wire may be eliminated.

Installation Of Conduit Under Existing Pavement - Directional Bore:

Directional bore shall be used for installation of conduits under existing pavement with a conduit diameter not less than 1-1/2" (38 mm). The size of a bore shall not exceed the outside diameter of the conduit by more than 1 inch (25 mm). If it does, cement grout shall be pumped into the void.

Installation Of Conduit Under Existing Pavement - Open Cut:

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

Installation Of Conduit In Unpaved Trench:

Trenching or other approved method shall be used for installation of conduit in unpaved trench or under new pavement. Backfill in conduit trenches shall be compacted thoroughly as it is being placed. At the discretion of the Engineer, sod, that must be removed for the placement of conduit, shall either be removed by the use of an approved sod cutter and then replaced or 6 inches (150 mm) of topsoil shall be placed and the surface seeded in accordance with Section 734001 - Seeding. In areas where new pavement is to be placed or in areas where total reconstruction is taking place, sodding or seeding may not be required by the Engineer.

Installation Of Conduit On Wood Pole:

Conduit installed on wood pole shall be installed in a straight vertical line. The conduit shall be attached to the wood pole with 2 hole straps spaced not more than 36 inches (1 m) apart with the top-most strap being 12 inches (300 mm) from the weatherhead and the lower-most being 12 inches (300 mm) from the 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 (50 mm) shall be placed 48 inches (1.2 m) above finished grade. Install two, 2 hole straps of the proper size, evenly spaced below the condulet. Nonmetallic pole risers (U-guard) shall be installed on wood poles to allow interduct to be connected directly to messenger cable. The underground conduit shall be as close to the base of the pole as possible. If the nonmetallic pole riser is not the same size as the conduit, an adapter shall be used at no additional cost to the Department. The nonmetallic pole riser shall be attached to the wood pole with 1/4" (6 mm) x 1-1/2" (38 mm) galvanized lag bolts with washers. Lag bolts will be used every 36 inches (1 m) on BOTH sides of the nonmetallic pole riser, and in the top most and bottom most set of slots.

Installation Of Conduit On Structure:

Conduit installed on structure shall consist of drilling anchors into concrete, brick, stone, steel or wood and mounting the conduit with the proper clamps or hangers. The conduit shall be attached to the structure by use of one-hole conduit hangers and approved anchors not more than 36 inches (1 m) apart. Any

90-degree turns in the conduit run shall be accomplished by placing the proper size and type sweeping bends for the application needed.

Installation Of Additional Conduit In Trench Or Open Cut Pavement:

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

Installation Of Additional Conduits In Directional Bore:

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

Method of Measurement:

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

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

Basis of Payment:

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

6/6/11

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.

6/3/13

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 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 ft² (0.3m²). Computations confirming conformance with AASHTO Specifications, with the year of the edition specified, shall be submitted to the Delaware Department of Transportation.

All electrical materials shall conform to the requirements of the National Electrical Code of the national Fire Protection Association, and shall conform to all local and special laws and/or ordinances governing such installations. Where these requirements do not govern, and where not otherwise specified, electrical materials shall conform to the Standardization Rules of the Institute of Electrical and Electronic Engineers.

Shop drawings and catalog cuts for all electrical and related materials shall be submitted by the Contractor for approval.

The bolts are to be supplied by the Contractor. The bolts will be installed using a template, and set so that luminaire arm is perpendicular to the roadway.

Anchor bolts, nuts, couplings, washers, and cap screws shall be of carbon steel conforming to the requirements of ASTM A307, and hot-dip galvanized in accordance with AASHTO M 232/M 232M.

Also included in the foundations will be ground rods which shall be copper clad steel 3/4" (19 mm) diameter 26' (6 m) long, complete with ground clamp and square head bolt equal to Joslyn's Cat. No. J8350, Line Materials Cat. No. 119960 or A. B. Chance Co. Cat. No. 8450, or approved equal.

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)	8' (2.4 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)	0.156" (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)	8' (2.4 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 8' (2.4 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 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

Cat. #OVY25SWN3ET4 (Multi Tap 277V)
Cooper/Crouse-Hinds OVY Swing-down Cat. #OVY25SWW3ET4 (Multi Tap 120V)
GE M-250 A2 Power/Door Cat. #M2AC25S0A2GMC32 (Multi Volt)

LUMINAIRE 150 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-27 Regulated Multi Voltage Ballast, Type III Light Pattern, or as shown on Plans, 1 1/2" - 2" (36 mm - 50 mm) Slipfitter

Cat. # OVY15SWW3ET4 (Multi Tap 120V) Cooper/Crouse-Hinds OVX Swing-down Cat. #OVY155WN3ET4 (Multi Tap 277V)
GE M-250A2 Power/Door Cat. #M2AC15SOA2GMC32

Foundations: Foundations shall be cast-in-place monolithically at the prescribed locations as shown in detail on Plans. If, not otherwise specified, a Type 6 Base as shown in the Standard Construction Details will be used. Exact locations of the bases will be determined in the field in order to avoid existing obstructions such as utilities or existing pole bases.

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 arm 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 arm 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, ground rods, washers, shims and nuts for the foundations, excavation and backfilling, 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.

4/22/13

746539 - REMOVAL OF EXISTING POLE

Description:

This work consists of removing and transporting signal pole(s) in accordance with the locations and notes on the Plans and as directed by the Engineer.

Construction Method:

The pole with related hardware assemblies shall be carefully removed from the pole base and stored within the project limits for transporting later to a specified place. Unless specified otherwise on the Plans the pole base concrete foundation including reinforcement bars and anchor bolts, shall be removed to a minimum depth of at least 6" (150 mm) below the ground level and disposed of. The area shall be graded, topsoiled, seeded and mulched to the satisfaction of the Engineer.

The pole with related hardware shall be transported to the Department's Maintenance Yard at Bear for all projects located in New Castle County; and to the Dover Maintenance Yard for all projects in Kent and Sussex Counties, unless otherwise directed on the Plans.

Method of Measurement:

The quantity of existing poles removed will be measured as the actual number of poles removed to the satisfaction of the Engineer.

Basis of Payment:

The quantity of existing poles removed will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for removing and transporting the pole with hardware, for removal and disposal of concrete base, for grading, topsoil and topsoiling, seeding and mulching, and for all labor, equipment, tools, and necessary incidentals to complete the work.

8/31/01

746553 - POLE BASE, SPECIAL

Description:

This work consists of furnishing all materials including anchor bolts and constructing pole base(s) in accordance with the notes and details on Plans and as directed by the Engineer.

Materials and Construction Methods:

All materials required for constructing the pole base shall conform to the applicable requirements of Section 746 of the Standard Specifications, the Standard Construction Details, and notes on the Plans.

If size and material requirements for anchor bolts are not shown on the Plans, the Contractor shall submit shop drawings with this information for approval. In general, the anchor bolts with nuts, etc. shall satisfy AASHTO design specifications and meet the requirements of ASTM A687 for studs and ASTM A563 Grade DH for nuts.

Construction method shall be performed in accordance with the applicable requirements of Section 746.

Method of Measurement and Basis of Payment:

Method of Measurement and Basis of Payment will be in accordance with Subsections 746.04 and 746.05 respectively.

1/9/03

746569 – RELOCATING ELECTRIC UTILITY

Description:

This work consists of furnishing all materials including cable, preformed splices, conduits, required fittings, bends, splice boxes, etc., and performing all work for relocating an existing electric utility as shown on the plans and in accordance with these special provisions, the National Electric Code (NFPA 70), the Delaware Department of Transportation Standard Specifications, the notes and details on the plans and the requirements of the Standard Specifications of the Owner of the utility. In case of any conflict between these sets of information, , the Standards and Specifications of the Owner of the Utility shall prevail. The Contractor shall obtain the Standards and Specifications of the Owner of the utility and review before submitting the bids. The Owner is identified on the plans and could be a city, municipality a county, or a state agency and from hereafter shall be addressed as the Owner.

General Requirements:

All work shall be subject to inspection and approval of the Engineer and a 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 the crossings of other existing and proposed utilities and other elements of the proposed project as shown in the contract documents. It is the responsibility of the Contractor to verify the location of these facilities to ensure that they are not damaged or that there are no conflicts between the relocated electric facility and other elements of the project. Any and all emergency repairs required during the period of this Contract due to damage from the Contractor's operations shall be the responsibility of the Contractor. In the event the Owner of a damaged facility is unable to contact the Contractor for the immediate emergency repair items of work, or in the event the Contractor when contacted does not take action within a reasonable length of time, the Owner of the facility reserves the right to perform any and all emergency repair work items and to submit the costs directly to the Contractor for complete payment.

It is of prime importance that the Contractor, in the performance of his/her work, shall coordinate with the Engineer, the Owner of the Utility, and any end customer(s) of the Utility, prior to any scheduled electrical outages. Outages shall be scheduled to minimize disruption of services to the end customers

Materials:

The requirements for the materials as applicable to the Contract are as noted below, unless otherwise stated on the Plans and/or required by the Owner of the utility. The Contractor shall submit shop drawings for all materials to the Engineer for approval.

Cable shall be 4/0 Copper cable type MV 90 that complies with UL 1072, ICEA S-93-639, and ICEA S-94-649. Conductor Stranding shall be Concentric Lay, Class B. Conductor interstices are filled with impermeable compound. Conductor Insulation shall be ethylene-propylene rubber rated for 15kV at a 133 percent insulation thickness. Cables shall be in a three-conductor assembly insulated, shielded, and cabled together. Circuit identification shall be with color-coded tape (black, red, and blue).

Connectors and splice kits shall comply with IEEE 404; type as recommended by cable or splicing kit manufacturer for the application. As recommended , in writing, from splicing kit manufacturer for specific sizes, ratings, and configurations of cable conductors, include all components required for complete splice, with detailed instructions.

Conduit shall be 4" diameter with a SDR rating of 13.5. All conduit shall comply with ANSI C2, NEMA TC 6 & 8, ASTM F 512, UL 651A, and is type HDPE with matching fittings complying with NEMA TC 9 by same manufacturer as duct. All lengths of HDPE conduit shall be connected with irreversible fusion couplings. Mechanical and removable couplings will not be accepted.

Splice boxes shall be per the size noted on the plans and manufactured of molded fiberglass-reinforced polyester resin, with covers made of fiberglass. The cover shall be marked "ELECTRIC". Covers shall be secured with factory installed tamper-proof connections.

Construction Methods:

All conduits shall be thoroughly cleaned before they are laid and shall be kept clean until the completed work is accepted. All conduits shall have a mandrel with a plug ½" smaller diameter than the inside diameter. If not already pre-installed by the manufacturer, a polyester or polypropylene pulling rope or tape (fish wire) with a minimum rated strength of 1250 pounds (5560 N) shall be installed in each conduit for future use. In instances where the Contractor installs the cable, the fish wire may be eliminated.

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

The color of the warning tape shall be bright red, and shall read "WARNING—BURIED ELECTRIC BELOW" or other wording approved by the Engineer or Owner that conveys the same message.

The excavation and backfill for the pipe shall be performed in accordance with the applicable requirements including backfill requirements of Section 612 of the DelDOT Standard Specifications, unless otherwise modified on the Plans, or in conflict with the requirements of the Owner. The conduits and cables shall be installed at the locations and to the lines, grades, and dimensions shown on the Plans or as directed by the Engineer. The ends of the conduits shall be sealed using end caps (with knockouts if empty) after compressed air has been used to clear all foreign matter.

Directional bore shall be used for installation of conduits under existing pavement. The size of a bore shall not exceed the outside diameter of the conduit by more than 1 inch (25 mm). If it does, cement grout shall be pumped into the void.

All cables shall be installed according to IEEE 576. Conductors shall be pulled in conduit without exceeding manufacturer's recommended maximum pulling tensions and sidewall pressure values. Where necessary, use manufacturer-approved pulling compound or lubricant that will not deteriorate conductor or insulation. Identify cables as directed by the Owner.

Contractor shall engage a cable splicer, trained and certified by the splice manufacturer, to install, splice, and terminate medium-voltage cable.

Acceptance Testing:

Prior to request for inspection by the Engineer, it shall be the Contractors responsibility to examine all completed conduits, cables, and splice boxes to insure that they are installed to the proper alignment and grade. After this has been done to the satisfaction of the Engineer, he/she will order tests to be made on all portions of the work performed under the Contract.

The testing agency shall be an independent agency, with the experience and capability to conduct the testing indicated, that is a member of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction. The testing agency's field supervisor shall be a person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing.

All electrical components, devices and Accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use. Test reports for the following and any other tests required by the Owner shall be submitted by the testing agency.

Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.

Perform direct-current High Potential test of each new conductor according to NETA ATS, Ch. 7.3.3. Do not exceed cable manufacturer's recommended maximum test voltage.

Perform Partial Discharge test of each new conductor according to NETA ATS, Ch. 7.3.3 and to test equipment manufacturer's recommendations.

Perform Dissipation Factor test of each new conductor according to NETA ATS, Ch. 7.3.3 and to test equipment manufacturer's recommendations.

Medium-voltage cables will be considered defective if they do not pass tests and inspections. Prepare test and inspection reports.

Method of Measurement:

Payment for this item shall be made on a lump sum basis wherein no measurement will be made.

Basis of Payment:

The quantity of Relocating Electric Utility shall be paid for at the Contract Lump Sum price. Price and payment shall constitute full compensation for performing all work, furnishing and installing all materials, testing and for all labor, equipment, tools and incidentals necessary to complete the work.

8/20/12

746590 - FURNISH & INSTALL GROUND ROD

Description:

This item consists of furnishing and installing ground rods at locations shown on the plans or as directed by the Engineer. The item will be used only when an individual ground rod is to be replaced or added as a singular item. Costs for Ground Rods installed as part of other items (Pole Bases, Junction Wells, Metered Service Pedestals, etc.) will not be paid separately, but will be included in those respective pay items.

Material:

Each Ground Rod shall be copper clad, approved by the Underwriter's Laboratory and be supplied with approved clamps for connecting the grounding conductor to the rod. The Ground Rod shall be ¾" Diameter and shall have a minimum length of 10', unless detailed otherwise in the contract documents.

Construction Methods:

When installing the Ground Rod, a length of at least 8 feet shall be embedded into undisturbed soil. Measure the ground resistance of each rod before connecting the rod to the grounding conductor. If the measured resistance exceeds 25 ohms, exothermically weld a 10 ft. extension to the top of the first rod and drive to its full depth. Measure the earth resistance again. If it still exceeds 25 ohms, contact the engineer for instruction.

Where rock is encountered and an acceptable earth ground cannot be accomplished by driving as described above, the Engineer may direct the use of a grounding grid. Direct buried rods are exothermically welded end to end to bond lighting standards and structures in continuous series to some point where an acceptable ground can be obtained.

Maintain continuity of the equipment grounding system throughout the project.
Connection to equipment grounding systems shall be made with suitable lugs at all grounding bushings specified, and at the ground lugs in lighting or traffic signal structure access holes or in a breakaway base. Make connections to ground rods as specified in the contract documents. Connections to neutral grounding systems shall be made with grounding lugs.

Measurement and Payment:

Ground Rods will be paid on a per each 10 ft. length. Price and payment includes furnishing, installing, labor, grounding lugs, welding, excavation, backfill, and connecting the ground rod as shown on the plans, standard details, or as directed by the Engineer.

2/29/12

746595 - ALUMINUM LIGHTING STANDARD, 40' POLE
746612 - ALUMINUM LIGHTING STANDARD, 20' POLE
746654 - ALUMINUM LIGHTING STANDARD, 45' POLE
746655 - ALUMINUM LIGHTING STANDARD, 30' POLE
746682 - ALUMINUM LIGHTING STANDARD, 35' POLE

Description:

This work consists of furnishing and installing lighting standards, and foundations, in accordance with these specifications and as detailed on the Plans. The foundation provided as part of this item shall be a Pole Base, Type 6 constructed in accordance with Section 746 and details on these Plans.

Materials:

Lighting standards shall meet or exceed the requirements of the latest edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals" based on 90 mph (145 kph) wind loads, luminaire weight of 70 lbs. (32 kg) and luminaire projected area of 3 square feet (0.3 square meters). Computations confirming conformance with AASHTO Specifications shall be submitted to the Delaware Department of Transportation.

The aluminum shaft, shall be spun from one piece of extruded tubing meeting the requirements of ASTM B 241, 6000 series alloy. The shaft shall be cold worked to form the specified taper. Aluminum castings shall conform to ASTM B 108, alloy 356-T6. All welding shall be of the metallic-arc-consumable-electrode-inert-gas-shielded-process. After welding, the entire assembly shall be precipitation heat treated to the T6 temper using an approved method and rotary sand finished. The shaft shall contain an internal vibration dampening device positioned approximately 2/3 the height of the pole. The pole shall be supplied with a standard 2" (50 mm) tenon or other hardware/fitting called for on the Plans or as required to mount the proposed luminaire.

Height of Pole Feet (Meters)	Outer Diameter Inches (Millimeters)	Wall Thickness Inches (Millimeters)
20 (6)	10 (250)	.156 (3.96)
30 (9)	10 (250)	.156 (3.96)
35 (10.5)	10 (250)	.156 (3.96)
40 (12)	10 (250)	.188 (4.78)
45 (13.5)	10 (250)	.188 (4.78)

Breakaway support systems (transformer bases), when required, shall be provided with each pole, and shall not be paid for separately, but will be considered incidental to this item. Transformer bases will meet the breakaway requirements of ASSHTO and FHWA.

A grounding lug shall be provided at each pole, integral with either the pole shaft or the transformer base. Included in the foundations will be ground rods which shall be copper clad steel 3/4" (19 mm) in diameter and 20' (6 meters) long.

Each lighting standard shall be provided with a permanent tag which shall be 2" by 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.

Method of Measurement:

The quantity of aluminum lighting standards will be measured as the actual number of poles complete in place and accepted.

Basis of Payment:

The quantity of aluminum lighting standards, will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for excavation, furnishing and placing/erecting all materials; and for all labor , equipment, tools and incidentals necessary to complete the item.

8/24/06

746596 - JUNCTION BOX ON STRUCTURE

Description:

The item shall consist of furnishing and installing Junction Box(es) as detailed on the Plans and specified herein.

Materials and Construction Methods:

Unless noted otherwise on the Plans, the junction box shall be 12" x 12" x 6", cast iron and hot-dipped galvanized. Units shall be surface-mounted to structure and held in place by four stainless steel drop-in anchors and bolts. A flat neoprene gasket shall be cemented to cover. The unit shall be U.L. listed and NEMA 4.

Method of Measurement:

The number of junction boxes to be measured under this item shall be the actual number of installed junction boxes in accordance with these specifications.

Basis of Payment:

The number of junction boxes, as determined above, shall be paid for at the contract unit price bid per Each for Item 746596, Junction Boxes on Structure, which price and payment shall constitute full compensation for furnishing and installing of the box, and other related hardware, for all labor, tools, equipment and necessary incidentals to complete the work.

746653 - ELECTRICAL TESTING

Description:

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

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

Construction Methods:

Ground Resistance Testing

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

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

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

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

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

System Testing

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

(1) Insulation from Ground. All underground circuits shall be tested for resistance to ground with a megger both before and after the conduit and wiring have been buried and all ground rods have been installed and connected. No circuit shall measure less than 10 megohms to ground. Circuits that fail will be inspected, repaired, and retested.

(2) Roadway Lighting Circuits. The Contractor shall connect field wiring to the load center terminals. The entire lighting system shall be energized for ten consecutive days for ten hours

each day at the time directed by the Engineer prior to initial acceptance. Failures occurring during this test period shall be corrected. The Contractor shall repair or replace any equipment, components, or system that fails during this test. A retest shall be performed on the repaired portion at the Engineer's direction.

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

Highway Lighting System Warranty:

The Contractor shall secure the manufacturer's warranties and/or guarantees on electrical and/or mechanical equipment. These warranties and/or guarantees shall be submitted to the Department upon final acceptance of the completed highway lighting system. In addition to the manufacturer's warranties and/or guarantees, the Contractor shall warrant to the Department the complete, installed highway lighting system to be free of defects, as hereafter defined, for one calendar year beginning at the initial acceptance of the highway lighting system by the Department. The initial acceptance of the highway lighting system will occur upon the satisfactory correction of all deficiencies noted in the lighting system during the final inspection of the project.

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

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

These conditions listed shall not be considered all inclusive.

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

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

The Department review team will be responsible for evaluating the highway lighting system within the project limits for both day and night acceptability considering all the possible defects listed above. If the

highway lighting system is considered defective because of abnormal operation or deterioration (as listed above), the Department will require repair or replacement of the defective portion at its sole option.

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

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

Method of Measurement:

The quantity of electrical testing will not be measured.

Basis of Payment:

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

5/24/02

746716 - ELECTRIC SERVICE ON PEDESTAL
746717 - ELECTRIC SERVICE ON PEDESTAL WITH SERVICE RISER

Description:

This work consists of the installation of an electrical service, aerial or underground, on a pedestal board or on a pedestal board with service riser.

Materials:

Meter pan (Supplied by Contractor - utility company approved)
3/4" (19 mm) "LB" condulet, Crouse-Hinds (C.H.) #LB-29, Killark #OLB-2, or approved equal
3/4" (19 mm) and 2" (50 mm) two hole pipe straps
3/4" (19 mm) weatherhead, C.H. #F75, Sepco # 401, or approved equal
2" (50 mm) galvanized conduit (5 feet (1.5 m) ±)
3/4" (19 mm) aluminum conduit (20 to 40 feet (6 to 12 m) ±)
2" (50 mm) "C" condulet, C.H. with cover and gasket, Killark #OC-6 or approved equal
2" (50 mm) to 3/4" (19 mm) reducer
2" (50 mm) conduit ground clamp
3/4" (19 mm) and 2" (50 mm) offset nipples, Steel City HO-222 and HO-226, Arlington #6A-3 and #6A-7, or approved equal
60 amp fuse disconnect, Elastanold #65U with 30 amp fuse #KTK, Ideal #65U or approved equal
#8TW or THWN stranded copper wire (50 to 100 feet (15 to 30 m) ±):
- black and/or red for power
- white for neutral
#4 split bolt connector, Burndy #KSU20, Ilsco #SK-4 or approved equal
#8/2 UF with ground
#8/3 UF with ground
#6 bare copper wire
3/4" (19 mm) Ground rod
3/4" (19 mm) Ground rod clamp
Copper covered staples
Service wedge clamp
Pressed steel channel clevis
Screw In Insulator
2" x 12" x 8' (50 mm x 300 mm x 2.4 m) pressure treated pine board
Anti-oxidant joint compound, Ideal #30-030 NOALOX, Ilsco #DE80Z or approved equal

All electrical materials 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 cuts for all electrical and related materials shall be submitted by the Contractor for approval.

Construction Methods:

Electric Service on Pedestal without Service Riser:

All work shall comply with NEC and NESC standards and comply with utility company minimum requirements.

All conduits and hardware connections shall be tightened with the appropriate wrenches or tools.

The meter pan shall be wired for 240 V single phase on the line side.

All service wires shall be #8 stranded copper.

All connections made within a meter pan shall include an anti-oxidant joint compound.

Install a 2" x 10" x 8' (50 mm x 250 mm x 2.4 m) pressure treated board with 3 feet (0.9 m) of the board placed in the ground at the service location as directed by the Engineer.

Install an appropriate length of 2" (50 mm) galvanized conduit (threaded and reamed on both ends) on the end of the 90-degree sweeps (installed by others or under other items in this contract) at the base of the pedestal board so that the condulet will be 3 feet (0.9 m) above the finished grade of the area.

Install the 2" (50 mm) "C" condulet on the top of the 2" (50 mm) galvanized conduit.

Place the meter pan 4 to 6 inches (100 to 150 mm) above the condulet and install a 2" (50 mm) chase or close nipple between them using approved methods. Place the meter pan on the pedestal to allow room for the line side conduit and connection (installed under other items in this contract) to be made.

Install #8/2 UF cable from the meter pan to the signal cabinet or the load location. The #8/2 UF cable and its installation shall be paid separately under other items in this contract.

The white wire shall be connected to the white wire of the #8/2 UF cable by the use of split bolt connector. The insulation should be removed from the ends of the wire to expose only 3/4" (19 mm) of stranded wire. The connection shall be completely taped. The bare copper wire from the #8/2 UF shall be attached to the "LB" condulet with a ground screw or clamp. The bare copper wire shall not enter the meter pan.

The black wire shall have a fused disconnect installed as per the manufacturer's installation instructions. Place all wires inside the condulet and install the cover(s) with gasket(s).

Install the ground rod under the condulet, driving rod within 6" (150 mm) of final grade. Using the appropriate ground rod clamps, attach enough #6 bare copper to reach and be connected to the 2" (50 mm) conduit ground clamp, to within 6" (150 mm) of the ground rod. Staple the #6 ground wire to the pedestal leaving enough slack to drive ground rod flush with final grade. Staples shall be placed every 6" (150 mm) and the #6 bare copper will be placed in a neat manner.

Electric Service on Pedestal with Service Riser:

Install the pedestal as described above. The pedestal will be installed within 10 feet (3 m) of the utility company's wood pole. If the distance from the pedestal to the utility company's wood pole exceeds 10 feet (3 m), the additional work and material will be covered under other items of this contract. Install a

length of 2" (50 mm) galvanized conduit under the meter pan, so that the conduit will have 2 feet (0.6 m) of cover after a 2" (50 mm) galvanized elbow is installed. Connect the required length of 2" (50 mm) conduit to the elbow and install a second 2" (50 mm) galvanized elbow so that it is in direct contact with the utility company's wood pole. Install a 2" x 3' (50 mm x 0.9 m) nipple to the elbow. Reduce the 2" (50 mm) conduit to 3/4" (19 mm) with an approved reducing bushing. Install 30 feet (9 m) of 3/4" (19 mm) aluminum conduit above the conduit reducer, securing it to the wood pole within 12" (300 mm) of the conduit reducer and then at intervals not exceeding 3 feet (0.9 m). On the top of the 3/4" (19 mm) aluminum conduit install a 3/4" (19 mm) weatherhead, and secure the conduit to the wood pole within 12" (300 mm) of the weatherhead.

Install 3 (three) # 8 THHN stranded conductors {1 red, 1 black and 1 white} from the line side of the meter pan to the weatherhead, leaving 5 feet (1.5 m) coiled and taped outside for connection by others. Connect the other end inside the meter pan using an anti-oxidation

Method of Measurement:

The quantity of electrical services will be measured as the number of services installed in accordance with these specifications, complete in place, and accepted.

Basis of Payment:

The quantity of electrical services will be paid for at the Contract unit price per each. Price and payment shall include full compensation for installing the service, all utility permits, all materials and for all labor, tools, equipment, and incidentals necessary to complete the item.

746787 - REMOVAL OF CABLE FROM CONDUIT OR STEEL POLE

Description:

This work consists of removing electrical wire and/or cable from existing conduits or steel poles. All electrical wire and/or cable may be removed, or one or more wires or cables may remain.

Construction Methods:

Hand pulling methods are required for conduit sizes of 1-1/2" (38 mm) or less and are preferred for all sizes.

Prior written approval by the engineer is required for the use of any power assisted method of pulling wire or cable from conduit. A short piece of material that will part if the strain exceeds the amount specified below shall be used between the pulling grip and the pulling medium, unless industry standards require less:

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

Any and all electrical wire or cable pulled from any conduit without the use of an acceptable pulling grip, kellems or equal, and without the use of a strain release element or by using methods which may have or did result in pulling forces in excess of those set forth herein or prescribed by industry standards are hereby declared damaged and shall be replaced by the contractor.

For removal from steel pole, only hand pulling methods are permitted. The weatherhead cover shall be removed first using proper tools. The wire or cable shall be removed by hand and the weatherhead cover replaced properly.

The electrical wire or the number of electrical or communications cable(s) to be pulled from each conduit or steel pole will be as shown on the plans or as directed by the Engineer.

The removal of wire or cables from existing conduit or steel pole shall be accomplished by pulling the wire or cables through the conduit or steel pole.

The number of electrical wires or cables pulled from a conduit may exceed one; the entire set to be pulled shall be considered one cable even if the wires or cables are pulled one at a time.

Method of Measurement:

The quantity of electrical wire or cable shall be measured as the number of linear feet (meters) of electrical wire or cable removed by pulling through a conduit or a steel pole in accordance with these specifications and returned to the Department at the Dover Sign Shop. If more than one wire is to be pulled, the entire set to be pulled shall be considered one cable, even if pulled one at a time. Old electrical wire or cable being used as a fish wire to pull in new wire or cable shall not be paid as removal of cable or wire from conduits or poles.

Basis of Payment:

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

01/15/03

746830 - REMOVAL OF CONCRETE POLE BASES AND CABINET FOUNDATIONS

Description:

This work consists of the removal of concrete pole bases and concrete cabinet foundations.

Materials:

Equipment as required to remove concrete pole bases and concrete cabinet foundations. Material as necessary to match the area surrounding the removed or graded masonry.

Construction Methods:

The masonry shall be removed to a depth of six inches below final grade or six inches below proposed pavement box in new pavement sections.

Backfill remaining hole with material that matches the surrounding area in accordance with the appropriate items.

Method of Measurement:

The quantity of concrete will be measured as the number of cubic yards (cubic meters) of concrete removed including anchor bolts, reinforcing bars, conduits and any other hardware within the concrete.

Concrete or other materials moved or removed which is not a part of the item being removed, shall not be measured for the purpose of payment under this item.

Basis of Payment:

The quantity of concrete will be paid for at the unit price per cubic yard (cubic meter). Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

9/16/10

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 1/2" 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 (2.5 m) of the ground rod must be driven into undisturbed soil.

If a utility or a right-of-way conflict is found when a Type 2 or Type 3 base is specified in the Plans, an alternate base of equivalent strength may be used as directed by the Engineer. A Type 2 base has two equivalents, namely Types 2A and 2B. A Type 3 base has two equivalents, namely Types 3A and 3B.

Though the contract calls for the use of a round pole base, the Contractor may use a square base at its discretion.

The end of the conduit sweeps in the ground shall be extended outside the concrete and any forms or sheeting by 12 inches (300 mm) and capped or connected to the existing conduit. If the conduit is to be capped underground for future use, it must be sealed with a galvanized threaded conduit plug. Tape is NOT an approved conduit plug. The location of the conduits shall be marked on the base with arrows drawn in the wet concrete within 6 inches (150 mm) of the outer edge.

Excavation for the pole bases may not exceed the dimension of the foundation by more than 12 inches (300 mm) in any one direction. If a form is used in the excavation more than 18 inches (450 mm) below the ground surface, it is necessary that the area between the form and excavation be filled with Borrow Type C and tamped on all sides in continuous, horizontal layers not to exceed 68 inches (200150 mm) in depth, loose measurement.

Where a pole base is to be placed in existing concrete pavement such as a sidewalk, the concrete shall be saw cut in a square pattern or removed to the nearest joint. In other pavement material, a round hole may be cut using an appropriate tool. Any damage to the existing pavement shall be repaired at the Contractor's expense and shall meet the approval of the Engineer. Any removal or replacement of any type of pavement under this item shall be an incidental cost to this item.

The bases shall be edged and have a broom finish.

Where water or highly unstable material is encountered during the excavation for the pole base, pole base sheeting may be required and the following steps shall apply:

1. The condition exists in the upper half of the excavation. Stop all work until the Bridge Design Section reviews the condition.

2. The condition exists below the upper half of the excavation:
   a. For a proposed Type 4A or 4B Base, increase the depth to 4 feet (1.2 m).
   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 (2.7 m), 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" (450 mm) outside of the neat line perimeter of the vertical face of the pole base foundation.

Any increase in the vertical dimension required herein shall be paid for separately under Item 746614, Pole Base Extension; another item of this contract.

The quantity of pole bases will be paid for at the Contract unit price for each pole base type. If an alternate pole base type is selected by the Engineer, payment will be the Contract unit price for the alternate selected. Price and payment will constitute full compensation for furnishing and placing all materials including concrete, ground rods, and a minimum of two conduit sweeps extending into the base; for excavating, backfilling and compacting around the base; for repairs to damaged existing pavement; for removal or replacement of pavement; and for all labor, equipment, tools, and incidentals required to complete the work.

746876 – UNDERPASS LIGHT FIXTURE

Description:

This work consists of furnishing and installing wall mounted luminaires with electrical circuitry for underpass lighting at locations shown on the plans. Work includes, but is not limited to, furnishing and installing underpass luminaire with lamp, ballast and mounting hardware.

Materials and Construction Methods:

Luminaires shall be listed as Suitable for Wet Locations according to UL Standard No. 1572 with sealed and filtered optical assemblies. Use high power factor ballasts that are completely pre-wired integral units for reliable starting and operating of high pressure sodium lamps at -40°F ambient temperature. Lamp sockets shall have a heavy-duty mogul base with split shell tempered brass lamp grips and a free-floating, spring-laded center contact. Use the luminaire type, wattage, voltage and IES illumination distribution pattern as shown on the plans.

Luminaire housing shall be cast aluminum, painted with premium quality gray or dark bronze paint. Use the same color luminaires throughout the project. Provide a prewired ballast and terminal board assembly and cast aluminum single-hinged door with glass refractor. Provide factory installed mounting holes in the back and conduit entrances in the sides and top. Provide a formed aluminum reflector and socket assembly with a chemically bonded lightweight non-breakable glass finish, which is removable with only a screwdriver.

Contractor shall mark the month and year the lamp is installed on the lamp base dating system with a sharp instrument.

The Contractor shall furnish and install identification decals on the luminaire housing that can be seen visually from the road. Lamp decals shall indicate the lamp wattage and type via standard identifying numbers and background color. For example, “20” on a yellow sticker indicates a 200 watt high pressure sodium lamp.

All underpass luminaires and lamps shall be furnished and installed as specified in the contract documents and in accordance with manufacturer’s recommendations. Clamps and attachment hardware shall be galvanized or stainless steel.

After installation has been completed and prior to performance test, refractors and reflectors shall be cleaned with a product approved for use by the manufacturer.

Standard Materials:

Luminaire 200W High Pressure Sodium with Photocell receptacle and field replaceable regulated multivoltage ballast as shown on the Plans.

Method of Measurement:

The quantity of underpass light fixtures will be measured as the actual number of underpass light fixtures (with lamps) furnished, installed, operational and accepted.

Basis of Payment:

The quantity of underpass light fixtures shall be paid at the Contract unit price per each light fixture furnished and installed. Price and payment will constitute full compensation for furnishing all materials, including mounting hardware and supply cables, and supply and installation of luminaires and lamps. The price will also include all labor, tools, equipment, testing and incidentals to complete the work.

9/21/11

747506 - CABINET BASE

Description:

This work consists of installing a Cabinet Base.

Materials:

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

Construction Methods:

The base shall conform to the dimensions as indicated in the cabinet base detail on the Standard Construction Details. Conduits entering the base must enter only in the designated area. A minimum distance of 1 inch shall be maintained between conduits and a minimum distance of 2 inches (50 mm) between conduits and the ground rods.

A minimum of 8 foot (2.5 m) of the ground rods must be driven into undisturbed soil through the 2 inch (50 mm) PVC sleeve. The PVC sleeve shall be driven into the ground so that the top of the sleeve will be flush with the concrete when the base is poured.

Method of Measurement:

The quantity of cabinet bases will be measured as the number of bases constructed in accordance with these specifications, complete in place, and accepted.

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

Basis of Payment:

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

12/21/2010

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

747509 - LIGHTING CONTROL CENTER - 200A

Description:

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

Materials:

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

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

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

Ground Rod shall be sectional, copper-clad ¾" diameter by 10 feet long.

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

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

Cabinet: Type 'R'

The service cabinets and doors shall have a minimum size of 44" wide by 77" tall by 25 1/2" deep.

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.

Main Disconnect

Provide a 200 AT/AF, 3 pole, molded-case circuit breaker. The circuit breaker shall be service entrance rated. It shall be rated for 277/480 volt three phase, four-wire operation. It shall have a minimum 22,000 RMS symmetrical ampere short circuit current rating. The circuit breaker shall be UL listed and comply with NEMA Standards and Federal Specification W-C-375B.

The main disconnect shall be separately enclosed external to the service cabinet. The main disconnect Enclosure shall be NEMA 3R rated.

Panelboard

Panelboards shall be rated for 277/480 volt, three phase, four-wire operation. The panel board shall be UL listed and have a minimum of 200 amp rated main busses and main lugs only. It shall have a minimum of 30 spaces for branch circuit breakers. It shall have a minimum 22,000 RMS symmetrical ampere short circuit current rating. It shall conform to Federal Specification W-P-115C, Type 1, Class 1.

A solidly bonded equipment ground bar and neutral bar shall be provided.

The panel board shall be mounted within its own enclosure. It shall be of dead front construction and be rated NEMA Type 1. Finish shall be gray baked enamel.

Branch Circuit Breakers

Provide circuit breakers of quantity 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

Lighting Contactor, Photocell and Override Control

Provide a central lighting contactor. Lighting contactor shall be two or three pole as required for the given service type. Contacts shall be rated for 200 amps at the given service voltage. Coil shall be rated for 277 volts.

Provide a remote photoelectric light control (photocell) mounted at the top of the closest light standard in the lighting system. Photocell shall be a cadmium-sulphide type with fail-safe in the “on” position. It shall be enclosed in a weatherproof housing, not susceptible to distortion, discoloration, cracking or crazing. It shall include pole mounting hardware and be a plug-in, locking type for mounting in a receptacle meeting UL Specification 773. It shall be rated of 1800 VA for ballast type loads and used to energize a contactor. It shall be designed to operate at 277 volts and at -20 degrees F ambient temperature. It shall have a turn-off time delay to prevent false turn-off due to lightning, stray lighting or flashing lights.

Provide 277 volt-rated DPST toggle switch for manual override of photocell control.

Construction Methods:

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

The concrete pad shall be a cast-in-place monolithic slab, with sides formed to a minimum 30" depth below the final ground surface. Concrete shall not be poured until the forming, position of conduits and grounding facilities are approved by the Engineer. Appropriate provisions shall be used to support conduit, grounding facilities and anchor bolts during concrete pouring and curing. All conduits shall be provided with temporary pipe caps during the placement of concrete. A minimum distance of 1" shall be maintained between conduits. Install 2" conduit to serve as a sleeve for the ground rod. The pad will include all conduits within the pad, grounding bushings on conduits coming out of top of pad, and anchor bolts as shown on the contract drawings, or as directed by the Engineer.

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

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

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

Electrical equipment shall be installed as indicated on the plans.

Method of Measurement:

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

Basis of Payment:

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

2/13/2012

747512 - LIGHTING SWITCH DISCONNECT PEDESTAL

Description:

This work consists of furnishing a lighting switch disconnect pedestal for roadway lighting.

Materials:

3/4 inch "LB" condulet, Crouse-Hinds (C.H.) #LB-29
3/4 inch and 2 inch two hole pipe straps
2-2 inch PVC Schedule 80 conduit (5 feet +/-)
2-2 inch galvanized conduit (5 feet +/-)
2-2 inch galvanized steel conduit elbow
2 or 3 inch "C" condulet, with cover and gasket or approved equal

Non-fusible Heavy Duty Safety Switch (see plans for voltage and current rating), with NEMA 3R enclosure

#4 split bolt connector, Burndy #KSU20 or approved equal
Pressed steel channel clevis, Blackburn #W62 or approved equal
Insulator, Joslyn #J-093 or approved equal
Galvanized Steel Pedestal Board
Galvanized Steel Conduit Adaptor
Concrete, Class B
Steel Posts, A570 Grade 50
Steel Tubing Anchor Base
Galvanizing A 653 Designation G-90
Spray Galvanizing Compound A780
4-Hex Bolts and Washers

Square Tubular Posts and Square Tubular Steel Anchor bases shall be formed from 12 gauge steel. All sides of the tubes shall have 7/16 inch die punched circular holes or perforated knock-outs, at one inch centers along their entire length.

The Tubular Steel Posts shall be two inch square tubes 12 feet long.

Square Tubular Steel Anchor Bases shall be comprised of two telescoping tubes. The first shall be 2-1/2 inch square, three feet long, formed from 12 gauge steel and shall snugly fit over the sign post. The second section shall be 3 inch square, 18 inch long, formed form 12 gauge steel, and shall snugly fit over the 2-1/2 inch section.

All electrical materials 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 cuts for all electrical and related materials shall be submitted by the Contractor for approval.

Construction Methods:

All work shall comply with NEC and NESC standards and comply with utility company minimum requirements.

All conduits and hardware connections shall be tightened with the appropriate wrenches or tools.

All service wires shall be as noted on the plans.

Install an appropriate length of 2 inch or 3 inch galvanized conduit (threaded and reamed on both ends) on the end of the 90-degree sweeps at the base of the pedestal board so that the condulet will be 3 feet above the finished grade of the area.

Install the 2 inch "C" condulet on the top of the 2 inch galvanized conduit.

The white wire shall be connected by placing the 18 inch base section over the 3 foot base section so that they are flush at the top and the holes are aligned. The entire unit shall be driven into the ground so that one or two rows of holes in the Square Perforated Tubular Steel Bays are exposed. The base shall be driven so that it remains plumb and to provide the final sign assembly with the correct orientation.

Finish length of the Tubular Steel Posts shall be determined by adding the total height of the safety switch to 5 feet. The sign post shall be cut to the correct length, and cold spray galvanizing shall be applied to the cut end. The safety switch shall be mounted to the pedestal board, which shall be bolted to the top of the post, using tamper proof bolts or drive rivets. The Square Tubular Steel Posts shall be lowered 8 inches into the base, and the post secured to the base using two corner bolts designed for this purpose.

Method of Measurement:

The quantity of lighting switch disconnect pedestal will be measured as the number of lighting switch disconnect pedestal installed in accordance with these specifications, complete in place, and accepted.

Basis of Payment:

The quantity of lighting switch disconnect pedestal will be paid for at the Contract unit price per each. Price and payment shall include full compensation for installing the service, all utility permits, all material including but not limited to safety switch, square tube steel posts, pedestal board, conduit, concrete, anchor bases, bolts, nuts, and adapters, and for all labor, tools, equipment, and incidentals necessary to complete the item.

6/10/15

747514 - CABINET BASE TYPE F
747515 - CABINET BASE TYPE M
747516 - CABINET BASE TYPE P
747517 - CABINET BASE TYPE R

Description:

This work consists of constructing cabinet base Type F, M, P and R in accordance with the Standard Construction Details or applicable Plan Details and at locations as directed by plans or the Engineer.

Materials:

Class B Concrete
3/4" x 10' sectional copperclad steel ground rods
5/8" Zinc plated or Stainless Steel Drop-in Anchors manufactured by Hilti Systems, Concrete Fastening Systems, or approved equal
5/8" x 1-1/2" galvanized hex bolts
3/4" acorn type ground clamps
PVC conduit sweeps

Construction Methods:

The base shall conform to the dimensions as indicated in the cabinet base detail on the Standard Construction Details or applicable Plan Sheets. A concrete collar is only required when installed in earth areas or as directed by the engineer. Conduits entering the base must enter only in the designated area. A minimum distance of 1 inch shall be maintained between conduits and a minimum distance of 2 inches between conduits and the ground rods.

A minimum of 8 foot of the ground rods must be driven into undisturbed soil through the 2 inch PVC sleeve. The PVC sleeve shall be driven into the ground so that the top of the sleeve will be flush with the concrete when the base is poured.

Method of Measurement:

The quantity of cabinet bases will be measured as the number of bases constructed in accordance with these specifications, complete in place, and accepted.

All conduit sweeps extending into the cabinet base as shown on the Plans or Standard Details as applicable shall be included in the price for each cabinet base..

Basis of Payment:

The quantity of cabinet bases will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all concrete, ground rods, labor, equipment, tools, conduit sweeps, and incidentals required to complete the work as shown on the standard details or applicable plan sheets.

10/9/2012

DRAFT
NOT FOR BIDDING
AUGUST 2015

748502 - RAISED/RECESSED PAVEMENT MARKER

Description:

This work consists of furnishing and installing raised/recessed pavement markers in accordance with the Plans and these specifications.

Materials:

The cast iron housing shall meet the requirements of ASTM A 536-84, Grade 72-45-84.

The reflectors shall meet the requirements of ASTM D 4383-03.

For installation on interstates, freeways, and principal arterials, the pavement marker shall have red reflectorized material on the back side (the side not facing the direction of traffic).

Epoxy shall meet the requirements of AASHTO M237, Type IV.

The followings models have been tested and approved by the Department and shall be used:

The followings models have been tested and approved by the Department and shall be used:

1. Ennis Paint - Stimsonite Model 101LPCR with Model C40 reflective pavement markers.
2. Ray-O-Lite Model 300 Snowplowable Marker with Model 2004 Reflector.
3. Or Approved Equal.

Construction Methods:

Pavement shall be saw cut to match the bottom contour of the marker housing using a saw and blade suitable for the pavement material being sawed. The depth of the cut slot must allow the housing to be set in epoxy, with leveling lugs resting on the pavement surface, so that the front edge of marker is at or below the surface of the pavement. Excessive saw cuts must be repaired to the satisfaction of the Engineer. When cutting is complete, the slot shall be cleaned as recommended by the manufacturer of the epoxy material. The epoxy and pavement marker will be installed in the prepared contour slot in the pavement per the manufacturer's recommendations.

Placement shall be in accordance with the DE MUTCD.

Method of Measurement:

The quantity of raised/recessed pavement markers will be measured as the actual number installed and accepted.

Basis of Payment:

The quantity of raised/recessed pavement markers will be paid for at the Contract unit price per each.

Price and payment will constitute full compensation for furnishing all materials, installation, saw-cutting, cleaning, disposal of discarded materials, for all labor, tools, equipment, all necessary incidentals associated with the item to complete the work.

07/26/2011

748506 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 4"
748507 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 6"
748508 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"
748509 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"
748510 - PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT
748535 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 4"
748536 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 6"
748537 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 8"
748538 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 10"
748539 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 12"
748540 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 16"
748548 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"
748549 -PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"
748557 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"
748559 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 5"
748568 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 9"
748569 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 14"

Description:

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

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

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

Materials Requirements:

A. White and Yellow Reflectorized Epoxy

1. Epoxy Composition Requirements:

The epoxy resin composition shall be specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures. The type and amounts of epoxy

resins and curing agents shall be at the option of the manufacturer, providing the other composition and physical requirements of this specification are met.

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

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

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

The entire pigment composition shall consist of either titanium dioxide and/or organic yellow pigment. No extender pigments are permitted. The white pigment upon analysis, shall contain a minimum of 16.5% TiO_2 (100% purity).

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

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

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

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

2. Physical Properties of Mixed Composition:

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

a. Color. The white epoxy composition when applied at a minimum wet film thickness of 20±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±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±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 - All edge lines on Portland cement concrete pavements shall have a base of black contrast markings which is 4 inches (100 mm) wider than the reflective white or yellow marking. The black contrast marking is to be applied first with a single drop of graded black aggregate. Once it has cured sufficiently so as not to track, the reflectorized white or yellow line is to be applied on top of it. The reflective line is to be centered along the black contrast line such that a minimum of 2 inches (50 mm) of black contrast marking is visible on either side of the reflective marking.

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

1. Insufficient film thickness [(less than 20±1 mils (500 µm) as applicable] and line widths; insufficient glass bead coverage or inadequate glass bead retention.

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

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

   Repair shall be made by re-striping over the cleaned surface, in accordance with the requirements of this specification and at a full 20±1 mils (500 µm) minimum line thickness as applicable.

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

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

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

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

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

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

3. Reflectivity for epoxy resin paint.

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

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

White 450
Yellow 325

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

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

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

Method of Measurement:

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

Basis of Payment:

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 3", 4", 5", 6", 8", 9", 10", 12", 14", 16" (75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 225 mm, 250 mm, 300 mm, 350 mm, or 400 mm) line and the Contract unit price per square foot (meter) of symbol. The quantity of permanent pavement marking (white, yellow, or black epoxy resin paint) will be paid for at the Contract unit price per linear foot (meter) of line and the Contract unit price per square foot (meter) of symbol. Price and payment shall include striping layout, cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

NOTE:

For information only:

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

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

2. IPS - Ennis Paint
   P.O. Box 13582
   Research Triangle Park, North Carolina 27709

Tel. 1-877-477-7623

3. Epoplex
   One Park Avenue
   Maple Shade, NJ 08052
   Tel. 1-800-822-6920

4. Or an approved equal.

2/14/12

748512 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 6"
748513 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 12"
748514 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 8"
748519 - RETROREFLECTIVE PREFORMED PATTERNED MARKING, 4"
748529 - RETROREFLECTIVE PREFORMED PATTERNED MARKING, SYMBOL/LEGEND
748547 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 9"
748556 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 16"
748564 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 5"
748565 - RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 10"
748566 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 8"
748567 - RETROREFLECTIVE PREFORMED PATTERNED CONTRAST MARKINGS, 13"

Description:

This work shall consist of furnishing and installing retroreflective preformed patterned pavement marking in accordance with this provision and in conformance to the existing pavement markings or as established by the Engineer. The Contractor is required to have all subcontractors involved in the placement of these markings attend the pre-placement meeting along with the tape manufacturer representative and Department representatives to coordinate this operation. The subcontractor for pavement markings shall be approved by the Department prior to the preconstruction meeting.

Materials:

General: The preformed patterned markings shall consist of white or yellow films with clear microcrystalline ceramic beads incorporated to provide immediate and continuing retroreflection. The markings shall be suitable for application on new or existing P.C. Concrete or bituminous pavements with a pre-coated pressure sensitive adhesive.

The preformed marking material must be used prior to one year from date of manufacture. When not placed by inlaid method a surface preparation adhesive shall be used. The markings shall be capable of providing retroreflection during both wet and dry conditions.

The markings shall be highly durable retroreflective pliant polymer materials designed for longitudinal and word/symbol markings subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations such as edge lines and lane lines. This film shall be manufactured without the use of lead chromate pigments or other similar, lead-containing chemicals.

Composition: The pavement marking shall consist of a mixture of high quality polymeric materials and pigments with glass beads distributed throughout the base cross-sectional area, with a reflective layer of microcrystalline ceramic beads bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 50% plus or minus 15% of the surface area raised and presenting a near vertical face, angled from 0 degrees to 60 degrees, to traffic from any direction. The channels between the raised areas shall be substantially free of exposed beads or particles. The marking shall have a precoated pressure sensitive adhesive. The edges of the markings shall be clean cut and true.

Retroreflectance: The white and yellow markings shall have the initial expected retroreflectance values as shown in Table 1 under dry, wet, and rainy conditions. The photometric quantity to be measured shall be coefficient of retroreflected luminance (R_L) and shall be expressed as millicandelas per square foot per foot-candle [(mcd ft^{-2}) fc^{-1}]. The metric equivalent shall be expressed as millicandelas per square meter per lux [(mcd m^{-2}) lx^{-1}].

Retroreflectance values shall be measured under dry conditions in accordance with the testing procedures of ASTM D4061. Retroreflectance values shall be measured under wet conditions in accordance with ASTM E2176 or ASTM E2177. Wet retroreflectance values measured under a "condition of continuous wetting" (simulated rain) shall be in accordance with ASTM E2176. Wet retroreflectance values measured under a "condition of wetness" shall be in accordance with ASTM E2177.

Table 1

Expected Initial R_L under dry, wet, and rainy conditions

White	Dry	Wet & Rainy
Entrance Angle	88.76	88.76
Observation Angle	1.05	1.05
Retroreflected Luminance	500	250
R_L [(mcd m^{-2}) lx^{-1}]		

Yellow	Dry	Wet & Rainy
Entrance Angle	88.76	88.76
Observation Angle	1.05	1.05
Retroreflected Luminance	300	250
R_L [(mcd m^{-2}) lx^{-1}]		

Beads, Index of Refraction: All "dry-performing" microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 1.70 when tested using the liquid oil immersion method. All "wet-performing" microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 2.30 when tested using the liquid oil immersion method. The glass beads mixed into the pliant polymer shall have a minimum index of refraction of 1.5 when tested by the liquid oil immersion method.

Beads, Acid Resistance: The beads shall show resistance to corrosion of their surface after exposure to a 1% solution (by weight) of sulfuric acid. The 1% acid solution shall be made by adding 5.7 cc of concentrated acid into 1000 cc of distilled water.

Color: The markings shall consist of white and/or yellow films with pigments selected and blended to conform to standard highway colors.

Skid Resistance: The patterned surface of the markings shall provide an initial average skid resistance value of 45 BPN when tested according to ASTM E 303.

Patchability: The pavement marking material shall be capable of use for patching worn areas of the same type in accordance with manufacturer's instructions.

Thickness: The patterned material without adhesive shall have a minimum caliper of 0.065 inches (1.651mm) at the thickest portion of the patterned cross section and a minimum caliper of 0.020 inches (.508mm) at the thinnest portion of the cross section.

Tolerance: The Contractor will be responsible for applying these markings in a straight manner not exceeding 1/2 (12 mm) per 40 (12 m). Any markings exceeding the 1/2 (12 mm) tolerance will require the Contractor to make corrective action approved by the Engineer and the tape manufacturer representative at no extra cost to the Department.

Construction Methods:

The Contractor shall be certified, by the manufacturer, in the installation of the pavement marking material prior to the start of the markings. The Contractor shall install the pavement marking material in accordance with the manufacturer's published recommendations.

The manufacturer shall provide technical assistance as required to ensure successful installation of the markings. This shall include a representative on site for the start of the markings, training, product information, problem solving, etc.

Installation of the pavement markings shall be performed in a neat and workmanlike manner. The Contractor shall premark the pavement to ensure correct location of markings and such layout work shall be incidental to the price bid for the pavement marking items. The method for premarking should be as recommended by the manufacturer. A thin layer of paint as a premarking is not recommended. Particular care shall be taken to ensure that the leading edges of the markings are secured to the pavement.

General application rules:

The Air and surface temperature shall be a minimum of 40 F.

The pavement must be clean and dry. 24 hours of dry weather where no rain is expected. When not placed by inlaid method a surface preparation adhesive shall be used.

Do not overlap tape - use butt splice.

Do not apply tape on longitudinal seams or joints or cracks.

Do not apply tape on deteriorating pavement surfaces.

Existing markings must be 80% removed.

After application, the markings shall be immediately ready for use by traffic.

Inlay into Fresh Bituminous Concrete:

When markings are specified in the contract for newly paved asphalt concrete surfaces, they shall be applied before public traffic is allowed on the freshly paved surface - the pavement markings shall be

inlaid in the fresh surface during final rolling of the mat, in accordance with the manufacturer's recommendations unless otherwise directed by Engineer.

The Contractor shall show how the pavement mats will be placed to avoid applying the tape on longitudinal seams or joints or cracks and maintain correct marking location.

The Contractor shall employ a sufficient number of workers to premark the pavement and install the markings such that all markings are inlaid into the hot pavement prior to the finish rolling. No paving shall be permitted unless the striping crew and materials are on the project site.

* General procedure for inlay application on fresh asphalt surfaces:

* Tape is applied after the compaction roller and before the finish roller using minimum water, slow speed and no vibration.

* Tape shall be applied using equipment recommended by manufacturer

* Tamping shall be done by the finish roller and in the same direction the tape was applied. A separate roller of a size approved by the tape manufacturer may be required to meet the manufacturer's requirements.

* Roller shall use minimum speed to prevent wrinkling the tape.

* Asphalt temperatures shall be between 180 F (66 C) and 120 F (49 C) when tape is applied.

NOTE: Even though the tape will stand these high temperatures the contractor is to use caution to assure the asphalt is firm enough to walk on above 140 F (60 C).

Placement on new P.C. Concrete Pavement:

When markings are specified in the contract for new P.C. concrete pavement surfaces they shall be applied after the concrete has adequately cured as determined by the Engineer and prior to opening to traffic.

1. When a membrane curing compound has been applied to the concrete surface, it shall be removed by sandblasting prior to applying the markings. Cost for such sandblasting shall be incidental to the price bid for the pavement marking item. The road shall be cleaned by sweeping and with high pressure air.

2. The manufacturer shall specify a primer/solvent for the pavement surface.

3. The tape shall be applied with an approved applicator.

4. The tape shall be tamped with a roller tamper cart with a minimum 200 lb (90 kg) load or by slowly (2-3 mph [3-5 km/hr]) driving over the tape with a vehicle tire. Do not twist or turn on the tape. A minimum of three passes back and forth over the tape will be required. All edges of the tape shall be thoroughly tamped.

Placement on Existing Pavement:

When markings are specified in the contract for existing pavement, the pavement surface shall be free of any existing markings.

1. The road shall be cleaned by sweeping and with high pressure air.

Steps 2 through 4 are the same as for new P.C. C. pavement.

Method of Measurement:

This work will be measured for payment by the number of linear feet (meters) of line or square foot (meter) of symbol/legend of Retroreflective Preformed Patterned Markings installed on the pavement and accepted in accordance with the plans.

Basis of Payment:

This work will be paid for at the contract unit price bid per linear foot (meter) of line or square meter of symbol/legend as measured for item "Retroreflective Preformed Patterned Markings" of the type specified. This price shall include cleaning and preparing the pavement surface, furnishing and placing all materials, for all labor, tools, equipment, maintenance bond and incidentals necessary to complete the work.

WARRANTY

The Contractor shall warrant to the Department that the installed retroreflective preformed patterned pavement markings are free of defects, as hereafter defined, for one calendar year beginning at the initial acceptance of the marking installation by the Department. The initial acceptance of the marking installation will occur upon the satisfactory correction of all deficiencies noted in the marking installation during the Final Inspection of the project. The markings shall show no fading, lifting, shrinking, tearing, rollback, distortion or chipping due to vehicular traffic or normal maintenance activities including snow plowing. Although some wear is expected, the markings shall remain intact and serviceable (as defined below) for no less than 95% of the total item quantities in the first year of installation.

The Contractor shall repair all defective areas identified by the Department after initial installation or during the Warranty Period. All repairs shall begin immediately following the notice to the Contractor unless weather limitations prevent the corrective work. Should the contractor not commence work within seventy-two hours, weather permitting, and pending severity, the Department reserves the right to remedy the condition and charge the contractor for the work. Any corrective work shall be as recommended by the manufacturer of the marking material and approved by the Department. The Department shall be given notification before the Contractor begins corrective work to allow for inspection of the operation. All costs associated with the repair work shall be the responsible of the contractor. These costs shall include, but are not limited to, removal, material, maintenance of traffic, etc.

Maintenance Bond:

Upon completion of the work, the Contractor shall submit to the Department a Maintenance Bond to insure the State of Delaware during the above Warranty periods. The Maintenance Bond shall meet the following requirements:

a) A sum equal to 100% of the value of all Retroreflective Preformed Patterned Markings Items paid to the Contractor;

b) All signatures are original signatures, in ink, and not mechanical reproductions or facsimiles of any kind;

c) The Contractor is the named principle;

d) The term of the bond is for one full year;

e) The term of the Maintenance Bond will be for a period of one year beyond completion of Retroreflective Preformed Patterned Markings; and

f) Written by a Surety or insurance company that is in good standing and currently licensed to write surety bonds in the State of Delaware by the Delaware Department of Insurance.

MANUFACTURER'S RESPONSIBILITY:

The following information is for use by DelDOT only. The Contractor will not be held responsible for the time frames listed in the chart below.

After satisfactory completion of the one-year warranty period, the contractor will be relieved of his responsibility and the Department shall work directly with the Manufacturer to guarantee the remainder of the warranty as specified below.

In addition, the pavement markings shall warrant the material to retain a minimum reflective value of 150 millicandelas per square foot (meter) per lux for the first year after initial acceptance.

1. All reflectance measurements shall be made on a clean, dry surface at a minimum temperature of 40 F (4 C).
2. All reflectance measurements shall be made using a "LTL 2000" retroreflectometer.
3. One year from initial installation acceptance all pavement marking material shall meet the minimum retained coefficient of dry retroreflection value of 125 millicandelas per foot squared per foot-candle (in accordance with ASTM E1710), and meet the minimum retained coefficient of wet retroreflection value of 75 millicandelas per foot squared per foot-candle (in accordance with ASTM E2177) for the following Warranty Periods.

Warranty Periods		
Application	Dry Retroreflectivity Warranty Period	Wet Retroreflectivity Warranty Period
Longitudinal Markings	4 years	2 years
Symbols and Legends	2 years	1 year

03/04/2011

748530 - REMOVAL OF PAVEMENT STRIPING

Description:

This work consists of removing pavement markings of all kinds including paint, tape, etc., in accordance with this special provision, notes on Plans and/or as directed by the Engineer. The Contractor shall coordinate with the Engineer for maintaining traffic during the operation, prior to starting the work.

Materials and Construction Methods:

Paint and Epoxy Resins:

Shot/abrasive grit blasting or water blasting equipment shall be used for removal of markings from pavement surfaces.

Alkyd Thermoplastic:

In addition to the removal techniques discussed for paint and epoxy, grinding (erasing machines) equipment may also be used for removal of markings from pavement surfaces.

The removal operation shall be performed in a manner that will not damage the pavement surface.

The Contractor shall collect and dispose of all shot/abrasive grit and pavement marking materials removed from the pavement surface. Washing or sweeping such material to the roadside will not be permitted.

After removal of striping on bituminous concrete asphalt sealer shall be used to cover any exposed aggregate or embedded paint at no additional cost.

Method of Measurement:

The quantity of pavement striping removal will be measured as the number of square feet (meters) of pavement striping removed and accepted. The area of lines will be calculated by multiplying the nominal width of line times the length and the area of symbols will be as specified in Subsection 748.10 of the Standard Specifications.

Basis of Payment:

The quantity of pavement striping removal will be paid for at the Contract unit price per square foot (meter) for "Removal of Pavement Striping". Price and payment shall be full compensation for furnishing all materials, removing the pavement markings, disposing of the removed marking material, covering up the exposed aggregate, and for all labor, equipment, tools and incidentals necessary to complete the work.

Note:

There will be no measurement and payment for removal of pavement markings placed incorrectly by the Contractor.

5/21/2013

749500 – SIGN PANEL
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

TABLE 3 Type IX Sheeting[A]							
Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue
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·lx^{-1}·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·lx^{-1}·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.

Signing requiring more than one sign panel conveying a singular message when mounted on a structure shall be positioned so that no vertical gap between panels is present in the final configuration. Costs for any required adjustments in this regard are incidental to Item 749500, Sign Panel.

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.

7/20/15

749552– INSTALLATION OF SIGN ON OVER HIGHWAY STRUCTURE
749553- REMOVAL OF SIGN ON OVER HIGHWAY STRUCTURE
795544– INSTALLATION OF SIGN ON SPAN WIRE OR MAST ARM
749555 - REMOVAL OF SIGN ON SPAN WIRE OR MAST ARM
749556 – INSTALLATION OF SIGN ON GROUND MOUNT POSTS
749557 - REMOVAL OF SIGN ON GROUND MOUNT POSTS

Description:

This item consists of installing or removing a sign on ground mount posts, an over highway structure, span wire, or mast arm. The sign may be mounted to existing supports or ones installed under this contract.

Materials:

All materials shall be either supplied by the Contractor or by the Department as indicated in the job order.

There are no materials required for the removal of overhead signs. All existing materials under this section will be returned to the Department.

Construction Methods:

Sign installation shall be performed as specified by the Engineer. Care shall be taken to prevent any damage to the sign panel, over highway structure, roadside I-beam and wood posts, span wire, mast arm, or any electrical cable attached to the above structures, or any lights attached to the sign panel.

Sign installation on over-highway structures or roadside I-beam and wood posts may require the sign to be assembled in panels. The sign may be made from several panels to make one complete sign. Signs on roadside I-beam and wood posts shall be installed at a height of 7 feet (2.1 m) from the bottom of the sign to the near edge of the pavement.

It is not anticipated that there will be any sign panels that 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 the approval of the Engineer and shall be included as part of this item and no separate payment will be made. The Engineer will indicate to the Contractor which signs, if any, must be covered, and when to remove the covers.

Sign Cover: Sign covers shall be 10 ounce cotton duck conforming to ASTM D-320, Army Duck, and dyed to a dark green approximating the green for sign backgrounds.

Sign removal shall be performed as specified by the Engineer. Care shall be taken to prevent any damage to the sign panel, over highway structure, roadside I-beam and wood posts, span wire, mast arm, any electrical wire attached to the above structures or any lights attached to the sign panel. If the panel has lights attached to the sign panel, the Contractor will be required to disconnect the wiring prior to removing the sign panel. Removal of the wiring that operates the lights will be at the direction of the Engineer and will be

included as part of this item and no separate payment will be made.

Installation and removal of supplemental sign panels and sign plaques, removal of wood posts, tubular and square steel posts, telspar, u-channel, and other small posts will be at the direction of the Engineer and will be included as part of this item and no separate payment will be made. All materials removed shall be returned to the Department at the Dover Sign Shop.

Method of Measurement:

The quantity of installation or removal of overhead and ground mount signs will be measured as the actual number of signs installed or removed for the type of posts or structure specified as per these specifications, complete, in place and accepted or removed and returned to the Department at the Dover Sign Shop.

Basis of Payment:

The quantity of installation or removal of overhead and ground mount signs will be paid for at the contract unit price per each sign per the type of structure or posts specified. The cost of furnishing, installing and removing sign covers, removal of wiring that operates the lights, installation and removal of supplemental sign panels and sign plaques, removal of wood posts, tubular and square steel posts, telspar, u-channel, and other small posts shall be considered incidental to the cost of installation or removal of signs. Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

749687 – INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON SINGLE SIGN POST

Description:

This work consists of installing or removing traffic sign(s) on a single post at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in boring holes constructed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than or equal to 48 inches shall be installed on multiple sign posts under Item 749690 – Installation or Removal of Traffic Sign on Multiple Sign Posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the DelDOT MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

Method of Measurement:

The number of single sign installations or removals will be measured as the actual number of sign posts installed or removed and accepted.

Basis of Payment:

The quantity of single sign post installations or removals will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed in accordance with the DelDOT MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

2/2/11

749690 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON MULTIPLE SIGN POSTS

Description:

This work consists of installing or removing traffic sign(s) on multiple sign posts at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in holes installed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than 48 inches shall be mounted on two (2) posts. Signs with a length greater than or equal to 78 inches shall be mounted on three (3) sign posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the DelDOT MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

Method of Measurement:

The number of sign installations or removals will be measured as the total square foot of the sign(s) installed or removed and accepted.

Basis of Payment:

The quantity of sign installations or removals will be paid for at the Contract unit price per square foot. Price and Payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed accordance with the DelDOT MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

2/2/11

DRAFT
NOT FOR BIDDING
AUGUST 2015

759508 - FIELD OFFICE, TYPE II.122 SPECIAL COMPLEX

Description:

This Field Office, Type II.122 Special Complex item provides a field office complex which consists of erecting, furnishing, equipping, maintaining, and removing one (1) single wide and two (2) double wide modular office units, their entrances, and their adjacent parking areas. Equivalent rented space may be substituted for the modular offices and their parking areas as approved by the Engineer. Rented space may be no more than one and a half miles from the project limits. The Contractor shall submit a specific location layout drawing and construction details for each office unit, its entrance, and its adjacent parking area for approval by the Engineer. Each office unit and its adjacent parking area shall be for the exclusive use of Department Officials, Engineers, Consultants, and Inspectors.

Each office unit shall be free of asbestos and/or other hazardous materials. Each office unit, its entrance, and its adjacent parking area shall be constructed and installed in accordance with all applicable city, county, state, and federal codes. The Contractor shall be responsible for obtaining all required licenses and permits for installation and placement of each office unit, its entrance, and its adjacent parking area. The costs of obtaining such licenses and permits are to be incidental to the "Field Office, Type II.122 Special Complex" Item. Each office unit shall be available for use by the Department continuously throughout the duration of the project.

Construction of and Equipment for the Office Units:

The single wide office unit 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 and each double wide office unit shall be new and have a minimum floor space of 1,200 square feet with minimum exterior dimensions of 50'-0" length by 24'-0" width. The floor to ceiling height of each office unit shall be nominal 8'-0". The exterior walls, ceiling, and floor of each office unit shall be insulated. Each office unit shall be of weather-proof construction, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, safely secured to its support if the support is an inground anchored foundation or otherwise by tie-downs to the ground, and fully skirted with rigid watertight covering overlapping the bottom of the exterior siding to the existing ground.

The Contractor shall provide entries to each office unit by constructing a stair and deck platform with canopy at each exterior door. Each entry shall have an exterior light. These entries shall be fabricated using treated dimension lumber, be constructed with hand and safety railing, be designed to last the life of the Contract, and conform to the requirements of the Architectural Accessibility Board and other federal, state and local boards, bodies and/or courts having jurisdiction in the Contract limits.

The Contractor shall construct and maintain an all-weather parking area adjacent to each office unit of at least 6000 square feet having a minimum of 16 functional parking spaces striped for full size cars. Lighting of the parking areas shall be provided. An entrance shall be constructed to each office unit from its point of access to its parking area as determined by its approved location layout drawing and construction details, the cost to be incidental to the "Field Office, Type II.122 Special Complex" Item. All weather pathways from the parking area to the entrances of each office unit shall also be constructed and maintained. This parking area and entrance pathways shall have a minimum of 2" type "C" hot mix on top of minimum 6" graded aggregate subbase. Snow and/or ice shall be removed from the entrance, the parking area, and the entrance pathways of

each office unit 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, Type II.122 Special Complex" Item.

The ground area 30'-0" from around the perimeter of each office unit shall be landscaped and maintained. If the earthen grounds do not have a stand of weed free grass, the surface of this area shall be loosened to a depth of 4" and a satisfactory seedbed shall be prepared free of debris and extraneous matter. The area shall be seeded to a healthy stand of grass or sodded, after which the area shall be watered, mowed, and trimmed a minimum of three times a month during the growing seasons. Cost for this landscaping and maintenance is incidental to the "Field Office, Type II.122 Special Complex" Item.

Each office unit shall have full carpeting, kitchenette facilities, interior paneling, lighting, and plumbing fixtures. Each office unit shall have a minimum of two (2) exterior doors, each door having a passage and a deadbolt lock. These door locks shall be keyed alike and at least 2 complete sets of keys shall be supplied to the Engineer's representatives. The exterior doors of each office unit shall be insulated or have storm doors. Each office unit shall have a minimum of six (6) windows, each window having a minimum glass area of 1,150 square inches and a horizontal mini-blind covering the full glass area. The windows of each office unit shall be insulated or have storm windows, shall be equipped with a locking device, and shall have screens installed and repaired when damaged.

At least two (2) outside water service connections shall be provided at each office unit. Each water connection shall have a 3/4" frost proof hose bib with vacuum breaker and shall include 100 linear feet of 5/8" minimum diameter reinforced, industrial or commercial grade, and soft rubber hose with spray nozzle per connection.

Each office unit shall be provided with sufficient natural and artificial light and shall be adequately heated and cooled to provide comfortable working conditions.

Each office unit 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 for each office unit shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

The Contractor shall furnish and maintain two fire extinguishers and provide one lighted "Exit" sign for each exterior passage door of the office units. Fire extinguisher(s) may be chemical or dry powder and shall be UL Classification 10-B:C(min.) and shall be suitable for Types A:B:C fires. A commercial or industrial type first aid and safety kit suitable for project conditions and hazards (including snakebite) shall be provided and maintained to full capacity on a monthly basis in each office unit.

The Contractor shall provide an alarm system in each office unit for security with electronic, direct connection to a security service provider. The security systems shall have interior motion, window, and entrance detectors and built in manual fire alarms. All windows of each office unit shall be covered with steel bar grids as a deterrent to forced entry. The Contractor shall provide validated monitoring and service contracts for the length of the Contract for each office unit. These contracts shall allow a Department authorized project person to deal directly with the security service provider to request service and/or repair.

The Contractor shall furnish and maintain in each office unit a hot and cold water dispenser with continuous adequate supply of 5-gallon bottled water, running potable water, a minimum 23 cubic foot new refrigerator, and a minimum 900-watt new microwave oven. Maintenance of the hot and cold water dispenser, running potable water supply, refrigerator, and microwave shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

Suitable indoor toilet facilities, conforming to the requirements of the State and Local Boards of Health or of other bodies or courts having jurisdiction in the area, shall be provided for each office unit.. Signs indicating the toilet facilities as being for Men, Women, or Unisex shall be placed on the doorway and an adequate positive locking system shall be provided on the inside of the doorway to insure privacy. The facility(s) shall be maintained by the Contractor to be clean and in good working condition and shall be stocked by the Contractor with adequate lavatory and sanitary supplies at all times during the period of the Contract.

For each office unit the Contractor shall be responsible for performing or for making arrangements for all necessary telephone connections and/or for their maintenance; for providing a new telephone equipment system, for payment of all connections and the new telephone system equipment and its installation; and for final disconnection of the telephones.

The telephone system for the field office complex shall have a total of 8 lines consisting of 7 direct single lines with call forward busy feature and 1 dedicated facsimile line and have 17 key sets consisting of 1 master key set having privacy feature, and 16 six-button key sets having privacy feature (1 set which may be for wall mounting) and 2 TLS or T1 circuit line for data transmission, all for the official and exclusive use of the Engineer and other representatives of the Department. Location of telephone lines and key sets shall be as directed by the Engineer. Arrangement shall be made to allow a Department authorized project person to deal directly with the telephone company to report outages and/or request repair. The Contractor shall arrange for the installation and initial setup of the specified telephone system including phone company provision of a termination point with smart-jack. Initial installation and setup costs shall be the responsibility of the Contractor as well. All subsequent monthly billings, after initial installation and setup, for the field office complex telephone system and the TLS or T1 circuit lines shall be received and paid by the Contractor. A copy of each of these subsequent bills shall be forwarded to the Project Resident for reimbursement on the contract pay estimate and the reimbursement will be for the amount of the bill only and shall not include any additional mark-up or profit. An intercom system shall be provided for use in and between office units; the intercom system may be integrated with the telephone system.

For all other utilities, the Contractor shall be responsible for performing or for making arrangements for all necessary utility connections and for their maintenance; for payment of all utility connections, installations, service fees and bills; and for final disconnection of utilities.

The Contractor shall provide new and maintain the following office furnishings, all which are to be approved by the Engineer prior to installation in the field office complex. Placement of these furnishings in the office units shall be as directed by the Engineer. These furnishings consist of 5 drafting tables with sufficient drawers for standard size plans, either attached to the tables or in cabinet form, each drafting table to have an ergonomic design spring back stool with five leg base having wheel casters, 15 full size office desks each with filing drawer and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 2 computer stations 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 16 people with surrounding chairs with armrests, 5 folding tables minimum 6'-0" by 3'-0" each with ergonomic design straight back chair with armrests, 3 work tables, 3 supply cabinets,

3 or more clothes closets of ample size to meet inspection manpower requirements, 5 rough plan racks, 5 legal size filing cabinets with 4 drawers, 3 legal size fire-resistant filing cabinets with lock and key with 4 drawers and meeting fire underwriters' approval for not less than one hour test, 2 stackable steel flat file cabinets for 43" by 32" size plan sheets each cabinet having 5 drawers with full suspension, rear hood, and hinged front depressor, 3 book shelves minimum 3'- 6" by 4'- 6" each, 5 vertical surface legal size three compartment pockets, 3 dry erase boards minimum 4' by 3' each with markers and erasers, and 3 cork bulletin boards minimum 3' by 2'. These office furnishings will remain the property of the Contractor at the conclusion of the project.

The Contractor shall also furnish new and maintain the following office equipment for the field office complex, all which are to be approved by the Engineer prior to installation. Location of the office equipment shall by as directed by the Engineer. The required equipment will enable the Department to synchronize project record keeping and office functions. The equipment shall be delivered in working and useable condition:

10 heavy-duty calculators having extra large 12-digit fluorescent display, full size keyboard with contoured keys, two-color ribbon printer, and AC powered;

1 Printer, multifunction having print, scan, copy, and e-media interface capability having print resolution up to 2400x1200 optimized dpi from 1200x1200 input dpi and optimization from photo paper selected, margins roll 0.2x0.2x0.2x0.2 in, ink cartridges cyan, gray, magenta, matte black, photo black and yellow, minimum line width 0.02 mm (GL/2 addressable and guaranteed line width 0.06 mm (ISO/IEC 13660:2001; Scan resolution up to 600 dpi, maximum scan size 36x93.6 in and maximum scan thickness 0.03 in; Copy reduction/enlargement 25 to 400%, copier setting – quality, color, roll, content type, original paper type, background removal, contrast and de-skew; Media handling - printer: sheet feed, 2 automatic roll feeds, automatic roll-switching and automatic cutter - scanner: straight-through scan paper path for sheet and cardboard originals, media types – printer bond and coated paper, technical paper, film, photographic paper, backlit and self adhesive – scanner: non-abrasive paper, vellum, translucent, Mylar, recycled, blueprints and cardboard; Memory, 32GB (virtual) and 160GB hard disk; and Connectivity – interfaces (standard): Gigabit Ethernet (1000Base-T), Hi-Speed USB 2.0 certified, EIO Jetdirect accessory slot – printing languages (standard) ... eMFP: TIFF, JPEG, HP-GL/2, HP-RTL, CALS G4 and HP PCL 3 GUI ... PostScript eMFP: Adobe PostScript 3, Adobe PDF 1.7, TIFF, JPEG, HP-GL/2 HP-RTL, CALS G4, and HP PCL 3 GUI, including drivers supporting the printing languages;

1 Konica Minolta bizhub C280 full color printer/copier/scanner/fax unit or approved equal all-in-one copier which includes scanner, printer, and fax unit. Unit to have high speed wireless and network capability. Unit shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on the field office complex local network. Unit to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity with automatic stapling capacity;

2 compact plain paper copying machine and cabinet with stationary platen, bypass feeding, and dual loading cassette system with cassettes for letter, legal, and ledger size paper. Copy machine to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity, and 20 bin collator with automatic stapling capacity;

1 micro cassette recorder, having fast playback, voice-activated system, three-digit tape counter, silent auto-stop and pause, two tape speeds, one-touch and follow-up, built-in condenser microphone, cue and review, and rechargeable with combination battery charger/AC adapter;

1 telephone answering machine having all-digital recording, 14 minute message capacity, selectable message time, voice prompt assistance, day/time stamp, call screening, two-digit LED message indicator, toll saver, power failure memory back-up, and message interrupt from any station;

8 compact digital cameras with 10 megapixels or greater, maximum dimensions of 3" x 5" x 3, built in flash, autofocus, video mode LCD for review of images, LCD viewfinder acceptable, removable memory compatible with compact flash, or secure digital (SD) or secure digital high capacity (SDHC), ISO compatible with 100, 200, 400 standard of quality of better, and memory cards supported by camera of 8 GB or better;

2 Canon Vixia HF M300, Panasonic HDC SD60, Samsung HMX-R10 or approved equal digital video camera, 1080p, CMOS optical sensor, digital format H.264, digital photo mode, camcorder sensor resolution 3.2 mega-pixels or greater, SD memory expansion card for still images, connection type, HDMI, USB, component video/audio output;

1 video projector, DLP projector, resolution of 1280x720 or greater, 16.7 million colors, contrast ratios of minimum 2000:1 or greater, video inputs to include SVGA, HDMI, S-Video and RGB, component, video modes minimum 720p or greater;

2 heavy duty 3-hole punch with minimum 40 sheet capacity;

3 extra heavy duty staplers with anti-jam feature having capacity up to 200 sheets; and

1 comb binding machine with manual punching capacity of 10 sheets having a minimum binding capacity of 150 sheets.

Consumables as required to manage the business of the project for the field office complex shall be provided for all office equipment for the length of the Contract. These consumables shall be furnished on request and shall include but not be limited to paper, tapes, ribbons, various size plastic combs, rolls, toner, cleaning kits, microcassette tapes and batteries, answering machine cassettes, camera batteries and memory cards/sticks, DVD and CD R/RW media, printer paper rolls for full and half size plans, ink cartridges, etc.

Maintenance of all office equipment in the field office complex shall be provided for by a validated service contract for the length of the Contract. This service contract shall allow a Department authorized project person to deal directly with the service organization to request repair.

Computer Requirements for the Field Office Complex:

The field office complex shall have fifteen (15) IBM compatible Microcomputer Systems to be furnished and maintained by the Contractor for use by the Engineer, the cost to be incidental to the "Field Office, Type II.122 Special Complex" Item. The specified computer systems will synchronize the construction management functions of the Department to monitor, report, and perform the accounting of the project work. The computer systems and all their related equipment specified below shall be furnished new and remain the property of the Contractor at the conclusion of the Contract. A detailed listing of the proposed computer systems and all their related equipment to be provided by the Contractor shall be submitted for approval by the Engineer prior to furnishing the Microcomputer Systems. The Microcomputer Systems shall be Laptop Computer Systems each with docking station, unless otherwise determined by the Engineer. Each of the fifteen (15) Microcomputer Systems shall consist of:

Central Processing Unit (CPU) – Lap Top

Intel Core i7 series processor and wireless networking capability included,

Minimum 6.0 GB RAM with expansion capability to at least 10.0 GB, and

Microsoft "Windows® 7 Professional with 64 bit support operating system with latest updates;

Memory (Storage)

DVD+RW or Blue Ray BD-RE (rewritable) drive with support for DVD RW support capability, and 120GB hard drive minimum, integrated Ethernet 10/100. Included software shall support system and data backups with the DVD/Blue Ray device using double/dual layer DVD discs;

Monitor (LCD)

Monitor for docking station and docking station. 21" minimum diagonal visual area flat panel capable of multiple frequency color graphics, 1440x900(wide) or 1280x1024 or better resolution, 16.7 million display colors, 5 ms response time, D-Sub and DVI video input ports;

Laptop - shall have 15.4” diagonal display minimum and anti-glare screen feature;

Color Graphics Card

PCIe video card or integrated video;

Keyboard

Keyboard shall be ergonomic, enhanced layout minimum with keyboard interface cable;

Software

The latest version programs for application management (operating system), word processing, spreadsheet, and anti-virus shall be provided with all user manuals. Upgrades, maintenance, and full technical support by the manufacturer shall be provided for the length of the Contract. The required software will enable the Department to synchronize accounting and record keeping functions between the project, District, and Department offices. A list of programs to be provided shall be submitted to the Engineer for approval. Software, other than for application management and anti-virus, is to be delivered unopened to the Department's administrative office. All software is to be compatible with and for use to run on "Windows® 7 Professional" or "Windows® XP Professional". The required applications software follows and is to be latest version unless noted:

collection - "Office 2010 Business Professional" with Word, Excel,
antivirus - "Norton™,
schedule - Primavera Project PlannerÒ version 3.1SP3 or latest,
replication - Adobe Acrobat X Suite Software w/Adobe Photoshop® CS5 suite, and
software - supporting creation of DVD +/- R/RW disks (supporting double layer media writing) and DVDR and DVDRW disks using DVDRW drive, for example: Ahead Nero, Roxio DVD/CD Creator, or some equivalent product. Note: software commonly included as part of the standard

CDRW upgrade/standalone package is acceptable if included with the unit,

An electrical outlet with dedicated circuit for the main computer unit,

A wireless optical mouse with proper driving software having complete Microsoft emulation,

Necessary cables for proper operation,

24 bit Sound Blaster compatible PCI soundcard with quality desktop speakers,

A combination surge, spike, and noise protection device with receptacles for all peripherals (may be in combination with the UPS power supply),

A wrist rest suitable for use with the furnished keyboard, and

All cards, hardware, and operating, anti-virus, and equipment software to be fully installed and operational;

Related Equipment for Field Office Complex

Wireless networking hub/router, 802.11g or better with all associated hardware (adapters, cables, etc) and software to enable wireless networking for resource/equipment sharing among all office computers and printers, the cost of wireless and network connections and service to be incidental to the "Field Office, Type II.122 Special Complex" Item,

3 laser printers, color, capable of printing 8-1/2"x11", 11"x17" and envelope, having wireless and hard line network connectivity, printers shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on a local network, and

2 uninterruptible power supply (UPS) units for protection from power loss or fluctuation, each with minimum of 6 outlets and adequate to provide a minimum of 30 minutes backup power for an orderly shutdown of the field office complex computer system with software and connections for automatic field office complex system shutdown;

Maintenance and Service

Maintenance of all specified equipment and components shall be provided for by a validated service agreement for the length of the Contract. Maintenance (upgrades, replacement, full technical support) for each software application shall be provided for by validated maintenance agreement for the length of the Contract. These agreements shall allow an authorized project person to deal directly with the service organization to request repair or the maintenance organization to request assistance; and

Supplies

Consumables as required to manage the business of the project shall be provided for the Microcomputer Systems in the field office complex for the length of the Contract. These consumables shall be furnished on request and include but not be limited to memory cards/sticks compatible with provided digital cameras having 8 GB or greater capacity and compatible with provided computers, DVDR and DVDRW media compatible supporting operational minimum to maximum speed of the

DVD/RW drive unit, cut sheet paper and labels compatible with the printers, hardware and screen cleaners, printer ink cartridges, and toner cartridges.

Maintenance Requirements for the Field Office Complex:

Maintenance of each office unit, its entrance, and 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 vermin and pest control by professional exterminator(s), providing satisfactory and sanitary janitorial and waste disposal services twice a week, providing cleanup of trash and debris on the parking area and landscaped area once a week, and shall be included in the monthly unit cost.

The Contractor shall provide a current copy of all validated office equipment and computer maintenance, service, assistance and/or monitoring agreements and/or contracts for the field office complex as mentioned hereinabove to the Department's administrative office on or before the first day each office unit is ready for use.

Method of Measurement:

This item will not be measured but will be paid for on a monthly basis. Partial months will be paid at the rate of 0.033 months per day.

Basis of Payment:

The field office complex will be paid for on a unit price bid per month, which price shall be full compensation for performing the work specified, obtaining all licenses and permits, and furnishing of all materials, labor, tools, equipment and incidentals necessary to construct and maintain each office unit, its entrance, and its adjacent parking area and restore each office unit area, its entrance, and its adjacent parking area to match their original site condition. No separate payment will be made for costs involved for removing hazardous material or underground tanks to install these office units, their entrances, and their parking areas. One (1) unit of payment will constitute erecting, furnishing, equipping, maintaining, and removing one (1) single wide and two (2) double wide modular office units, their entrances, and their adjacent parking areas.

Payment will be made only for the actual number of months that the field office complex is acceptably provided by the Contractor.

Per Standard Specification subsection 108.02, the Engineer shall issue a Notice to Proceed and stipulate the date on or before which the Contractor is expected to begin work. The office units, their entrances, and their adjacent parking areas and all materials and equipment shall be ready for use at least seven (7) calendar days prior to the date which the Contractor is expected to begin work as stipulated in the Notice to Proceed and before any construction operations begin. Contract time charges shall begin on the day work actually starts or on the date stipulated in the notice to proceed, whichever is earlier. There will be no delays in beginning the contract time charges due to delays in preparing the field office complex.

4/22/15

759509 - FIELD OFFICE, TYPE II.122.C SPECIAL COMPLEX

Description:

This Field Office, Type II.122.C Special Complex item provides a field office complex which consists of erecting, furnishing, equipping, maintaining, and removing one (1) single wide and two (2) double wide modular office units, their entrances, and their adjacent parking areas. Equivalent rented space may be substituted for the modular offices and their parking areas as approved by the Engineer. Rented space may be no more than one and a half miles from the project limits. The Contractor shall submit a specific location layout drawing and construction details for each office unit, its entrance, and its adjacent parking area for approval by the Engineer. Each office unit and its adjacent parking area shall be for the exclusive use of Department Officials, Engineers, Consultants, and Inspectors.

Each office unit shall be free of asbestos and/or other hazardous materials. Each office unit, its entrance, and its adjacent parking area shall be constructed and installed in accordance with all applicable city, county, state, and federal codes. The Contractor shall be responsible for obtaining all required licenses and permits for installation and placement of each office unit, its entrance, and its adjacent parking area. The costs of obtaining such licenses and permits are to be incidental to the "Field Office, Type II.122.C Special Complex" Item. Each office unit shall be available for use by the Department continuously throughout the duration of the project.

Construction of and Equipment for the Office Units:

The single wide office unit 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 and each double wide office unit shall be new and have a minimum floor space of 1,200 square feet with minimum exterior dimensions of 50'-0" length by 24'-0" width. The floor to ceiling height of each office unit shall be nominal 8'-0". The exterior walls, ceiling, and floor of each office unit shall be insulated. Each office unit shall be of weather-proof construction, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, safely secured to its support if the support is an inground anchored foundation or otherwise by tie-downs to the ground, and fully skirted with rigid watertight covering overlapping the bottom of the exterior siding to the existing ground.

The Contractor shall provide entries to each office unit by constructing a stair and deck platform with canopy at each exterior door. Each entry shall have an exterior light. These entries shall be fabricated using treated dimension lumber, be constructed with hand and safety railing, be designed to last the life of the Contract, and conform to the requirements of the Architectural Accessibility Board and other federal, state and local boards, bodies and/or courts having jurisdiction in the Contract limits.

The Contractor shall construct and maintain an all-weather parking area adjacent to each office unit of at least 6000 square feet having a minimum of 16 functional parking spaces striped for full size cars. Lighting of the parking areas shall be provided. An entrance shall be constructed to each office unit from its point of access to its parking area as determined by its approved location layout drawing and construction details, the cost to be incidental to the "Field Office, Type II.122.C Special Complex" Item. All weather pathways from the parking area to the entrances of each office unit shall also be constructed and maintained. This parking area and entrance pathways shall have a minimum of 2" type "C" hot mix on top of minimum 6" graded aggregate subbase. Snow and/or ice shall be removed from the entrance, the parking area, and the entrance pathways of

each office unit 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, Type II.122.C Special Complex" Item.

The ground area 30'-0" from around the perimeter of each office unit shall be landscaped and maintained. If the earthen grounds do not have a stand of weed free grass, the surface of this area shall be loosened to a depth of 4" and a satisfactory seedbed shall be prepared free of debris and extraneous matter. The area shall be seeded to a healthy stand of grass or sodded, after which the area shall be watered, mowed, and trimmed a minimum of three times a month during the growing seasons. Cost for this landscaping and maintenance is incidental to the "Field Office, Type II.122.C Special Complex" Item.

Each office unit shall have full carpeting, kitchenette facilities, interior paneling, lighting, and plumbing fixtures. Each office unit shall have a minimum of two (2) exterior doors, each door having a passage and a deadbolt lock. These door locks shall be keyed alike and at least 2 complete sets of keys shall be supplied to the Engineer's representatives. The exterior doors of each office unit shall be insulated or have storm doors. Each office unit shall have a minimum of six (6) windows, each window having a minimum glass area of 1,150 square inches and a horizontal mini-blind covering the full glass area. The windows of each office unit shall be insulated or have storm windows, shall be equipped with a locking device, and shall have screens installed and repaired when damaged.

At least two (2) outside water service connections shall be provided at each office unit. Each water connection shall have a 3/4" frost proof hose bib with vacuum breaker and shall include 100 linear feet of 5/8" minimum diameter reinforced, industrial or commercial grade, and soft rubber hose with spray nozzle per connection.

Each office unit shall be provided with sufficient natural and artificial light and shall be adequately heated and cooled to provide comfortable working conditions.

Each office unit 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 for each office unit shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

The Contractor shall furnish and maintain two fire extinguishers and provide one lighted "Exit" sign for each exterior passage door of the office units. Fire extinguisher(s) may be chemical or dry powder and shall be UL Classification 10-B:C(min.) and shall be suitable for Types A:B:C fires. A commercial or industrial type first aid and safety kit suitable for project conditions and hazards (including snakebite) shall be provided and maintained to full capacity on a monthly basis in each office unit.

The Contractor shall provide an alarm system in each office unit for security with electronic, direct connection to a security service provider. The security systems shall have interior motion, window, and entrance detectors and built in manual fire alarms. All windows of each office unit shall be covered with steel bar grids as a deterrent to forced entry. The Contractor shall provide validated monitoring and service contracts for the length of the Contract for each office unit. These contracts shall allow a Department authorized project person to deal directly with the security service provider to request service and/or repair.

The Contractor shall furnish and maintain in each office unit a hot and cold water dispenser with continuous adequate supply of 5-gallon bottled water, running potable water, a minimum 23 cubic foot new refrigerator, and a minimum 900-watt new microwave oven. Maintenance of the hot and cold water dispenser, running potable water supply, refrigerator, and microwave shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

Suitable indoor toilet facilities, conforming to the requirements of the State and Local Boards of Health or of other bodies or courts having jurisdiction in the area, shall be provided for each office unit.. Signs indicating the toilet facilities as being for Men, Women, or Unisex shall be placed on the doorway and an adequate positive locking system shall be provided on the inside of the doorway to insure privacy. The facility(s) shall be maintained by the Contractor to be clean and in good working condition and shall be stocked by the Contractor with adequate lavatory and sanitary supplies at all times during the period of the Contract.

For each office unit the Contractor shall be responsible for performing or for making arrangements for all necessary telephone connections and/or for their maintenance; for providing a new telephone equipment system, for payment of all connections and the new telephone system equipment and its installation; and for final disconnection of the telephones.

The telephone system for the field office complex shall have a total of 8 lines consisting of 7 direct single lines with call forward busy feature and 1 dedicated facsimile line and have 17 key sets consisting of 1 master key set having privacy feature, and 16 six-button key sets having privacy feature (1 set which may be for wall mounting) and 2 TLS or T1 circuit line for data transmission, all for the official and exclusive use of the Engineer and other representatives of the Department. Location of telephone lines and key sets shall be as directed by the Engineer. Arrangement shall be made to allow a Department authorized project person to deal directly with the telephone company to report outages and/or request repair. The Contractor shall arrange for the installation and initial setup of the specified telephone system including phone company provision of a termination point with smart-jack. Initial installation and setup costs shall be the responsibility of the Contractor as well. All subsequent monthly billings, after initial installation and setup, for the field office complex telephone system and the TLS or T1 circuit lines shall be received and paid by the Contractor. A copy of each of these subsequent bills shall be forwarded to the Project Resident for reimbursement on the contract pay estimate and the reimbursement will be for the amount of the bill only and shall not include any additional mark-up or profit. An intercom system shall be provided for use in and between office units; the intercom system may be integrated with the telephone system.

For all other utilities, the Contractor shall be responsible for performing or for making arrangements for all necessary utility connections and for their maintenance; for payment of all utility connections, installations, service fees and bills; and for final disconnection of utilities.

The Contractor shall provide new and maintain one (1) cargo box having minimum dimensions of 8'-0" x 8'-0" x 20'-0". The cargo box shall be a heavy duty manufactured steel container with a full-sized heavy duty double swing steel door on one end with heavy duty locking assembly and heavy gauge lock. The cargo box shall also have satisfactory lighting, an emergency air vent, a suitable portable electric heater, and a minimum of 6 grounded electrical receptacles connected to an operational power source. Electric current shall be furnished by the Contractor. The cargo box shall be positioned next to the field office complex at a location as approved by the Engineer. The cargo box will remain the property of the Contractor at the conclusion of the project.

The Contractor shall provide new and maintain the following office furnishings, all which are to be

approved by the Engineer prior to installation in the field office complex. Placement of these furnishings in the office units shall be as directed by the Engineer. These furnishings consist of 5 drafting tables with sufficient drawers for standard size plans, either attached to the tables or in cabinet form, each drafting table to have an ergonomic design spring back stool with five leg base having wheel casters, 15 full size office desks each with filing drawer and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 2 computer stations 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 16 people with surrounding chairs with armrests, 5 folding tables minimum 6'-0" by 3'-0" each with ergonomic design straight back chair with armrests, 3 work tables, 3 supply cabinets, 3 or more clothes closets of ample size to meet inspection manpower requirements, 5 rough plan racks, 5 legal size filing cabinets with 4 drawers, 3 legal size fire-resistant filing cabinets with lock and key with 4 drawers and meeting fire underwriters' approval for not less than one hour test, 2 stackable steel flat file cabinets for 43" by 32" size plan sheets each cabinet having 5 drawers with full suspension, rear hood, and hinged front depressor, 3 book shelves minimum 3'- 6" by 4'- 6" each, 5 vertical surface legal size three compartment pockets, 3 dry erase boards minimum 4' by 3' each with markers and erasers, and 3 cork bulletin boards minimum 3' by 2'. These office furnishings will remain the property of the Contractor at the conclusion of the project.

The Contractor shall also furnish new and maintain the following office equipment for the field office complex, all which are to be approved by the Engineer prior to installation. Location of the office equipment shall by as directed by the Engineer. The required equipment will enable the Department to synchronize project record keeping and office functions. The equipment shall be delivered in working and useable condition:

10 heavy-duty calculators having extra large 12-digit fluorescent display, full size keyboard with contoured keys, two-color ribbon printer, and AC powered;

1 Printer, multifunction having print, scan, copy, and e-media interface capability having print resolution up to 2400x1200 optimized dpi from 1200x1200 input dpi and optimization from photo paper selected, margins roll 0.2x0.2x0.2x0.2 in, ink cartridges cyan, gray, magenta, matte black, photo black and yellow, minimum line width 0.02 mm (GL/2 addressable and guaranteed line width 0.06 mm (ISO/IEC 13660:2001; Scan resolution up to 600 dpi, maximum scan size 36x93.6 in and maximum scan thickness 0.03 in; Copy reduction/enlargement 25 to 400%, copier setting – quality, color, roll, content type, original paper type, background removal, contrast and de-skew; Media handling - printer: sheet feed, 2 automatic roll feeds, automatic roll-switching and automatic cutter - scanner: straight-through scan paper path for sheet and cardboard originals, media types – printer bond and coated paper, technical paper, film, photographic paper, backlit and self adhesive – scanner: non-abrasive paper, vellum, translucent, Mylar, recycled, blueprints and cardboard; Memory, 32GB (virtual) and 160GB hard disk; and Connectivity – interfaces (standard): Gigabit Ethernet (1000Base-T), Hi-Speed USB 2.0 certified, EIO Jetdirect accessory slot – printing languages (standard) ... eMFP: TIFF, JPEG, HP-GL/2, HP-RTL, CALS G4 and HP PCL 3 GUI ... PostScript eMFP: Adobe PostScript 3, Adobe PDF 1.7, TIFF, JPEG, HP-GL/2 HP-RTL, CALS G4, and HP PCL 3 GUI, including drivers supporting the printing languages;

1 Konica Minolta bizhub C280 full color printer/copier/scanner/fax unit or approved equal all-in-one copier which includes scanner, printer, and fax unit. Unit to have high speed wireless and network capability. Unit shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on the field office complex local network. Unit to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity with automatic stapling capacity;

2 compact plain paper copying machine and cabinet with stationary platen, bypass feeding, and dual loading cassette system with cassettes for letter, legal, and ledger size paper. Copy machine to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity, and 20 bin collator with automatic stapling capacity;

1 micro cassette recorder, having fast playback, voice-activated system, three-digit tape counter, silent auto-stop and pause, two tape speeds, one-touch and follow-up, built-in condenser microphone, cue and review, and rechargeable with combination battery charger/AC adapter;

1 telephone answering machine having all-digital recording, 14 minute message capacity, selectable message time, voice prompt assistance, day/time stamp, call screening, two-digit LED message indicator, toll saver, power failure memory back-up, and message interrupt from any station;

8 compact digital cameras with 10 megapixels or greater, maximum dimensions of 3" x 5" x 3, built in flash, autofocus, video mode LCD for review of images, LCD viewfinder acceptable, removable memory compatible with compact flash, or secure digital (SD) or secure digital high capacity (SDHC), ISO compatible with 100, 200, 400 standard of quality of better, and memory cards supported by camera of 8 GB or better;

2 Canon Vixia HF M300, Panasonic HDC SD60, Samsung HMX-R10 or approved equal digital video camera, 1080p, CMOS optical sensor, digital format H.264, digital photo mode, camcorder sensor resolution 3.2 mega-pixels or greater, SD memory expansion card for still images, connection type, HDMI, USB, component video/audio output;

1 video projector, DLP projector, resolution of 1280x720 or greater, 16.7 million colors, contrast ratios of minimum 2000:1 or greater, video inputs to include SVGA, HDMI, S-Video and RGB, component, video modes minimum 720p or greater;

2 heavy duty 3-hole punch with minimum 40 sheet capacity;

3 extra heavy duty staplers with anti-jam feature having capacity up to 200 sheets; and

1 comb binding machine with manual punching capacity of 10 sheets having a minimum binding capacity of 150 sheets.

Consumables as required to manage the business of the project for the field office complex shall be provided for all office equipment for the length of the Contract. These consumables shall be furnished on request and shall include but not be limited to paper, tapes, ribbons, various size plastic combs, rolls, toner, cleaning kits, microcassette tapes and batteries, answering machine cassettes, camera batteries and memory cards/sticks, DVD and CD R/RW media, printer paper rolls for full and half size plans, ink cartridges, etc.

Maintenance of all office equipment in the field office complex shall be provided for by a validated service contract for the length of the Contract. This service contract shall allow a Department authorized project person to deal directly with the service organization to request repair.

Computer Requirements for the Field Office Complex:

The field office complex shall have fifteen (15) IBM compatible Microcomputer Systems to be furnished and maintained by the Contractor for use by the Engineer, the cost to be incidental to the "Field

Office, Type II.122.C Special Complex" Item. The specified computer systems will synchronize the construction management functions of the Department to monitor, report, and perform the accounting of the project work. The computer systems and all their related equipment specified below shall be furnished new and remain the property of the Contractor at the conclusion of the Contract. A detailed listing of the proposed computer systems and all their related equipment to be provided by the Contractor shall be submitted for approval by the Engineer prior to furnishing the Microcomputer Systems. The Microcomputer Systems shall be Laptop Computer Systems each with docking station, unless otherwise determined by the Engineer. Each of the fifteen (15) Microcomputer Systems shall consist of:

Central Processing Unit (CPU) – Lap Top

Intel Core i7 series processor and wireless networking capability included,

Minimum 6.0 GB RAM with expansion capability to at least 10.0 GB, and

Microsoft "Windows® 7 Professional with 64 bit support operating system with latest updates;

Memory (Storage)

DVD+RW or Blue Ray BD-RE (rewritable) drive with support for DVD RW support capability, and 120GB hard drive minimum, integrated Ethernet 10/100. Included software shall support system and data backups with the DVD/Blue Ray device using double/dual layer DVD discs;

Monitor (LCD)

Monitor for docking station and docking station. 21" minimum diagonal visual area flat panel capable of multiple frequency color graphics, 1440x900(wide) or 1280x1024 or better resolution, 16.7 million display colors, 5 ms response time, D-Sub and DVI video input ports;

Laptop - shall have 15.4" diagonal display minimum and anti-glare screen feature;

Color Graphics Card

PCIe video card or integrated video;

Keyboard

Keyboard shall be ergonomic, enhanced layout minimum with keyboard interface cable;

Software

The latest version programs for application management (operating system), word processing, spreadsheet, and anti-virus shall be provided with all user manuals. Upgrades, maintenance, and full technical support by the manufacturer shall be provided for the length of the Contract. The required software will enable the Department to synchronize accounting and record keeping functions between the project, District, and Department offices. A list of programs to be provided shall be submitted to the Engineer for approval. Software, other than for application management and anti-virus, is to be delivered unopened to the Department's administrative office. All software is to be compatible with and for use to run on "Windows® 7 Professional" or "Windows® XP Professional". The required

applications software follows and is to be latest version unless noted:

collection - "Office 2010 Business Professional" with Word, Excel,
antivirus - "Norton™,
schedule - Primavera Project PlannerÒ version 3.1SP3 or latest,
replication - Adobe Acrobat X Suite Software w/Adobe Photoshop® CS5 suite, and
software - supporting creation of DVD +/- R/RW disks (supporting double layer media writing) and DVDR and DVDRW disks using DVDRW drive, for example: Ahead Nero, Roxio DVD/CD Creator, or some equivalent product. Note: software commonly included as part of the standard CDRW upgrade/standalone package is acceptable if included with the unit,

An electrical outlet with dedicated circuit for the main computer unit,

A wireless optical mouse with proper driving software having complete Microsoft emulation,

Necessary cables for proper operation,

24 bit Sound Blaster compatible PCI soundcard with quality desktop speakers,

A combination surge, spike, and noise protection device with receptacles for all peripherals (may be in combination with the UPS power supply),

A wrist rest suitable for use with the furnished keyboard, and

All cards, hardware, and operating, anti-virus, and equipment software to be fully installed and operational;

Related Equipment for Field Office Complex

Wireless networking hub/router, 802.11g or better with all associated hardware (adapters, cables, etc) and software to enable wireless networking for resource/equipment sharing among all office computers and printers, the cost of wireless and network connections and service to be incidental to the "Field Office, Type II.122.C Special Complex" Item,

3 laser printers, color, capable of printing 8-1/2”x11”, 11”x17” and envelope, having wireless and hard line network connectivity, printers shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on a local network, and

2 uninterruptible power supply (UPS) units for protection from power loss or fluctuation, each with minimum of 6 outlets and adequate to provide a minimum of 30 minutes backup power for an orderly shutdown of the field office complex computer system with software and connections for automatic field office complex system shutdown;

Maintenance and Service

Maintenance of all specified equipment and components shall be provided for by a validated service agreement for the length of the Contract. Maintenance (upgrades, replacement, full technical support) for each software application shall be provided for by validated maintenance agreement for the length of the Contract. These agreements shall allow an authorized project person to deal directly with the

service organization to request repair or the maintenance organization to request assistance; and

Supplies

Consumables as required to manage the business of the project shall be provided for the Microcomputer Systems in the field office complex for the length of the Contract. These consumables shall be furnished on request and include but not be limited to memory cards/sticks compatible with provided digital cameras having 8 GB or greater capacity and compatible with provided computers, DVDR and DVDRW media compatible supporting operational minimum to maximum speed of the DVD/RW drive unit, cut sheet paper and labels compatible with the printers, hardware and screen cleaners, printer ink cartridges, and toner cartridges.

Maintenance Requirements for the Field Office Complex:

Maintenance of each office unit, its entrance, and 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 vermin and pest control by professional exterminator(s), providing satisfactory and sanitary janitorial and waste disposal services twice a week, providing cleanup of trash and debris on the parking area and landscaped area once a week, and shall be included in the monthly unit cost.

The Contractor shall provide a current copy of all validated office equipment and computer maintenance, service, assistance and/or monitoring agreements and/or contracts for the field office complex as mentioned hereinabove to the Department's administrative office on or before the first day each office unit is ready for use.

Method of Measurement:

This item will not be measured but will be paid for on a monthly basis. Partial months will be paid at the rate of 0.033 months per day.

Basis of Payment:

The field office complex will be paid for on a unit price bid per month, which price shall be full compensation for performing the work specified, obtaining all licenses and permits, and furnishing of all materials, labor, tools, equipment and incidentals necessary to construct and maintain each office unit, its entrance, and its adjacent parking area and restore each office unit area, its entrance, and its adjacent parking area to match their original site condition. No separate payment will be made for costs involved for removing hazardous material or underground tanks to install these office units, their entrances, and their parking areas. One (1) unit of payment will constitute erecting, furnishing, equipping, maintaining, and removing one (1) single wide and two (2) double wide modular office units, their entrances, and their adjacent parking areas.

Payment will be made only for the actual number of months that the field office complex is acceptably provided by the Contractor.

Per Standard Specification subsection 108.02, the Engineer shall issue a Notice to Proceed and stipulate the date on or before which the Contractor is expected to begin work. The office units, their entrances, and their adjacent parking areas and all materials and equipment shall be ready for use at least seven (7) calendar days

prior to the date which the Contractor is expected to begin work as stipulated in the Notice to Proceed and before any construction operations begin. Contract time charges shall begin on the day work actually starts or on the date stipulated in the notice to proceed, whichever is earlier. There will be no delays in beginning the contract time charges due to delays in preparing the field office complex.

4/22/15

760507 - PROFILE MILLING, HOT-MIX
760508 - PROFILE MILLING, CONCRETE

Description:

This work consists of furnishing a pavement-milling machine or cold planer and planing the existing bituminous concrete pavement or P.C.C. Pavement at the locations and to the nominal depths shown on the Plans and/or as directed by the Engineer to obtain a smooth profile on the existing roadway surface. Unless otherwise noted on the Plans or specifications the Contractor shall reuse, salvage and/or dispose of the milled material.

Equipment:

The milling equipment shall be a commercially designed and manufactured milling machine capable of performing the work in a manner satisfactory to the Engineer.
The machine shall be power-operated and self-propelled, shall have sufficient power, traction and stability to remove a thickness of material to a specified depth. In addition, the machine must accurately and automatically establish profile grades by referencing the existing pavement surface. This shall be accomplished by means of 1.) a ski of 30′ (9 m) minimum length with an accuracy of ±0.125″ in 30′ (3 mm in 9 m) or 2.) a minimum of three (3) ultra sonic, non-ground contacting sensors with an accuracy of ±0.100″ in 25′ (2.5 mm in 7.5 m). If noted on the Plans, a profile grade shall be established independent of the existing pavement surface. In such case the machine shall be capable of following the independent grade line (e.g. string line). The machine shall have an automatic system for controlling grade elevation and cross slope. The machine shall also be equipped with a means to effectively control dust generated by the cutting operation.

Construction Methods:

The surface resulting from the planing operation shall be in accordance with notes and details on the Plans and shall be characterized by uniform, discontinuous longitudinal striations and shall not be gouged or torn. Imperfections exceeding 5/16" (8 mm) at any point along the surface as a result of missing teeth or faulty operation shall be removed by approved methods.

Before opening the milled surface to traffic, all loose material shall be removed from the surface with a power vacuum sweeper.

Whenever the milling operation causes water to pond or lay within the wheelpaths of the roadway the Contractor shall alleviate this problem by cutting bleeders into the shoulder or median to provide positive drainage. Cost for such work will be incidental to this item.

If the road is to remain open to traffic, longitudinal vertical drop-offs in excess of 2" (50 mm) at lane lines or at the centerline shall not be left overnight.

Transverse faces at the beginning and end of the milling operation existing at the end of a work period shall be tapered 20:1 or flatter in a manner approved by the Engineer to avoid a hazard for traffic.

Surface material that cannot be removed by cold planing equipment because of physical or

geometrical restraints shall be removed by other methods acceptable to the Engineer.

If independent grade reference is required, it shall be designated in the Plans and/or Contract documents and elevations shall be provided by the Plans or at the direction of the Engineer.

If a severe bump exist in the pavement surface extra effort shall be taken at these locations to improve the profile. Manual changes to the cutter head may be needed at these locations to achieve this. It is the intent to remove bumps and irregularities in the pavement and produce a smooth milled surface for hot-mix resurfacing.

If the existing bituminous surface is over concrete the intent is to remove all of the existing bituminous material to the top of the concrete surface unless otherwise directed by the Plans or the Engineer.

If milling to remove open graded hot mix, the milling operation must remove all of the open graded hot mix from the roadway surface.

Method of Measurement:

The quantity of pavement milling will be measured as the number of square yards per inch (square meters per 25 mm) of depth as shown on the Plans or established by the Engineer. The nominal depth shown on the Plans and initially set on the milling machine, even though it will vary automatically during profiling, will be the depth measured and paid.

Basis of Payment:

The quantity of pavement milling will be paid for at the Contract unit price per square yard per inch (square meter per 25 mm) of depth. Price and payment will constitute full compensation for furnishing an accepted pavement-milling machine and operator, for removal and disposal of the milled material or delivery to a designated site, for transporting equipment, for all labor, tools equipment and incidentals necessary to complete the item.

5/02/02

763501 - CONSTRUCTION ENGINEERING

Description:

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

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

The Engineer will only establish the following:

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

Equipment:

The Contractor shall use adequate equipment/instruments in a good working order. He/she shall provide written certification that the equipment/instrument has been calibrated and is within manufacturer's tolerance. The certification shall be dated a maximum of 9 months before the start of construction. The Contractor shall renew the certification a minimum of every 9 months. The equipment/instrument shall have a minimum measuring accuracy of [3mm+ 2ppmxD] and an angle accuracy of up to 2.0 arc seconds or 0.6 milligons. If the Contractor chooses to use GPS technology in construction stakeout, the Contractor shall provide the Engineer with a GPS rover for the duration of the contract. The GPS rover shall be in good working condition and of similar make and model used by the Contractor. The Contractor shall provide up to 8 hours of formal training on the Contractor's GPS system to a maximum of four Engineer's appointees. At the end of the contract, the Engineer will return the GPS rover to the Contractor. If any of the equipment/instruments are found to be out of adjustment or inadequate to perform its function, such instrument or equipment shall be immediately replaced by the Contractor to the satisfaction of the Engineer. The Contractor may utilize GPS equipment to perform the excavation and embankment for the project as indicated on the plans. Use of this procedure and equipment is intended for grading the subgrade surface only; it is not intended for use in constructing final surface grades. GPS technology and machine control technology shall not be used in the construction of bridge or structures such as, but not limited to, curb, drainage inlets, manholes, junction boxes, pole bases and pipe inverts.

Engineering/Survey Staff:

The Contractor shall provide and have available for the project an adequate engineering staff that is competent and experienced to set lines and grades needed to construct the project. The engineering personnel required to perform the work outlined herein shall have experience and ability compatible with the magnitude and scope of the project. Additionally, the Contractor shall employ an engineer or surveyor licensed in the State of Delaware to be responsible for the quality and accuracy of the work done by the engineering staff. When individuals or firms other than the Contractor perform any professional services under this item, that work shall not be subject to the subcontracting requirements of Subsection 108.01 of the Standard

Specifications. The Contractor shall assume full responsibility for any errors and/or omissions in the work of the engineering staff described herein. If construction errors are caused due to erroneous work done under Construction Engineering the Contractor accepts full responsibility, no matter when the error is discovered. Consideration will not be given for any extension of contract time or additional compensation due to delays, corrective work, or additional work that may result from faulty and erroneous construction stakeout, surveying, and engineering required by this specification.

Construction Methods:

Performance Requirements:

(a) Construction Engineering shall include establishing the survey points and survey centerlines; finding, referencing, offsetting the project control points; running a horizontal and vertical circuit to check the accuracy of given control points. Establishing plan coordinates and elevations marks for culverts, slopes, subbase, subsurface drains, paving, subgrade, retaining walls, and any other stakes required for control lines and grades; and setting vertical control elevations, such as footings, caps, bridge seats and deck screed. The Contractor shall be responsible for the preservation of the Department's project control points and benchmarks. The Contractor shall establish and preserve any temporary control points (traverse points or benchmarks) needed for construction. Any project control points (traverse points) or benchmarks conflicting with construction of the project shall be relocated by the Contractor. The Contractor as directed by the Engineer must replace any or all stakes that are destroyed at any time during the life of the contract. The Contractor shall re-establish centerline points and stationing prior to final cross-sections by the Engineer. The Vertical Control error of closure shall not exceed 0.05 ft times [Square root of number of miles in the level run] (0.01 m times [square root of number of kilometers]). The Horizontal Control accuracy ratio shall not exceed an error of closure of 1 foot per 20,000 feet (1 meter per 20,000 meters or 1:20,000) of distance traversed prior to adjustment.

(b) The Contractor shall perform construction centerline layout of all roadways, ramps and connections, etc. from project control points set by the Engineer. The Contractor using the profiles and typical sections provided in the plans shall calculate proposed grades at the edge of pavement or verify information shown on Grades and Geometric sheets.

(c) The Contractor shall advise the Engineer of any horizontal or vertical alignment revisions needed to establish smooth transitions to existing facilities. The Contractor shall immediately bring to the attention of the Engineer any potential drainage problem within the project limits. The Engineer must approve any proposed variation in profile, width or cross slope.

(d) The Contractor shall establish the working points, centerlines of bearings on bridge abutments and on piers, mark the location of anchor bolts to be installed, check the elevation of bearing surfaces after they are ground and set anchor bolts at their exact elevation and alignment as per Contract Plans. Before completion of the fabrication of beams for bridge superstructures, the Contractor shall verify by accurate field measurements the locations both vertically and horizontally of all bearings and shall assume full responsibility for fabricated beams fitting and bearing as constructed. After beam erection and concurrently with the Department project surveyors, the Contractor shall survey top of beam elevations at a maximum of 10-ft (3.0-meter) stations and

compute screed grades. These shall be submitted to the Engineer for review and approval before the stay in place forms are set. Construction stakes and other reference control marks shall be set at sufficiently frequent intervals to assure that all components of the structure are constructed in accordance with the lines and grades shown on the plans. The Contractor will be responsible for all structure alignment control, grade control and all necessary calculations to establish and set these controls.

(e) The Contractor, using contract plans, shall investigate proposed construction for possible conflicts with existing and proposed utilities. The Contractor shall then report such conflicts to the Engineer for resolution. All stakes for advanced utility relocation, which will be performed by others, shall be paid for under item 763597 – Utility Construction Engineering.

(f) The Contractor shall be responsible for the staking of all sidewalk and curb ramp grades in accordance with the plans and the Departments Standard Construction Details. The Contractor shall review the stakeout with the Engineer prior to construction. The Engineer must approve any deviation from plans, Department Standard Construction Details and Specifications in writing. The Contractor shall be responsible for any corrective actions resulting from problems created by adjustments if they fail to obtain such approval.

(g) If wetland areas are involved and specifically defined on the Plans the following shall apply:

i. It is the intent of these provisions to alert the Contractor, that he/she shall not damage or destroy wetland areas, which exist beyond the construction limits. These provisions will be strictly enforced and the Contractor shall advise his/her personnel and those of any Subcontractor of the importance of these provisions.

ii. All clearing operations and delineation of wetlands areas shall be performed in accordance with these Special Provisions. Before any clearing operation commences the Contractor shall demarcate wetlands at the Limits of Construction throughout the entire project as shown on the Plans labeled as Limits of Construction or Wetland Delineation to the satisfaction of the Engineer.

iii. The material to be used for flagging the limits of construction shall be orange vinyl material with the wording "Wetland Boundary" printed thereon. In wooded areas, the flagging shall be tied on the trees, at approximate 20-foot (6.1 meter) intervals through wetland areas. In open field and yard areas that have been identified as wetlands, 3 foot (one meter) wooden grade stakes shall be driven into the ground at approximate 20 foot (6.1 meter) intervals and tied with the flagging.

iv. If the flagging has been destroyed and the Engineer determines that its use is still required, the Contractor shall reflag the area at no cost to the Department. If the Contractor, after notification by the Engineer that replacement flagging is needed, does not replace the destroyed flagging within 48 hours, the Engineer may proceed to have the area reflagged. The cost of the reflagging by the Engineer will be charged to the Contractor and deducted from any monies due under the Contract.

v. At the completion of construction, the Contractor shall remove all stakes and flagging.

vi. The Contractor shall be responsible for any damages to wetlands located beyond the construction limits, which occurs from his/her operations during the life of the Contract. The Contractor shall restore all temporarily disturbed wetland areas to their preconstruction conditions. This includes restoring bank elevations, streambed and wetland surface contours and wetlands vegetation disturbed or destroyed. The expense for this restoration shall be borne solely by the Contractor.

Submittals:

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

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

(a) Proposed method of recording information in field books to ensure clarity and adequacy.

(b) A printout of horizontal control verification, as well as coordinates, differences and error of closure for all reestablished or temporary Control Points.

(c) A printout of vertical control verification, with benchmark location elevation and differences from plan elevation.

(d) Sketch of location of newly referenced horizontal control, with text printout of coordinates, method of reference and field notes associated with referencing control.

(e) Description of newly established benchmarks with location, elevation and closed loop survey field notes.

(f) All updated electronic and manuscript survey records.

(g) Stakeout plan for each structure and culvert.

(h) Computations for buildups over beams, screed grades and overhang form elevations.

(i) A report showing differences between supplied baseline coordinates and field obtained coordinates, including a list of preliminary input data.

(j) Any proposed plan alteration to rectify a construction stakeout error, including design

calculations, narrative and sealed drawings.

(k) Baseline for each borrow pit location.

(l) Detailed sketch of proposed overhead ground mounted signs or signals showing obstructions that may interfere with their installation.

(m) Copies of cut sheets.

Method of Measurement:

The quantity of Construction Engineering will not be measured.

Basis of Payment:

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

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

6/11/2012

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

763518 - ELECTRICAL WORK, TOLL PLAZA

Description:

The Contractor shall furnish and install all materials and equipment necessary for and incidental to the complete installation and operation of all electrical items for the Toll Plaza and all electrical work on the site outside the boundaries of the building except highway lighting, in accordance with the Plans and the Technical Specifications referenced in Appendix A, or as directed by the Engineer.

Materials and Construction Methods:

Refer to Technical Specifications for detailed description of materials, construction methods and equipment.

Working drawings including materials shall be submitted to the Engineer for approval.

Method of Measurement:

Measurement of this item, "Electrical Work, Toll Plaza" will not be made. Payment for this item will be made on a lump sum basis.

Basis of Payment:

Payment will be made at the lump sum price bid for this item. The price bid shall include the cost for performing the work specified and furnishing all labor, materials, tools, equipment and incidentals necessary to provide a complete, working and usable facility acceptable to the Engineer.

NOTE:

The Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each item of work, the sum of which is to equal the lump sum price bid. The required breakdown of the Lump Sum price is shown on a breakout sheet attached to the proposal. The complete breakout sheet shall be attached to the submitted Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the Bid Proposal being declared non-responsive and rejected.

The Department reserves the right to delete from the Contract one or more items listed and the right to add or subtract from the quantity of each item. The total price to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation or increase in unit prices in the breakout sheet if such additions and/or deletions are made to the quantities.

3/20/15

763519 - MECHANICAL WORK, TOLL PLAZA

Description:

The Contractor shall furnish and install all materials and equipment necessary for and incidental to the complete installation and operation of all mechanical items for the Toll Plaza and building HVAC system, in accordance with the Plans and the Technical Specifications referenced in Appendix A, or as directed by the Engineer.

Materials and Construction Methods:

Refer to Technical Specifications for detailed description of materials, construction methods and equipment.

Working drawings including materials shall be submitted to the Engineer for approval.

Method of Measurement:

Measurement of this item, "Mechanical Work, Toll Plaza" will not be made. Payment for this item will be made on a lump sum basis.

Basis of Payment:

Payment will be made at the lump sum price bid for this item. The price bid shall include the cost for performing the work specified and furnishing all labor, materials, tools, equipment and incidentals necessary to provide a complete, working and usable facility acceptable to the Engineer.

NOTE:

The Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each item of work, the sum of which is to equal the lump sum price bid. The required breakdown of the Lump Sum price is shown on a breakout sheet attached to the proposal. The complete breakout sheet shall be attached to the submitted Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the Bid Proposal being declared non-responsive and rejected.

The Department reserves the right to delete from the Contract one or more items listed and the right to add or subtract from the quantity of each item. The total price to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation or increase in unit prices in the breakout sheet if such additions and/or deletions are made to the quantities.

3/20/15

763568 - EMERGENCY GENERATOR

Description:

The Contractor shall furnish and install all materials and equipment necessary for and incidental to the complete installation and operation of the emergency generator for the Toll Plaza, including all associated electrical connections in accordance with the Plans and the Technical Specifications referenced in Appendix A, or as directed by the Engineer.

Materials and Construction Methods:

Refer to Technical Specifications for detailed description of materials, construction methods and equipment.

Working drawings including materials shall be submitted to the Engineer for approval.

Method of Measurement:

Measurement of this item, "Emergency Generator" will not be made. Payment for this item will be made on a lump sum basis.

Basis of Payment:

Payment will be made at the lump sum price bid for this item. The price bid shall include the cost for performing the work specified and furnishing all labor, materials, tools, equipment and incidentals necessary to provide a complete, working and usable facility acceptable to the Engineer.

03/20/15

763626 - DIESEL FUEL COST PRICE ADJUSTMENT

I. Description: This section defines the criteria for payments to the Contractor to reflect increases or decreases in the cost of diesel fuel consumed in the performance of applicable construction work. To have the Diesel Fuel Cost Price Adjustment provisions apply to this project, a properly completed Diesel Fuel Cost Price Adjustment Option form must be submitted to the Department with the Bidder's bid proposal. If a properly completed Diesel Fuel Cost Price Adjustment Option form is not provided by the bidder, the Department will consider the option to apply the Diesel Fuel Cost Price Adjustment provisions for the project to be declined. No further opportunity to elect Diesel Fuel Cost Price Adjustment for the project will be made available.

a. General. These price adjustment provisions apply to contract items in the contract schedule of prices as grouped by category. Specific pay items to be adjusted are attached as an appendix to this Special Provision. General category descriptions and the fuel usage factors which are applicable to each are as follows:

1. Categories

1.a. Category A: Earthwork. The combined total of the applicable item plan quantities must exceed 5,000 CY.

1.b. Category B: Subbase and Aggregate Base Courses. The combined total of the applicable item plan quantities must exceed 500 tons.

1.c. Category C: Flexible Bases and Pavements. The combined total of the applicable item plan quantities must exceed 500 tons.

1.d. Category D: Rigid Bases and Pavements. The combined total of the applicable item plan quantities must exceed 5,000 CY.

1.e. Category E: Structures. Contract items will be based upon the total square foot price for each structure including any associated items of work, i.e. items not grouped under Categories A thru D.

2. Diesel Fuel Usage Factors – ENGLISH UNITS

Category	Factor	Units
A – Earthwork	0.34	Gallons per CY
B – Subbase and Aggregate Base Courses	0.62	Gallons per ton
C – Flexible Bases & Pavements	2.98	Gallons per ton
D – Rigid Bases & Pavements	0.98	Gallons per CY
E – Structures	8.00	Gallons per $1,000 of work performed

3. Quantity Conversion Factors – ENGLISH UNITS

Category	Conversion	Factor
B	SY to ton	90 lbs/Inch of depth/SY
C	SY to ton	112.5 lbs/Inch of depth/SY
D	SY to CY	Inches of depth/36

II. The posted index price will be the monthly price most recent data published by the U.S. Department of Energy, U.S. Energy Information Administration. The source information for the posted price for Central Atlantic (PADD 1B) No 2 Diesel Ultra Low Sulfur (0-15 ppm) Retail Prices (Dollars per Gallon) may be viewed at the following website:

http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n= PET&s= EMD_EPD2DXL0_PTE_R1Y_DPG&f= M

The release date for the U.S. Department of Energy, U.S. Energy Information Administration average price data occurs the first Monday of the following month, i.e. October prices are released the first Monday of November and used as the November Price Index.

The price index, FB, is the index price posted by the Department, determined as specified above, on the project advertisement date.

PRICE INDEX (FB) FOR DIESEL FUEL

PER GALLON (PER LITER) = $ ~CEMENT_PRICE_72~

The price index, FP, will be the index price posted by the Department, determined as specified above, for the month during which the Notice to Proceed (NTP) is issued, and every 90 calendar days thereafter.

III. Price Adjustment Criteria and Conditions. The following criteria and conditions will be considered in determining a price adjustment for diesel fuel cost fluctuations.

a. Price Adjustment Calculation. When the ratio FP/FB is calculated to be less than 0.95 or calculated to be greater than 1.05, the Department will adjust unit bid price prices in accordance with the following formula:

AUP = (FP-FB)(F)+ (UBP)
where:
AUP = Adjusted Unit Price
FP = Fuel Price Index for the month in which prices are adjusted for applicable construction work.
FB = Fuel Price Index in the Bid Proposal
F = Diesel Fuel Usage Factor
UBP = Unit Bid Price specified in the Contractor's Bid Proposal

b. Payment of Adjusted Unit Prices. The unit bid prices of work items affected by the fuel escalation will be adjusted by work order, either up or down, at Notice to Proceed and every 90 Calendar Days thereafter.

c. Expiration of Contract Time. If the Contractor exceeds the authorized allotted completion time, the adjusted item prices on the last authorized allotted work day shall be the prices used during the time liquidated damages are assessed. However, if the posted price for diesel fuel goes down, the item prices shall be adjusted downward accordingly

d. Final Quantities. Upon completion of the work and determination of final pay quantities, an adjusting work order will be prepared to reconcile any difference between estimated quantities previously paid and the final quantities. In this situation, the value for FP used in the price adjustment formula will be the average of all FP's previously used for computing price adjustments.

e. Inspection of Records. The Department reserves the right to inspect the records of the prime contractor and its subcontractors and material suppliers to ascertain actual pricing and cost information for the diesel fuel used in the performance of applicable items of work.

f. Extra Work. When applicable items of work, as specified herein, are added to the contract as Extra Work in accordance with the provisions of Section 110.03, no price adjustment will be made for fluctuations in the cost of diesel fuel consumed in the performance of the extra work, unless otherwise approved by the Engineer. The current price for diesel fuel is to be used when preparing required backup data for extra work to be performed at a negotiated price. For extra work performed on force account basis, reimbursement for material and equipment along with specified overhead and profit markups will be considered to include full compensation for the current cost of diesel fuel.

g. Subcontractors. Any Price Increases or Price Rebates that are calculated based on items of work performed by subcontractors will be added to or deducted from payments due to the Contractor in the appropriate pay period. The Contractor shall then accurately record on the appropriate CN-91 or CN-103 form the additions or deductions into adjusted contract value. The Contractor shall make payment to the subcontractor(s) who actually performed the work in accordance with DelCode Title 17, Chapter 8.

11/10/11

Contract No. T200911303.01

Diesel Fuel Cost Price Adjustment Option

The Bidder is required to submit this form with his/her Bid Proposal at the time of bid opening. When this form is not provided by the Bidder at the time of Bid, the Option-OUT will be automatically selected and no further option is available to the Contractor and no Diesel Fuel Cost Adjustments will be made.

OPTION-IN

☐ Checking here selects the option to participate in the 763626 - Diesel Fuel Cost Price Adjustment.

OPTION-OUT

☐ Checking here declines the option to participate in the 763626 - Diesel Fuel Cost Price Adjustment.

The undersigned hereby certifies that he/she is authorized to make this Option on behalf of the bidder in compliance with the special provision 763626 - Diesel Fuel Cost Price Adjustment.

Sealed and dated this _____ day of _____ in the year of our Lord two thousand and ___ _____ (20__).

_____
Name of Bidder (Organization)

Corporate Seal

By: _____
Authorized Signature

Attest _____

_____
Title

SWORN TO AND SUBSCRIBED BEFORE ME this ____ day of _____, 20___.

Notary Seal

_____
Notary

763641 - ARCHITECTURAL WORK, TOLL PLAZA

Description:

This work generally consists of furnishing materials and constructing at the Ramp Toll Facility sites, the Building (complete in its entirety, including all waterproofing and architectural work) in accordance with the Plans and the Technical Specifications referenced in Appendix A, or as directed by the Engineer.

Materials and Construction Methods:

Refer to Technical Specifications for detailed description of materials, construction methods and equipment.

Working drawings including materials shall be submitted to the Engineer for approval.

Method of Measurement:

Measurement of this item, "Architectural Work, Toll Plaza" will not be made. Payment for this item will be made on a lump sum basis.

Basis of Payment:

Payment will be made at the lump sum price bid for this item. The price bid shall include the cost for performing the work specified and furnishing all labor, materials, tools, equipment and incidentals necessary to provide a complete, working and usable facility acceptable to the Engineer.

03/20/15

763654 - BEAVER DAM BYPASS DEVICE

Description:

This work shall consist of furnishing all materials; construction and installation of beaver dam bypass devices, as specified here, at locations shown on the Plans and as directed by the Engineer.

Materials:

(a) General: Each of the beaver dam bypass devices shall consist of one inlet pipe assembly; a variable length run/quantity of ductile iron pipe, pipe bedding and seep collars; and one riser-pipe outlet assembly. The material specifications of each of these components are listed below. Other material specifications, sizes and quantities shall conform to the details shown on the Contract Plans, or as approved by the Engineer.

(b) Inlet pipe assembly:

Schedule 80 PVC pipe, ASTM D1785
Schedule 80 PVC 150 lb socket flange fittings with bolt holes meeting ANSI B 16.5, reamed to fit over PVC pipe
Schedule 80 PVC end cap
PVC Solvent cement welding per manufacturer's standards
Stainless steel clamp pipe, AISI Type 304/316
Reducer, ductile iron pipe, CL 350, ANSI A21.53/AWWA C155
Elastomer sleeve couplings, ASTM C 564, with Series 300 stainless steel hose clamps and shear rings
Stainless steel wire cloth, 14 gauge, 1" mesh, AISI Type 316
Stainless steel wire ties, 14 gauge, AISI Type 316
Stainless steel saddle, AISI Type 304
Stainless steel threaded rod, with stainless steel hex nuts, AISI Type 316
Concrete pedestal supports with bar reinforcement, per DelDOT Section 603, Class B concrete

(c) Ductile iron pipe run:

Ductile iron pipe, CL 50 with push-on joints, ANSI A 21.51/AWWA C 151
Concrete seep collars with bar reinforcement, Class B concrete.

(d) Riser-pipe Outlet assembly:

Ductile iron tee, CL 350, ANSI A21.53/AWWA C 153
Megalug MJ restraint fittings, ASTM A536
MJ plug with threaded IPS tap ANSI B 16.4 and A 21.53
Malleable iron threaded plug, ASTM A 197
Concrete pedestal supports with bar reinforcement, per DelDOT Section 603, Class B concrete

Stainless steel anchor/U-bolts and threaded coupling, ANSI Type 304/316
Ductile iron pipe, CL50, ANSI A 21.51/AWWA C 151
Stainless steel saddle, AISI Type 304
Elastomer sleeve coupling ASTM C 564, with Series 300 stainless steel clamps and shear rings
HDPE pipe, SDR 17, ASTM D 3350, cut to length to match riser pipe elevation

Construction Methods:

All structure elevations and pipe slopes shall conform to details shown on the Contract Plans, as shown on alternate approved drawings or as directed by the Project Engineer.

The construction and installation of the beaver dam bypass devices shall be coordinated with the borrow excavation activities to ensure the inlet ponds and outlet basins are excavated prior to the installation of the devices. Dewatering activities shall not cease until the devices have been installed, the devices have been inspected, as-built structure elevations have been approved and the Engineer has accepted the devices.

The trench in which the pipe is laid shall be excavated in accordance with Section 208 to the required depth. The bottom of the trench shall be shaped to provide the required class of bedding, and shall be backfilled with approved materials and thoroughly tamped.

Backfill material shall conform to the requirements of Subsection 209.04, Borrow type C. If the existing material meets these requirements, it shall be used for pipe backfill. Placement of backfill shall conform to Section 208.

Prior to assmbling pipe joints, the bells, spigots and rubber gaskets shall be thoroughly washed with soapy water. If necessary, the bells and spigots shall be cleaned first with a wire brush. A cast iron gland shall be slipped over the spigot, followed by rubber gasket, thoroughly soaped, with its tapered side facing the bell. The spigot shall then be inserted fully into the bell. The rubber gasket for pipe bells shall be forced into position with fingers until it is flush with the face of the bell. The gland shall be slid against the face of the rubber gasket, and the bolts inserted and made finger tight. Nuts shall be tightened with a torque wrench at 90-foot pounds or with a ratchet wrench if approved by the Engineer. Bolts shall be drawn up evenly on alternate sides, beginning at the top, keeping the gland parallel to the face of the bell at all times. In the event the use of ratchet wrenches is permitted, extreme care shall be taken to tighten the nuts to the specific tension without over-tightening.

Concrete pedestal supports and seep collars shall be constructed with Class B concrete in accordance with the plans and the requirements in Section 602.

Method of Measurement:

The quantity of materials and labor to construct and install these devices will not be measured, but will be paid at the contract lump sum price bid for “Beaver Dam Bypass Device.”

Basis of Payment:

The item Beaver Dam Bypass Device will be paid for at the Contract lump sum price. Price and

payment shall constitute full compensation for all materials, labor, equipment, tools and incidentals necessary to complete the work. Included in this lump sum are the excavation of the pipe trenches, concrete pedestal support pits, material cost and installation of bedding, required backfill materials and backfilling labor.

Labor, materials and construction associated with the Beaver Dam Bypass Device but not paid for under this lump sum shall include:

- Excavation of the two inlet ponds, and the outlet basins for the beaver dam bypass devices.
- The material and labor cost for the placement of soil retention blanket mulch, geotextile and riprap stone at the beaver dam bypass device outlets.

6/4/15

763688 - PLUMBING SYSTEM

Description:

The Contractor shall furnish and install all materials and equipment necessary for and incidental to the complete installation and operation of the Clean Agent Fire Suppression System items in the building and on the site outside the boundaries of the building, in accordance with the Plans and the Technical Specifications referenced in Appendix A, or as directed by the Engineer.

Materials and Construction Methods:

Refer to Technical Specifications for detailed description of materials, construction methods and equipment.

Working drawings including materials shall be submitted to the Engineer for approval.

Method of Measurement:

Measurement of this item, "Plumbing System" will not be made. Payment for this item will be made on a lump sum basis.

Basis of Payment:

Payment will be made at the sum price bid for this item. The price bid shall include the cost for performing the work specified and furnishing all labor, materials, tools, equipment and incidentals necessary to provide a complete, working and usable facility acceptable to the Engineer.

03/20/15

763689 - STRUCTURAL WORK, GANTRY

Description:

The Contractor shall furnish and install all materials necessary for and incidental to the complete construction of gantries in accordance with the Plans and the Technical Specifications referenced in Appendix A, or as directed by the Engineer.

Materials and Construction Methods:

Refer to Technical Specifications for detailed description of materials, construction methods and equipment. Working drawings including materials shall be submitted to the Engineer for approval.

Method of Measurement:

Measurement of this item, "Structural Work, Gantry" will not be made.

Basis of Payment:

Payment will be made at the lump sum price bid for this item. The price bid shall include the cost for performing the work specified and furnishing all labor, materials, tools, equipment and incidentals necessary to provide a complete, working and usable facility acceptable to the Engineer.

NOTE:

The Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each item of work, the sum of which is to equal the lump sum price bid. The required breakdown of the Lump Sum price is shown on a breakout sheet attached to the proposal.

The Department reserves the right to delete from the Contract one or more items listed and the right to add or subtract from the quantity of each item. The total price to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation or increase in unit prices in the breakout sheet if such additions and/or deletions are made to the quantities.

3/20/15

900500 - ENVIRONMENTAL PERFORMANCE INCENTIVE (DISINCENTIVE)

Description:

This work consists of maintaining the project's erosion and sediment control items and provides an incentive payment for that Work.

Materials:

There are no materials included in this specification.

Construction Methods:

Continuously maintain all erosion and sediment control items per the approved plan throughout the duration of the Project. Repair, replace, and/or maintain any erosion and sediment control measures as noted on the ES2M Inspection Rating Reports

http://www.deldot.gov/information/business/drc/pd_files/plan_development/es2m_inspection_rating_form.pdf?050415

and as directed by the Engineer. Maintain access to all sediment control devices until construction phasing and stabilization allow the removal of those controls that are no longer required.

The incentive payment is based on performance. Performance is determined by the score obtained only on the weekly ES2M Inspection Rating Reports.

Compliance procedures for failure to perform will be implemented per Section 901.06.

Method of Measurement:

There is no method of measurement in this specification.

Basis of Payment:

The total incentive awarded for this Contract will not exceed ***$ 604,000.00.*** This amount applies to all erosion and sediment control work shown on the Plans or required by the Engineer to complete the Work and any erosion and sediment control work that is required to perform work that is added to the Contract.

Divide the total incentive by the number of Calendar Days originally assigned to the Contract to obtain the daily incentive amount. At the end of each estimate period, the Engineer will multiply the number of Calendar Days consumed during the estimate period times the daily incentive amount times the incentive factor taken from the table below. This amount will be paid on the next estimate

Payments will be made per each Calendar Day charged until either (1) Substantial Completion or (2) the total incentive amount reaches **$604,000.00** or (3) the expiration of Contract time (including approved time extensions), whichever occurs first.

Environmental Performance Incentive Schedule	
Average ES2M Inspection Rating Report Score (Sum of the scores of the reports received during the estimate period divided by the number of reports)	Incentive Factor
100 – 90	1.00
89.9 – 80	0.75
79.9 – 70	0.50
69.9 – 0	0.00

6/24/15

900501 - BORROW AREA EROSION AND SEDIMENT CONTROL AND DEWATERING

Description:

Prepare and implement plans for erosion and sediment controls (ESC), including dewatering operations, for each proposed phase of construction in compliance with Subsections 107.01 and 107.02.

Furnish and maintain all ESC measures until the final stabilization is accepted by the Engineer.

Design:

Submittal and Review:

Submit to the Engineer and Stormwater Engineer prior to implementation the proposed erosion and sediment control plans, including dewatering operations for each phase of construction proposed by the contractor. At a minimum, include these phases of construction:

1. Initial clearing, grubbing and removal of topsoil.
2. Operations from original ground to final grade.
3. Final grades until stabilization is achieved and the site is accepted by the Engineer.

The Plans will be used by the Department for informational purposes, not approval.

Design Specifications:

In accordance with Section 901. All dewatering operations in accordance with Section 902.

General Requirements:

Provide erosion and sediment control measures such that in the receiving stream at a point directly downstream of any borrow site discharge point(s) the Nephelometric Turbidity Units (NTU) do not increase by more than 10% at any time as compared to a point directly upstream of the furthest upstream borrow site discharge point.

Maintain and protect all discharge outfalls until a point where a clean, stabilized outfall location is established. For any discharge points not draining directly to a stream, the turbidity at the discharge can not exceed 300 NTU.

Maintain dust control during all phases of construction as required in Section 202.09. Failure to maintain adequate dust control measures during borrow pit earth moving operations will result in stoppage of Work until the dust control has been acceptably addressed. All costs associated with dust control are incidental to Item No. 202000.

Testing:

Turbidity testing will be performed by DelDOT during DelDOT's normal working hours and at locations determined by the Stormwater Engineer

Compliance:

Submit a plan of action to the Stormwater and Construction Engineers to reduce the turbidity of the discharge to acceptable levels within 24 hours of receiving the test results if the turbidity testing exceeds the turbidity standards and/or if an erosive condition exists due to dewatering operations.

Implement the plan of action within 48 hours of receiving the test. Failure to acceptably remedy unsatisfactory conditions within the time frame established will result in the Engineer proceeding with adequate forces and equipment to implement or maintain the necessary erosion and sediment control items to bring the project into compliance. The entire cost of work for correcting unsatisfactory conditions by the Engineer will be deducted from monies due the Contractor on this Contract.

Failure to acceptably remedy unsatisfactory conditions within the time frame established will result in stoppage of Work until the unsatisfactory conditions have been acceptably addressed.

Method of Measurement:

The quantity of Borrow Area Erosion and Sediment Control and Dewatering Operations is not measured.

Basis of Payment:

Payment will be made at the lump sum price bid for the item Borrow Area Erosion and Sediment Control and Dewatering paid on a monthly basis pro-rated per the total number of months in the Contract. The bid price includes, but is not limited to the following; preparing, submitting and updating erosion sediment control plans, including dewatering operations; installation, maintenance and removal of all erosion and sediment control and dewatering devices; removal and disposal of all sediment; corrections to damages inside or outside of the borrow source due to the Contractor's operations; and all materials, labor, equipment and incidentals required to complete the work.

If the work is acceptably completed by the Engineer prior to the end of the contract time, the remainder of the Lump Sum will be paid.

Permanent topsoiling and seeding on final slopes will be paid in accordance with contract items as indicated in the contract documents.

NOTE:

When Item 900501- Borrow Area Erosion and Sediment Control and Dewatering is applicable to more than one location, the Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each location, the sum of which is to equal the lump sum price bid. The required breakdown of the Lump Sum price is shown on a breakout sheet attached to the proposal. The complete breakout sheet shall be attached to the submitted Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the Bid Proposal being declared non-responsive and rejected.

The Department reserves the right to delete from the Contract the application of this item at one or more of the locations. The lump sum to be paid will be adjusted in accordance with the Contractor's cost breakdown as required above. There will be no extra compensation to the Contractor if such deletions are made.

DRAFT
NOT FOR BIDDING
AUGUST 2015

905501 - TEMPORARY STORM WATER INLET COVERS

Description:

This work consists of furnishing all materials including sandbags, aggregate, exterior grade plywood and caulking compound, etc., and performing all work for installing temporary storm water inlet covers as shown on the plans and in accordance with these special provisions, the Delaware Department of Transportation Standard Specifications, the notes and details on the plans.

General Requirements.

All work shall be subject to inspection and approval of the Engineer; and the Contractor shall be required to correct the discrepancies at his/her expense.

Any and all emergency repairs required during the period of this Contract due to damage from the Contractor's operations shall be the responsibility of the Contractor. In the event the Owner of a damaged facility is unable to contact the Contractor for the immediate emergency repair items of work, or in the event the Contractor when contacted does not take action within a reasonable length of time, the Owner of the facility reserves the right to perform any and all emergency repair work items and to submit the costs directly to the Contractor for complete payment.

Materials:

The requirements for the materials as applicable to the Contract are as noted below, unless otherwise stated on the Plans and/or required by the Owner of the utility. The Contractor shall submit shop drawings for all materials to the Engineer for approval.

Prefabricated Sandbags. Sandbags shall conform to Section 266.07.

Sand. Sand shall conform to Section 266.02.

Plywood. Exterior Grade Plywood, ¾" Thick

Caulk. Caulking Compound shall be exterior grade and able to withstand typical weather ranges for the site.

Construction Methods:

Construction of Temporary Storm Water Inlet Cover. The Constrictor shall fill bags uniformly to about three quarters full, tie choke cords and tuck in bottom corners of bags after filling. Cut a piece of plywood approximately the same size as the storm water inlet box. Caulk on top of the storm water inlet frame then place the piece of plywood on top of the inlet box. Place a minimum of five sand bags on top of the plywood. When the storm water inlet covers are no longer needed as determined by the Representative, remove the inlet covers and clean any residual caulk from the inlet boxes.

Maintenance of Temporary Storm Water Inlet Covers. The Contractor shall maintain the original installation of accepted temporary storm water inlet covers.

Removal of Temporary Storm Water Inlet Covers. When the storm water inlet covers are no longer needed as determined by the Representative, remove the inlet covers and clean any residual caulk from the inlet boxes.

Method of Measurement:

The quantity of temporary storm water inlet covers, will be paid for at the Contract unit price per each temporary storm water inlet cover location.

Basis of Payment:

Price and payment will constitute full compensation for furnishing and placing all material, including the sandbags, sand, caulk and plywood; for maintaining the temporary storm water inlet covers during the Project construction period; for removing the temporary storm water inlet covers after completion of the Project; for restoring the site, including any required seeding and mulching; and for all labor, equipment, tools, and incidentals required to complete the work.

6/2/15

907500 - TEMPORARY SWALE, TYPE A-1
907501 - TEMPORARY SWALE, TYPE A-2
907502 - TEMPORARY SWALE, TYPE A-3
907503 - TEMPORARY SWALE, TYPE B-2

Description:

Construct, maintain, and remove various types of temporary swales as detailed in this specification and indicated on the plans. Prevent clean runoff from entering disturbed areas by intercepting and diverting runoff to stabilized outlets, or intercept sediment-laden runoff and divert it to a sediment trapping device.

Materials:

Seed and Mulch - Section 908.02
Erosion Control Blanket - Section 908.02
Riprap (R-4) - Section 712.04
Geotextile - Section 827.06

Construction Methods:

General Requirements for all Types:

1. Convey runoff from disturbed areas to a sediment trapping device.

2. Outlet diverted runoff from undisturbed areas to an undisturbed stabilized area at non-erosive velocity.

3. Stabilize Temporary Swales that will be operational for less than 14 calendar days with Geotextile in accordance with the Standard Detail titled "Geotextile-Lined Channel Diversion". Completely cover side slopes and swale bottom in this case.

4. Stabilize Temporary Swales that will be operational for 14 calendar days or more as specified below.

5. Stabilization in all cases must begin no more than 7 calendar days after the start of temporary swale construction.

6. Remove accumulated sediment when it reaches 50% of the swale height or if sediment impedes drainage of the swale, whichever occurs first.

7. Maintain the original dimensions and function of the temporary swale throughout its life.

8. Remove the temporary swale when no longer needed, or as directed by the Engineer. Perform restoration, final grading, seeding and stabilization of the area.

Type A-1: Use where shown on the plans when swale bottom profile is between 0.5% and 2.0%. Excavate at locations shown on the plans (1 foot minimum depth); Construct side slopes at 1:1 maximum;

Provide a 4 foot flat bottom; Stabilize using seed and erosion control blanket.

Type A-2: Use where shown on the plans when swale bottom profile is between 2.1% and 8.0%. Excavate at locations shown on the plans (1 foot minimum depth); Construct side slopes at 1:1 maximum; Provide a 4 foot flat bottom; Excavate to stabilize using size R-4 riprap on geotextile.

Type A-3: Use where shown on the plans when swale bottom profile is between 8.1% and 20.0%. Excavate to elevations shown on the plans (1 foot minimum depth); Construct side slopes at 1:1; Provide a 4 foot flat bottom; Stabilize using materials detailed on the plans.

Type B-2: Use where shown on the plans when swale bottom profile is between 2.1% and 8.0%. Excavate at locations shown on the plans (1 foot minimum depth); Construct side slopes at 1:1 maximum; Provide a 6 foot flat bottom; Excavate to stabilize using size R-4 riprap on geotextile.

Method of Measurement:

Linear foot measured along the swale bottom.

Basis of Payment:

Linear foot measurement includes excavation, applicable stabilization (seeding, erosion control blanket, riprap, and/or geotextile), maintenance, sediment removal, removal when no longer required, restoration, final grading, and final stabilization of the area. Pay for clearing and grubbing under their respective items if required.

1/14/15

907506 - EARTH DIKE, TYPE A-1
907507 - EARTH DIKE, TYPE A-2
907508 - EARTH DIKE, TYPE B-1
907509 - EARTH DIKE, TYPE B-2

Description:

Construct, maintain, and remove various types of earth dikes as detailed in this specification and indicated on the Plans. Prevent clean runoff from entering disturbed areas by intercepting and diverting runoff to stabilized outlets, or intercept sediment-laden runoff and divert it to a sediment trapping device.

Materials:

Borrow - Material excavated onsite or supplied from an outside source meeting 209.04(f)
Seed and Mulch - Section 908.02
Erosion Control Blanket - Section 908.02
Riprap (R-4) - Section 712.04
Geotextile - Section 827.06

Construction Methods:

General Requirements for all Types:

1. Convey runoff from disturbed areas to a sediment trapping device

2. Outlet diverted runoff from undisturbed areas to an undisturbed stabilized area at non-erosive velocity.

3. Construct the earth berm having side slopes no steeper than 2:1. Top surface and height dimensions as listed below under Type A-1, A-2, B-1, or B-2. Compact the soil using earthmoving equipment or mechanical tamps to at least 90% of maximum density (per AASHTO T 99 Method C, Modified). Construct in lifts not to exceed 12 inches loose measurement.

4. Begin earth dike stabilization within seven days of the start of construction or prior to the earth dike becoming operational, whichever is sooner.

5. Stabilize the top surface and outside slope (opposite the side conveying runoff) with seed and mulch chosen by the Contractor.

6. Stabilize the side slope carrying water, and the adjoining existing ground using materials and dimensions specified below under Earth Dikes, Type A-1, A-2, B-1, or B-2.

7. Remove accumulated sediment when it reaches 50% of the earth dike height.

8. Maintain the original dimensions and function of the earth dike throughout its life.

9. Remove the temporary earth dike when no longer needed, or as directed by the Engineer. Perform

restoration, final grading, seeding and stabilization of the area.

Type A-1: Use where shown on the plans when the profile of the water carrying channel is between 0.5% and 2.0%. Stabilize the water carrying channel with seed and Erosion Control Blanket. Place the seed and blanket covering the water carrying channel created by the earth dike to a length of 14 inches measured along the dike slope and a length of 48 inches along the adjoining existing ground. Construct the earth dike to an overall height of 12 inches measured from the channel flow line to top of earth dike. Top surface of the earth dike shall be 12 inches wide.

Type A-2: Use where shown on the plans when the profile of the water carrying channel is between 2.1% and 8.0%. Stabilize the water carrying channel with stone meeting R-4 riprap gradation on geotextile. Excavate and place the riprap covering the water carrying channel created by the earth dike to a length of 14 inches measured along the dike slope and a length of 48 inches along the adjoining existing ground. Construct the earth dike to an overall height of 12 inches measured from the channel flow line to top of earth dike. Top surface of the earth dike shall be 12 inches wide.

Type B-1: Use where shown on the plans when the profile of the water carrying channel is between 0.5% and 2.0%. Stabilize the water carrying channel with seed and Erosion Control Blanket. Place the blanket covering the water carrying channel created by the earth dike to a length of 27 inches measured along the dike slope and a length of 72 inches along the adjoining existing ground. Construct the earth dike to an overall height of 18 inches measured from the channel flow line to top of earth dike. Top surface of the earth dike shall be 24 inches wide.

Type B-2: Use where shown on the plans when the profile of the water carrying channel is between 2.1% and 8.0%. Stabilize the water carrying channel with stone meeting R-4 riprap gradation on geotextile. Excavate and place the riprap covering the water carrying channel created by the earth dike to a length of 27 inches measured along the dike slope and a length of 72 inches along the adjoining existing ground. Construct the earth dike to an overall height of 18 inches measured from the channel flow line to top of earth dike. Top surface of the earth dike shall be 24 inches wide.

Method of Measurement:

Linear foot measured along the earth dike's centerline at the top surface.

Basis of Payment:

Linear foot measurement includes soil placement, compacting, and grading; applicable stabilization (seeding and mulching, erosion control blanket, and /or riprap), removal when no longer required, maintenance, sediment removal, restoration, final grading, and final stabilization of the area. Pay for clearing and grubbing under the respective items if required. Furnish and pay for soil required to construct the earth dikes as follows:

For Borrow from an outside source - Pay under item 209006, Borrow, Type F

For Borrow excavated from the job - Payment will be made under the applicable excavation item when the material is initially excavated. Hauling and placing the material in the earth dike is incidental to the applicable earth dike being constructed.

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NOT FOR BIDDING
AUGUST 2015

908501 – NATIVE GRASS SEEDING: NO MOW MIX

Description:

This work consists of furnishing and placing seed and straw mulch.

Materials:

Add the following after the end of 908.02 C 3 of the Standard Specifications:

Native Grass Seeding: No Mow Mix:

Species Name Common / *(Latin)*	Max. % Weed Seeds	Min % Purity	Min % Germination	Seeding Rate lb/Ac
Annual Rye *(Lolium multiflorum)*	0.15	98	90	30
Little Bluestem *(Schizachyrium scoparium* var. *scoparium* (formerly *Andropogon scoparius*))	1.00	80	70	40
Deertongue (*Dichanthelium clandestinum* (formerly *Panicum clandestinum*))	1.00	95	60	30
Switchgrass *(Panicum virgatum)*	1.00	95	70	20
Indian Grass *(Sorghastrum nutans)*	1.00	85	75	30
			Total Seed Quantity (lb/ac)	**150**

All seed shall be fresh, clean, from new crop seed, and delivered to the site in original unopened tagged packages in accordance with the Delaware Code and respective State laws.

Small Grain Straw: Straw for mulching shall be from oats, wheat, rye, or other approved grain crops that are free from noxious weeds, mold, or other objectionable material. Straw mulch shall be in an air-dry condition and shall be suitable for placing with an approved mechanical blower.

Construction Methods:

As per Section 908 Seeding with changes to methods as shown on the Plans.

Application of the Native Grass Seeding: No Mow Mix shall only occur between the following dates:

September 1 st to November 15 th .

Low-pressure tires or equipment shall be used in preparation of the seed bed and on seeding equipment.

No Lime or Fertilizer shall be added to the Native Grass Seeding: No Mow Mix.

Small grain straw shall be uniformly and evenly applied immediately after seed has been placed. An approved mechanical blower shall be used to apply the straw. Straw mulch applied by blowers shall provide a loose depth of not less than 1/2 nor more than 2". Ninety-five percent of the blown and shredded straw mulch shall be 6" or more in length when in place.

Straw mulch shall be applied uniformly and evenly across the seeded area at the rate of 4,000 lb/ac and secured by one of the following methods:

1. *Crimping Method.* This method of incorporating the straw into the ground shall be accomplished with the use of crimping device that produces horizontally oriented indentation. Straw mulch shall be incorporated into the soil to a minimum depth of 2" (50 mm). The crimping device shall be approved by the Engineer.
2. *Tracking Method.* This method may be used on all sites mulched with straw and shall involve the use of steel-cleat track-type equipment driving up and down the slopes producing horizontally oriented indentations with the cleats. Cleats shall be capable of incorporating the straw mulch into the soil to a minimum depth of 1 1/2" (40 mm). The equipment used and the method of tracking shall be approved by the Engineer.
3. *Discing Method.* This method shall only be used if specified on the plans and shall involve the use of a disc or harrow to mix the straw into the soil. Straw mulch shall be incorporated into the soil to the depths specified on the plans and to a minimum depth of 3" (76 mm) if not specified on the plans. The discing device shall be as specified on the plans and approved by the Engineer.

Acceptance of 908501– Native Grass Seeding: No Mow Mix shall be made at time of placement, provided the seed and straw are mixed and placed as specified herein and as directed on the Plans.

No Maintenance Bond is required for this work.

All other aspects and conditions of Section 908 – Soil Stabilization Practices shall apply.

Method of Measurement:

As per Section 908.05 C – Seeding.

Basis of Payment:

As per Section 908.06 C – Seeding.

11/12/2014

908503 - WETLAND MITIGATION SEED MIX

Description:

This work consists of furnishing and placing seed in wetland mitigation areas in accordance with this specification, notes and details on the Plans, and applicable requirements of Section 908 of the Standard Specifications.

Materials:

Wetland mitigation seed mix shall conform to the following requirements:

	Max.% Weed Seeds	Min.% Purity	Min.% Germination	Seeding Rate (lb/Ac)
Redtop (Agrostis alba)	0.75	95	90	20
Creeping Bentgrass (Agrostis palustris) Annual Barnyard Grass	0.75	98	90	12
Duck Millet (Echinocloa spp.)	1.00	90	90	20
			Total Seed Quantity (lb/Ac)	52

Construction Methods:

Construction methods shall be in accordance with notes and details on the Plans, Section 908 of the Standard Specifications.

Method of Measurement & Basis of Payment:

The method of measurement and basis of payment will be in accordance with Subsections 908.05 and 908.06, respectively of the Standard Specifications.

11/17/2014

908504 – COIR FIBER MATTING

Description:

This work consists of stabilizing the streambanks using Natural Fiber Matting, as shown on the Miscellaneous Stream Details, at the locations shown on the Plans, and as directed by the Engineer.

Materials:

Natural Fiber Matting. The Natural Fiber Matting shall be equivalent to Nedia KoirMat 900 or BioD-Mat 90, consisting of machine produced matting of degradable natural fibers meeting the following minimum specifications:

Material:	Woven Coir matting
Minimum Thickness:	0.30 inches
Minimum Weight:	25 oz/SY
Maximum Allowable Water Velocity:	16 ft/sec
Maximum Open Area:	40%

Anchoring Devices. Staple or Anchor Stake – as indicated on the plans, or as recommended by the mat manufacturer and approved by the Representative. Staples shall consist of 4 mm (No. 8 gauge) steel wire, bent U-shaped or square top with a throat width of 25 mm to 50 mm (1 inch to 2 inches), with and effective minimum driving depth of 200 mm (8 inches). Anchor Stakes shall consist of a 12" long, 1" x 2" hardwood notched stake.

Certification:

The Contractor shall furnish the Engineer with a specification and source of the Natural Fiber Matting for review and approval two (2) weeks prior to intended use. The specifications furnished to the Engineer shall be equivalent to Nedia KoirMat 900 or BioD-Mat 90.

Construction Methods:

Grading, Topsoil and Seeding shall be completed before the soil stabilization matting is installed. The bank surface shall be a smooth soil surface free from stones, clods, or debris. The matting shall be placed within 24 hours after seeding operations have been completed. Matting shall be laid smoothly and securely upon the seeded bed in the direction of water flow. Ensure full contact of the matting with the topsoil and that the matting is free of tears, folds, holes, or other inconsistencies in its final placement. Stretching shall be avoided.

The matting shall be rolled lengthwise along the streambank. The matting shall be secured throughout using staples placed every two (2) feet on center, except as indicated for matting overlap and along the edges of the matting.

Where more than one width of matting is required, the ends of each strip shall overlap at least one (1) foot for both vertical and horizontal overlaps. Overlapping shall be done with the upslope matting overlapping the downslope matting and the upstream matting overlapping the downstream matting. The overlapped mat shall be firmly fastened in place with anchor stakes driven vertically into the soil and flush with the surface. Anchor stakes shall be placed a maximum of two (2) feet on center along overlapping matting.

The Contractor shall secure the edges of the matting along the slope by excavating a six (6)-inch deep trench and securing the edge of the matting within the trench with anchor stakes placed every two (2) feet on center. The trench shall then be backfilled and tamped. The matting shall extend a minimum of one (1) foot beyond the limits of grading at the top of the slope, or to a location along the slope indicated by the Engineer.

Along the bottom of the slope, the matting shall be secured by trenching the mat a minimum of one (1) foot below the channel invert and securing with anchor stakes placed every two (2) feet on center. The trench shall be backfilled with channel bed material and tamped.

The matting shall be secured along the toe of slope along Rock Toe Protection, Step-pool Crest, and Step-pool Pool locations by extending the matting down one (1) foot vertical and securing with anchor stakes as shown on the details. The anchor stakes shall be placed every two (2) feet on center.

If any area of the Natural Fiber Matting degrades before the disturbed area is fully stabilized, the Contractor shall replace the matting and reseed the affected area at the Contractor's expense.

Method of Measurement:

The quantity of Natural Fiber Matting will be measured in square yards of actual surface covered along the surface of the treated area. The payment will be full compensation for furnishing and placing mat, staples, stakes, and for all material, labor, tools, and incidentals necessary to complete the work.

Basis of Payment:

The quantity of Natural Fiber Matting will be paid for at the Contract unit price per square yard. Price and payment will constitute full compensation for ground preparation, furnishing and installing all materials, labor, equipment and other incidentals necessary to complete the work.

1/31/2015

DRAFT
NOT FOR BIDDING
AUGUST 2015

DRAFT
NOT FOR BIDDING
AUGUST 2015

RIGHT OF WAY CERTIFICATE

DRAFT
NOT FOR BIDDING
AUGUST 2015

DRAFT
NOT FOR BIDDING
AUGUST 2015

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

JENNIFER COHAN
SECRETARY

June 9, 2015

STIPULATED

ENVIRONMENTAL REQUIREMENTS

for

U.S. 301, Levels Road to Summit Bridge Road (Contract #2A)
State Contract No.: T200911303
Federal Aid Project Number: NH-2015(23)

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 A/ Class I Action.

PERMIT REQUIREMENTS:

The proposed construction work for this portion of U.S. 301, requires permit approval from those agencies listed below. It is the responsibility of the contracting agency, the Delaware Department of Transportation, Division of Transportation Solutions to obtain the necessary permits to ensure that the contractor complies with the requirements and conditions established by the regulatory agencies.

REQUIRED PERMITS AND APPROVAL STATUS:

- U.S. Army Corps of Engineers (USACE) – Individual Permit – **Approved 01-07-2013**, CENAP-OP-R-2006-6071-1, Expiration 12-31-2023

- Delaware Department of Natural Resources and Environmental Control (DNREC) Subaqueous Lands Permit – **Approved 04-29-2013**, SP-312/12, Expiration 04-20-2018

- DNREC – 401 Water Quality Certification – **Approved 04-29-2013**, WQ-315/12, Expiration 04-20-2018

- DNREC – Coastal Zone Consistency – **Approved 09-14-07**, **modification of condition 3 – 04-04-11** – No expiration

- New Castle County Floodplain Permit – **Approved 11-01-12,** Bridge 1-508A, SLD# 20120689 – No expiration

- Town of Middletown Floodplain Approval – application sent 10/2/12 - **PENDING**

SPECIFIC REQUIREMENTS:

Compliance with all requirements of the permits is the responsibility of the contractor. The contractor will follow all special conditions or requirements as stated within those permits or as indicated below. The contractor will be subject to penalties, fines, and the risk of shut down as mandated by law if conditions of the permits or other additional requirements are violated or ignored.

Additional requirements by DelDOT not specified within the permits, but listed below, or on the Environmental Compliance Sheets are also the responsibility of the contractor and are subject to risk of shut down at the contractor's expense.

1. The contractor shall employ measures during construction to prevent spills of fuels, or lubricants, if a spill should occur, efforts shall be undertaken to prevent its entry into wetlands, aquatic, or drainage areas. Any spills entering wetlands, aquatic, or drainage areas shall be removed immediately. The Division of Water Resources (DNREC), Wetlands & Aquatic Protection Branch, 302-739-4691, shall be notified of any spill(s) within six (6) hours of their occurrence. That office will determine the effectiveness of spill and contamination removal and specify remediation efforts as necessary.

2. All construction debris, excavated material, brush, rocks, and refuse incidental to such work shall be placed either on shore above the influence of flood waters or on some suitable disposal site approved by the department.

3. The disposal of trees, brush, and other debris in any stream corridor, wetland surface water or any drainage ditch is prohibited.

4. There shall be no stockpiling of construction materials or temporary fills in wetlands or subaqueous lands unless otherwise specified on project plans and approved by permitting agencies that govern them. It is the contractor's responsibility to coordinate and secure those additional permits/amendments in deviating from the plan.

5. The effort shall be made to keep construction debris from entering adjacent waterways, wetlands, ground cover, or drainage areas. Any debris that enters these areas shall be

removed immediately. Netting, mats, or establishing confined work areas in stages may be necessary to address these issues.

6. If routine maintenance of worker equipment and heavy machinery is necessary during the construction period, refuse material is prohibited from being disposed or deposited onto or into the ground. All used oils and filters must be recycled or disposed of properly.

7. Harmful chemical wash water applied to clean equipment or machinery shall be discouraged. If undertaken, the residue water and/or material must be collected or contained such that it will be disposed of properly. By no means, shall it be deposited or disposed of in waterways, streams, wetlands, or drainage areas.

8. The contractor shall follow all requirements as indicated in the Environmental Compliance Sheet. It will be the contractor's responsibility, expense, & effort to ensure that workers also follow these requirements. As part of the restrictions, please note the timetables reflected in the contract for the in-stream/water work for endangered species protection.

9. **Environmental Monitor:**

   DelDOT has designated an environmental monitoring team to help and ensure compliance with the Project's environmental commitments contained in NEPA documentation, Permits, and shown on the Environmental Compliance Sheets. The environmental monitoring team will attend relevant pre-construction and construction meetings and monitor construction activities adjacent to protected resources. The environmental monitoring team will track compliance with Project commitments and report regularly to DelDOT Environmental Studies. The environmental monitor will work closely with the Engineer to resolve any environmental issues, or concerns in a timely but environmentally suitable fashion.

10. **Resource Protection Fence:**

    Resource protection fence is being used to prevent impacts to sensitive resources near the Project. Resource protection fence is shown in the Project's Environmental Compliance Sheets and shall be installed immediately after stakeout of the LOC. The Contractor shall ensure that all employees understand and comply with the purpose of the resource protection fence.

CULTURAL RESOURCE REQUIREMENTS:

1. The contractor will submit to the District, the location(s) of permanent disposal sites to be used for the disposition of clean wasted materials resulting from the construction contract. The contractor will submit at the Preconstruction meeting, a location map and a plot plan (sketch or diagram) of where on the property clean wasted material is to be placed. The limits of the site(s) will be physically staked or surveyed on the property.

The District will submit the contractor's disposal site location(s) to the State Historic Preservation Office for approval.

The SHPO will determine if a cultural resource survey is required before the site can be approved. If additional survey work is required, it will be the contractor's responsibility to hire a qualified professional to assess the site(s) for the presence or absence of cultural resources (i.e. historic or prehistoric archeological sites). The contractor's consultant will be responsible for producing documentation of the survey results for submission to the SHPO.

If the contractor proposes the use of disposal sites outside the State of Delaware, the contractor must provide written approval from the State Historic Preservation Office of each respective state.

A project's disposal operation will not commence until the SHPO has notified the DelDOT District office that the site location(s) is approved for use.

The use of the disposal site will not result in discharge of materials into the Corps of Engineer or DNREC jurisdictional wetlands or waters. It is the responsibility of the contractor to provide any site surveys or wetland delineations needed to preclude wetland encroachment.

The contractor will be responsible for all sediment and erosion control measures and subsequent approvals required for the disposal site(s) operations.

It is the contractor's responsibility to obtain all other appropriate Federal, State, or local approvals required by law for use of the disposal site(s).

NATURAL RESOURCES SPECIFIC REQUIREMENTS :

The contractor shall pay special attention to specific construction requirements listed below **[USACOE conditions unless noted]**:

1. Any deviation in construction methodology or project design of the regulated activities from that shown on the construction plan sheets must be approved by Corps of Engineers Philadelphia Office, in writing, prior to performance of the work. All modifications to the construction plans shall be approved, in writing by the Corps of Engineers. No work shall be performed prior to written approval of the Corps of Engineers.

2. Prior to the placement of temporary fill in any Waters of the United States including wetlands, a removal and restoration plan of the fill must be submitted to and approved by the Corps of Engineers. This plan should include but shall not be limited to: reason for temporary fill; location, quantity and type of temporary fill; methods of installation and removal; restoration procedures; and Corps of Engineers final inspection provisions.

This condition does not apply to temporary fills associated with erosion and sediment controls. The following shall be considered when utilizing temporary fills:

a. Earthen materials shall not be used in the deployment of temporary stream diversions, crossings, or cofferdams, due to the potential for washout during storm events, unless those materials are properly contained and stabilized as shown on approved plans.

b. Any temporary stream crossings will be completely removed when no longer needed and the stream banks restored by planting native woody vegetation.

c. Any pre-existing riparian vegetation that is disturbed will be replanted after the removal of temporary disturbance.

d. Temporary stream crossings shall be located within the approved limits of disturbance.

3. The permittee will continue to coordinate project plan development for work in regulated wetlands and waters of the United States to assure that the identified impacts remain the same, and that if possible, further reductions in impacts to the aquatic environment may be identified.

4. The permittee is responsible for ensuring that the contractor and/or workers executing the activity(s) authorized by this permit have knowledge of the terms and conditions of the authorization and that a copy of the permit document is at the project site throughout the period the work is underway.

5. All fill materials shall be clean and free from fines, oils, grease, debris, wood, asphalt and other contaminants. **[DNREC]**

6. Waterways temporarily diverted in association with construction activities authorized herein shall be re-diverted to their original channels within 72 hours of completion of the culvert installation. **[DNREC]**

7. Bridges will be constructed at the major stream crossings listed below. No bridge piers will be constructed in any stream without a site specific approval by the Corps of Engineers. The bridges will be constructed to the dimensions discussed below. All vertical dimensions referenced below will be permitted to decrease by two feet or increase without further coordination with the Corps of Engineers. The bridges over Sandy Branch near Station 304+00 shall be constructed such that the profile grade line (PGL) near centerline Station 304+00 is 16 feet above the water surface elevation immediately below, and shall be approximately 268 feet long. The bridges over Sandy

Branch near Station 313+00 shall be constructed such that the profile grade line (PGL) near centerline Station 313+00 is 15 feet above the floodplain floor immediately below, and shall be approximately 190 feet long

8. Unless specifically reviewed and approved by the Corps of Engineers, there shall be no grubbing of vegetation that grows beneath the proposed bridges over Sandy Branch, except where necessary to construct project components such as foundations, slope protection, and utilities.

9. Culverts conveying the stream base flow, and capable of passing aquatic life, will be depressed so that a natural substrate will accumulate in the culvert. The culvert will be designed to address the specific geomorphic characteristics of the stream to avoid downstream scour and channel degradation, and to maintain ecological functions such as aquatic habitat, flood attenuation, sediment transport, and stream channel stability.

10. If riprap is needed in a stream channel for energy dissipation at either end of a stream culvert, or to protect a buried utility, riprap and stream substrate material shall be placed together, to establish a stream invert that will not impede fish passage during low flows.

11. The permittee is responsible to ensure that, after construction, the stream shall not be "lost" or infiltrate beneath the channel or culvert. If flow is lost from the stream, the permittee shall take corrective action to restore flow to the stream. **[DNREC]**

12. No stockpiling or storage of equipment, materials, or structural steel; no staging areas; and no installation of ancillary facilities such as concrete or asphalt plants or construction trailers shall be permitted within any wetland or stream areas outside of identified storage areas as approved by the Corps of Engineers. No construction materials, aggregates, or earth shall be stockpiled or stored in a manner that would affect wetlands or streams, and such stockpiles shall have erosion and sediment controls approved by DelDOT.

13. Where utility lines are being relocated by DelDOT and pass through or along the boundaries of wetland areas, measures must be taken to prevent the porous bedding and backfill material from acting as a French drain that would drain the wetland. Examples of acceptable measures would be clay collars or trench plugs installed, at a minimum, every 100 feet, with a collar located at the entrance point and exit point of the utility lines into and out of the wetland area.

14. As a part of the earthen grading activities associated with surface water management and runoff, and/or the restoration of temporary drainage and diversion activities associated with project construction, the permittee shall assure that any wetlands or waters of the United States outside of the approved limit of construction (LOC) and not shown as impacted on the plans identified in special condition 1 are not adversely affected by the

project. These adverse effects would include, but are not limited to, the removal of wetland hydrology (surface or subsurface), and the increased scour and erosion of stream channels within the project area. In the event that any adverse effects are identified, the permittee will immediately contact this office and coordinate with this office to develop and implement corrective or remedial measures.

15. All excess excavated material not used in highway or compensatory mitigation site construction shall be disposed of at upland, non-wetland disposal site(s). The excavated material shall be properly contained and stabilized to prevent its entry into any adjacent wetlands or waterways. No disposal/wasting operation shall commence until the permittee obtains written approval of any disposal site(s) from the Corps of Engineers to ensure that there are no unauthorized discharges of fill into waters of the United States, including jurisdictional wetlands.

Any changes to or deviations from these plans requested by the contractor must be reviewed and approved by the Engineer and Environmental Monitor prior to conducting any work. Approval may take a significant amount of time to complete and all changes may not be approved. The contractor shall have no claim against the department for costs or delays associated with the approval or rejection of requested changes or deviations from these plans

DRAFT
NOT FOR BIDDING
AUGUST 2015

RAILROAD STATEMENT

DRAFT
NOT FOR BIDDING
AUGUST 2015

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

SHAILEN P. BHATT
SECRETARY

RAILROAD STATEMENT
For

State Contract No.: T200911303

Federal Aid No.: NH-2015(23)

Project Title: US 301, Levels Rd to Summit Bridge Rd

The following railroad companies maintain facilities within the contract limits:

- ☐ Amtrak
- ☐ CSX
- ☐ Delaware Coast Line
- ☐ East Penn
- ☐ Maryland & Delaware
- ☑ Norfolk Southern
- ☐ Wilmington & Western
- ☐ None

In accordance with 23 CFR 635, herein is the railroad statement of coordination (check one):

☐ No Railroad involvement.

☑ Railroad Agreement unnecessary but railroad flagging required. The contractor shall follow requirements stated in the DelDOT Maintenance of Railroad Traffic Item in the Special Provisions. Contractor shall coordinate railroad flagging with DelDOT's Railroad Program Manager at (302) 760-2183.

☐ Railroad Agreement required. The necessary railroad agreement, attached, is complete and fully executed. Railroad related work to be undertaken and completed as required for proper coordination with physical construction schedules. The Contractor shall follow requirements stated in the DelDOT Maintenance of Railroad Traffic Item in the Special Provisions. Contractor shall coordinate railroad flagging with DelDOT's Railroad Program Manager at (302) 760-2183.

Approved As To Form:

Robert A. Perrine
DelDOT Railroad Program Manager

2/26/2015
DATE

Appendix---Item 763626 Diesel Fuel Cost Adjustment

Contract: **T200911308 US 301, SR 896 to SR 1**

		Item No./s
Category A:	**Earthwork** Excavation & Embankment, Borrow (total qty must exceed 5000 CY)	202000, 207000, 208000, 209002, 209511, 209512
Category B:	**Subbase and Agg.** GABC, PTB, Soil Cement Base (total qty must exceed 500 T)	302007, 304501, 304502, 608000
Category C:	**Flexible Bases and Pavements** Warm Mix Asphalts (total qty must exceed 500 T)	401801, 401810, 401819
Category D:	**Rigid Bases and Pavements** Concrete, P.C.C. Patching (total qty must exceed 5000 CY)	501006
Category E:	**Structures** Bridges, Large P.C.C. Structures	602001, 602002, 602003, 602004, 602006, 602007, 602013, 602014, 602015, 602017, 602018, 602019, 602522, 602556, 602772, 603000, 604000, 605001, 605500, 605510, 605511, 605512, 605581, 605639, 618062, 618065, 618081, 618091, 619042, 619045, 619061, 619067, 619501, 619502, 619519, 619539, 623003

THE FOLLOWING SUPPLEMENTAL SPECIFICATIONS ONLY APPLY TO CONTRACT T200911303.01

SECTION 501 – PORTLAND CEMENT CONCRETE PAVEMENT

DELETE STANDARD SPECIFICATION SECTION 501 IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:

501.01 Description

Construct a Portland cement concrete pavement on a prepared subgrade or base course.

501.02 Materials

Provide materials as specified in the listed Standard Specifications or clauses in this Special Provision:

Portland Cement	Section 812.02
Ground Granulated Blast Furnace Slag (GGBFS)	Section 812.02
Fly Ash	Section 812.02
Fine Aggregate	Section 812.02
Coarse Aggregate	Section 812.02
Air Entraining Admixtures	Section 812.02
Chemical Admixtures	Section 812.02
Water	Section 812.02
Curing Materials	Section 812.02
Reinforcing Steel	Section 824.02
Embedded Hardware:	
Load Transfer Devices	Section 824.02
Tie Bars	Section 824.02
Coated Dowel Bars	Section 824.02
Tie Bolts (Hook Bolts and/or W-Bolts)	Section 824.02
Insulation Materials	Section 602.11(c)
Temperature Monitoring Equipment	Section 501.08 of this Special Provision
Inertial Profiler	Section 501.14 of this Special Provision

Mix Design. Prepare and submit a mix design as specified in Standard Specification Subsection 812.03. (Class B/SF) for slip form paving and 812.03 (Class B) for fixed form paving.

501.03 General

The Contractor may choose to slip form or conventionally form the pavement unless otherwise specified. If slip form is selected, small, irregular, or areas inaccessible to the paver may be constructed with fixed forms. These areas may be hand finished, but must still meet all Performance Measures. No portions of pavement shall be formed to produce a "point". Unless otherwise approved, no formed dimension shall be less than 2 feet.

At least 10 Calendar Days prior to paving, schedule a "Pre-paving Meeting" with representatives from the Engineer, Contractor, and other interested parties in attendance.

Submit on or before the date of the "Pre-paving Meeting", a "Means and Methods" plan. The plan shall include, but not be limited to, the Contractors proposed:

1. Method of concrete placement and concrete delivery schedule
2. Proposed width of paving pulls
3. Installation methods for all embedded hardware
4. Typical locations of longitudinal sawed and construction joints
5. Method of transverse construction joint installation
6. Joint locations if different than shown on the plans
7. Procedure, including the finishing screed, for forming and constructing small or irregular shaped portions of pavement.
8. Safety edge construction method
9. Method of installing and securing load transfer devices [Contractor to also provide a template for use by the Engineer (See 501.04-2-b below)]
10. Procedure for final texturing the pavement surface
11. Location of the concrete delivery trucks in relation to the paving area and the proposed haul route from the concrete plant
12. Hand finishing procedures and tools including a misting or fogging device
13. Contingency plan and protective covering for rain events
14. Proposed subcontractors
15. Proposed thermal protection plan for extreme hot and cold concrete placement

501.04 Slip Form Paving

1. Equipment – Furnish and maintain all equipment and tools for concrete batching, placement, finishing, curing, and texturing operations.

   a. Batch Plant and Central Plant Equipment – Section 812.07

b. Place concrete with a track operated, self-propelled, slip-form paver that can independently, or in conjunction with an advance concrete spreader:

1) Strike-off

2) Screed

3) Adjust to produce the specified cross slope and pavement width

4) Place a minimum width pavement of 24 feet in one pull

5) Operate using electronic grade controls for both horizontal and vertical alignment

6) Provide a vertical pavement edge with slump off not exceeding ¼ inch, exclusive of edge rounding, when checked under a 10 foot straight edge

7) Vibrate and consolidate the concrete for the full width being placed. Vibrators are to be attached to the paving equipment or mounted on a separate carriage. Vibrators shall not contact load transfer devices, embedded hardware, or forms. The Contractor is responsible for the number and frequency setting of the vibrators to achieve uniform consolidation of the concrete throughout the entire slab thickness and width. Vibration must automatically stop when forward movement of the unit is interrupted.

8) Provide a smooth, uniform concrete surface finish requiring minimal or no floating or hand finishing

9) A paver equipped with a Dowel Bar Inserter (DBI) may be utilized if approved in advance by the Engineer.

c. Concrete Saws – Provide mechanical saws capable of producing the specified joint details. The Contractor shall determine the number of saws needed based on weather, temperature, and amount of pavement placed. Backup equipment and lighting (if necessary) must be on site prior to beginning concrete placement.

d. Work Bridge(s) – Provide platforms spanning the full width of the paving pull so that workers can perform necessary finishing, texturing, and/or curing. The work bridge(s) shall not come in direct contact with the pavement surface.

e. Texturing – Provide independently powered, self propelled texturing equipment capable of adjusting the depth of tine penetration to produce the

specified pavement surface texture. For formed pavement, the texturing equipment shall ride on the forms or rails.

f. Curing – Provide mechanically powered equipment to place curing compound at the specified rate to the pavement surface and all exposed edges. Use a fully atomized mechanical sprayer equipped with a tank agitator and wind guard.

g. Diamond Grinding – Provide self-propelled machines equipped with gang mounted diamond blades having a minimum cutting head width of 3 feet, capable of producing a "corduroy type" pavement surface texture consisting of parallel grooves between 3/32" and 5/32" wide and 1/16" deep. 50 to 60 diamond blades per foot of cutting head are required.

2. Construction Methods –

a. No hardware may be placed on the grade in contact with the concrete pavement until the Engineer has given approval to do so. Place and grade the base course to tolerance as specified under the applicable item.

b. Furnish and install load transfer devices. Clearly mark, on both sides of the pavement, the center of each assembly using paint, stakes or other agreed upon method so that the transverse sawed joints can be properly located. Unless otherwise specified in the contract documents, construct load transfer assemblies, typically spaced at 15 feet, center to center. If the approved dowels are AASHTO M254, Type A, no additional coating is required. If they are AASHTO M254, Type B (fusion bonded epoxy), then a graphite coating shall manually be applied to each dowel just prior to concrete placement. Securely stake or otherwise fasten the load transfer device to the subgrade to prevent movement during concrete placement. Do not use load transfer assemblies that are damaged in any way. Verify horizontal and vertical alignment of the devices not to exceed ¼ inch from parallel to line and grade. Locate dowels at a pavement depth of T/2, (T = pavement thickness) plus or minus 1 inch. Check initial dowel placement on grade with a template or other approved tool supplied by the Contractor for use by the Engineer. The Engineer may elect to check the location of dowels at any time throughout the duration of the contract with a pachometer or other non-destructive testing device.

c. Furnish Hook Bolts (or W-Bolts) for use when additional lanes will longitudinally abut the pavement being placed, and #5 standard rebars for tie

bars used under longitudinal sawed joints or for tying into concrete lanes placed under previous contracts. Install these items during or prior to concrete placement. The method of installation must be approved prior to beginning concrete placement.

d. Install lines, wires, or other devices of the Contractor's choice as needed for electronic grade control.

e. Placing Concrete –

1) Minimize or eliminate stopping the forward movement of the paver. Sufficient number and proper scheduling of concrete delivery trucks is required in this regard.

2) Maintain a vertical pavement edge. If necessary, use extra finishers, temporary forms, or trailing forms as part of the paver.

3) Maintain a uniform level of concrete feeding the paver screed, allowing sufficient concrete to completely fill the void under the screed for the entire width of pavement placed. A roll of concrete covering approximately half of the distributing augers is desirable. Spreaders in advance of the paver may be used to control the concrete supplied to the paver.

4) Wet the base course just prior to contact by the concrete using a hose or other spray device for uniform water application. The application rate should not cause any pooling of water on the grade.

5) As the concrete is being placed, install tie bars under longitudinal sawed joints and Hook or W-Bolts along longitudinal pavement edges requiring abutting pavement to be placed in the future.

6) Build a transverse construction joint at the end of the day's paving run in accordance with the previously approved details.

7) Prior to placing adjoining concrete paving lanes or shoulders, seal the previously sawed joint opening along the edges of the existing concrete using duct tape, caulk, or other approved material to prevent stones or grout from entering the sawcut.

8) When placing concrete in lanes adjoining previously constructed pavement, locate the full width of the paver tracks over the pavement with no overhang across the edge, in order to prevent breaking. Use rubber facing, wood, or other approved protection when the paver

tracks will be in contact with the existing pavement surface. Concrete in the completed lane must have achieved a compressive strength of at least 2,000 psi prior to placing any adjoining pavement.

9) For small, irregular sections, or areas of pavement inaccessible to the paver:

a) Use wooden or steel forms. Depth of the forms must be at least that of the required pavement thickness. Form faces shall not deviate from a true plane by any more that 1/8 inch in 10 feet. Provide pins or other bracing to prevent movement of the forms under the weight of the concrete.

b) Place concrete directly onto a previously approved, moistened grade. Consolidate with hand vibrators paying particular attention not to dislodge the load transfer devices or come in contact with the forms.

c) Finish with a pre-approved screed. Hand float or otherwise finish any areas as necessary. Pull a damp burlap drag longitudinally along the placement area. Texture and cure in accordance with sections 501.06 and 501.07 below.

d) If forms are stripped prior to 5 calendar days following concrete placement, apply curing compound or extend other curing methods immediately after patching any "honey-combed" areas to completely cure the exposed edge. Forms must remain in place at least 12 hours following initial concrete placement, except for areas immediately adjacent sawcut transverse joints. Forms at these joints must be removed when required in order to complete the sawcut through the entire pavement surface. Maintain curing methods in place until the full five day time has elapsed or the compressive strength of the concrete has reached 2,000 psi.

10) Safety Edge – Construct a safety edge as specified in the contract documents. The safety edge is required longitudinally along the outermost pavement edge (generally a shoulder) on all mainline and ramp paving unless otherwise approved by the Engineer.

f. Finishing –

1) Produce a smooth, uniform concrete surface with the paver screed conforming to the specified pavement cross slope and width.

2) Hand finishing to be limited to sealing any surface tears, supporting any non-vertical pavement edges, and to assist in the surface finish of small, irregular, or other areas inaccessible to the paver.

3) Finish all longitudinal pavement edges with a ¼ inch rounded edging tool.

4) Do not add surface water as an aid to finishing. If absolutely necessary, an evaporation retardant may be added through the use of a misting or fogging device approved prior to beginning paving operations. Water shaken from brushes or applied through a hose is not permitted.

5) Finish the final pavement surface prior to texturing by pulling a wet burlap drag in the longitudinal direction. Keep the burlap in a moist condition throughout the paving operation in order to prevent surface tearing.

6) Texture and cure the pavement per subsections 501.06 and 501.07 below.

501.05 Fixed Form Paving

1. Forms –

a. Use straight, metal forms having adequate strength to support the equipment. Each section shall be a minimum of 10 feet in length. Use forms with a depth equal to or greater than the prescribed edge thickness of the concrete, a base width at least equal to the depth of the forms, but not required to exceed 8 inches for deeper forms, and without a horizontal joint. Use flexible or curved forms of proper radius for curves of 150 foot radius or less, except approved straight forms of 5 foot lengths may be used for curves of a radius from 75 to 150 feet. Flexible or curved forms must be approved by the Engineer. The Engineer may approve the use of wood forms in areas requiring hand finishing [see Subsection 501.04-2-e-9) above]. Secure the forms in place to withstand the impact and vibration of the consolidating and finishing equipment without visible spring or settlement. Extend flange braces outward on the base a minimum of ⅔ the height of the form. Remove forms with battered top surfaces or bent, twisted or broken forms. Do not use repaired forms until they have been inspected and approved by the Engineer. Do not use buildup forms, except where the total area of pavement of any specified thickness on the project is less than 2,000 square yards. Do not vary the top face of the

form from a true plane more than ⅛ inch in 10 feet, and do not vary the vertical face of the form by more than ¼ inch. Make provisions for locking the ends of abutting form sections together tightly, and for secure setting.

b. Supplementary Rails -

1) Provide suitable metal rails capable of being securely attached to the top of the side forms to provide a track which will allow spreading, finishing, and curing equipment to back over the end of the previous day's run.

2) Ensure metal rail length is sufficient to accommodate all equipment which must be backed out of the way. Also ensure the rails are of such a height that all wheels and flanges of wheels will clear the previously placed concrete by at least 1/2 inch.

c. Base Support - Provide a foundation under the forms so that the whole length of the form will be set firmly in contact with the grade.

d. Form Setting - Set forms sufficiently in advance of the point where concrete is being placed so that line and grade may be checked. Stake forms into place with a minimum of 3 pins for each 10 feet section. Place a pin at each side of every joint. Tightly lock form sections, free from play or movement in any direction. Do not deviate the form from true line by more than ¼ inch at any point. No excessive settlement or springing of forms under the finishing machine is permitted. Clean and oil forms before the placing of concrete.

e. Grade and Alignment - Check the alignment and grade elevations of the forms immediately before placing the concrete and make any necessary corrections. When any form has been disturbed or any grade has become unstable, reset and recheck the form.

f. Removing Forms - Unless otherwise provided, do not remove forms from freshly placed concrete until it has set for a minimum of 12 hours, except auxiliary forms used temporarily in widened areas and forms against transverse sawcut joint locations. Remove forms carefully to avoid damage to the pavement.

2. Equipment - Furnish and maintain all equipment and tools for concrete batching, placement, finishing, curing, and texturing operations.

a. In addition to the equipment included in this section, all equipment listed under Subsection 501.04-1 above is required except that section 501.04-1-b is replaced with the following for fixed form paving:

b. Place concrete with a finishing machine designed for fixed form paving that can ride on previously set forms and can independently, or in conjunction with an advance concrete spreader:

1) Strike-off

2) Screed

3) Adjust to produce the specified cross slope and pavement width

4) Place a minimum width pavement of 12 feet in one pull

5) Provide a smooth, uniform concrete surface finish requiring minimal or no floating or hand finishing

c. Vibration –

Vibrate and consolidate the concrete for the full placement width. Vibrators are to be attached to the paving equipment or mounted on a separate carriage. Only operate the vibrators when the machine they are mounted on is moving forward. Do not operate hand vibrators more than 10 seconds, or less than 5 seconds in any one location unless approved otherwise by the Engineer. Place vibrators in and withdraw from concrete vertically in a slow deliberate manner. In order to obtain concrete consolidation in the vicinity of joint assemblies, the Engineer may require that these areas be hand vibrated with an immersion spud vibrator. Vibrators shall not contact load transfer devices, embedded hardware, or forms. The Contractor is responsible for the number and frequency setting of the vibrators to achieve uniform consolidation of the concrete throughout the entire slab thickness and width.

d. Form Line Excavating Machine –

Excavate form lines for all forms supporting mechanical finishing equipment to line and grade by a machine designed for this purpose and approved by the Engineer, or an approved machine which concurrently trims the subgrade or subbase to grade.

e. If, during the operation of paving equipment, it is necessary to operate one or both sets of wheels or tracks on previously placed concrete, adjust or alter the wheels or tracks so that the bearing on the concrete will not be closer than 3 inches from the pavement edge. When operating with one side of the machine on pavement and the other side on forms, the wheels operating on the forms may be double flanged. Use flangeless, rubber faced wheels on the pavement. When operating over the edge of concrete less than 2 months old, support the ends of the finishing machine screeds with an approved device to provide

from 1/16 to 1/8 inch clearance between the screed and previously placed pavement.

3. Construction Methods

a. No hardware may be placed on the grade in contact with the concrete pavement until the Engineer has given approval to do so. Place and grade the base course to the tolerance specified under the applicable item.

b. Furnish and install load transfer devices. Clearly mark, on both sides, the center of each assembly using paint, stakes or other agreed upon method so that the transverse sawed joints can be properly located. Unless otherwise specified, space load transfer assemblies at 15 feet, center to center. If the approved dowels are AASHTO M254, Type A, no additional coating is required. If they are AASHTO M254, Type B (fusion bonded epoxy), then manually apply a graphite coating to each dowel just prior to concrete placement. Securely stake or otherwise fasten the load transfer device to the subgrade to prevent movement during concrete placement. Do not use load transfer assemblies that are damaged in any way. Verify horizontal and vertical alignment of the devices not to exceed ¼ inch from parallel to line and grade. Locate dowels at a pavement depth of T/2, (T = pavement thickness) plus or minus 1 inch. Check dowel placement with a template or other approved tool supplied by the Contractor for use by the Engineer. The Engineer may elect to check the location of dowels at any time throughout the duration of the contract with a pachometer or other non-destructive testing device.

c. Furnish Hook Bolts (or W-Bolts) for use when lanes will longitudinally abut the pavement being placed, and #5 standard rebars for tie bars used under longitudinal sawed joints or for tying into concrete lanes placed under previous contracts. Install these items prior to or during concrete placement. The method of installation must be approved prior to beginning concrete placement.

d. Placing Concrete –

1) Minimize or eliminate stopping the forward movement of the paver. Sufficient number and proper scheduling of concrete delivery trucks is required in this regard.

2) Maintain a uniform level of concrete feeding the paver screed, allowing sufficient concrete to completely fill the void under the

screed for the entire width of pavement placed. Spreaders in advance of the paver may be used to control the concrete supplied to the paver.

3) Wet the base course just prior to contact by the concrete using a hose or other spray device for uniform water application. The application rate should not cause any pooling of water on the grade.

4) As the concrete is being placed, install tie bars under longitudinal sawed joints and Hook or W-Bolts along longitudinal pavement edges requiring abutting pavement to be placed in the future.

5) Build a transverse construction joint at the end of the day's paving run in accordance with the previously approved details.

6) Prior to placing adjoining concrete paving lanes or shoulders, seal the previously sawed joint opening along the edges of the existing concrete using duct tape, caulk, or other approved material to prevent stones or grout from entering the sawcut.

7) When placing concrete in lanes adjoining previously constructed pavement, the paver tracks must be fully in contact with the completed pavement surface to prevent breaking of the edge. Use rubber facing, wood, or other approved protection if the paver tracks will be in contact with the existing pavement surface. Concrete in the completed lane must have achieved a compressive strength of at least 2,000 psi prior to placing any adjoining pavement.

8) For small, irregular sections, or areas of pavement inaccessible to the paver:

   a) Use wooden or steel forms. Depth of the forms must be at least that of the required pavement thickness. Form faces shall not deviate from a true plane by any more that 1/8 inch in 10 feet. Provide pins or other bracing to prevent movement of the forms under the weight of the concrete.

   b) Place concrete directly onto a previously approved, moistened grade. Consolidate with hand vibrators paying particular attention not to dislodge the load transfer devices or come in contact with the forms.

   c) Finish with a pre-approved screed. Hand float or otherwise finish any areas as necessary. Pull a damp burlap drag

longitudinally along the placement area. Texture and cure in accordance with sections 501.06 and 501.07 below.

d) If forms are stripped prior to 5 calendar days following concrete placement, apply curing compound or extend other curing methods immediately after patching any "honey-combed" areas to completely cure the exposed edge. Forms must remain in place at least 12 hours following initial concrete placement, except for areas immediately adjacent sawcut transverse joints. Forms at these joints must be removed when required in order to complete the sawcut through the entire pavement surface. Curing methods shall remain in place until the full five day time has elapsed or the compressive strength of the concrete has reached 2,000 psi.

9) Safety Edge – Construct a safety edge as specified in the contract documents. The safety edge is required longitudinally along the outermost pavement edge (generally a shoulder) on all mainline and ramp paving unless otherwise approved by the Engineer.

e. Finishing –

1) The paver screed shall produce a smooth, uniform concrete surface conforming to the specified pavement cross slope and width.

2) Limit hand finishing to sealing any surface tears, supporting any non-vertical pavement edges, and to assist in the surface finish of small, irregular, or other areas inaccessible to the paver.

3) Finish all longitudinal pavement edges with a ¼ inch rounded edging tool.

4) Do not add surface water as an aid to finishing. If absolutely necessary, an evaporation retardant may be added through the use of a misting or fogging device approved prior to beginning paving operations. Water shaken from brushes or applied through a hose is not permitted.

5) Create a final pavement surface prior to texturing by pulling a wet burlap drag in the longitudinal direction. Keep the burlap in a moist condition throughout the paving operation in order to prevent surface tearing.

6) Texture and cure the pavement per subsections 501.06 and 501.07.

501.06 Texturing

1. Texture the finished pavement for the entire placement width with an approved tining device. Flat steel wire tines are required and shall be 3/32 inches wide and 5 to 6 inches in length unless otherwise approved, having a ¾ inch spacing between the tines. The tines shall form rectangular shaped grooves 1/16 inch to 3/16 inches in depth. Do not texture portions of the pavement that will receive permanent pavement markings. In these areas, maintain a 10 inch wide flat surface to accommodate the striping and raised pavement markers. The burlap drag finish is acceptable for these areas.

2. The Contractor may elect to diamond grind all surfaces of concrete pavement to create a final texture. If so, the grinding shall not be performed until the concrete has obtained a compressive strength of at least 3,500 psi.

3. Tining shall be pulled in the longitudinal direction, parallel to the centerline of the pavement, in one pass without dragging or tearing the mortar.

4. The Contractor is responsible to determine the proper time to install the tining. The tining should not pull excessive mortar or aggregate from the pavement (too early) or fail to penetrate the surface by the minimum 1/16 inch (too late).

5. Make available hand tining devices at least 4 feet in width equipped with tines identical to those specified above for use in areas inaccessible to the mechanical device.

6. Immediately follow the tining operation with approved curing.

501.07 Curing – Use one of the methods listed below

1. White Membrane Curing Compound

   a. Spray the curing material on the pavement surface and all exposed edges immediately following the texturing operation.

   b. Continuously agitate the material during application to keep it thoroughly mixed.

   c. Uniformly apply 2 applications of spray to the entire surface at a rate covering no more than 200 square feet (22.2 square yards) per gallon per each of the two applications. Apply the first coat immediately following the tining operation and the second coat no more than 30 minutes after the first.

d. If necessary, use hand sprayers for pavement edges or small and irregular areas inaccessible to the larger mechanical applicator. The rate of application remains no more than 200 sq. ft. per gallon per each of two applications.

e. No equipment or traffic (other than joint saws, foot traffic and pick up type vehicles) is permitted on the pavement until the compressive strength has reached at least 2,000 psi.

2. Polyethylene Film –

a. Extend the polyethylene beyond the slab edges by at least twice the pavement thickness and add weight to secure the material against wind and weather.

b. Maintain the polyethylene in place for at least 5 calendar days or until the concrete compressive strength has reached at least 2,000 psi. At sawed joint locations, remove as little polyethylene as possible just prior to the sawing operation. Re-cover the area over the sawed joint immediately upon completion of the sawing operation and maintain for the remainder of the curing period.

501.08 Temperature Limitations

Concrete will not be placed when the evaporation rate is greater than or equal to 0.15 lb per square foot per hour as published in the ACI 305 chart developed by Delmar Bloem. DelDOT Materials and Research Section can provide copies of the chart upon request.

The contractor will submit, for approval, a "Thermal Plan" for protection of concrete pavement to address both hot and cold placement temperatures (as defined by ACI 305 and 306 respectively). The plan must incorporate, as a minimum, the following restrictions:

1. Cold Weather –

a. Do not place concrete when the ambient air temperature in the shade, and away from artificial heat, is less than 35° F. Resume placement when the ambient air temperature is 35° F and rising.

b. Do not place concrete on frozen grade.

c. Maintain temperatures of not less than 50° F surrounding the concrete pavement for a curing period of five calendar days following placement of the concrete. Provide all necessary monitoring devices (High-Low thermometers or other tools) and a plan for monitoring the temperature during the five day

period ensuring placed concrete is not damaged by the temperatures. Use of insulating blankets, straw, polyethylene, or other protection subject to the approval of the Engineer must be addressed in the plan.

2. Hot Weather

   a. If plastic concrete temperatures reach 80º F, give additional attention to dampening the subgrade immediately in advance of the concrete placement. Perform finishing, texturing, and curing operations as soon as possible. Should the pavement surface dry out to the extent that it cannot be sealed without the application of surface water, paving shall be suspended.

   b. No concrete may be placed when the temperature of the plastic concrete exceeds 85º F at the production facility.

3. Regardless of the protection methods selected, the Contractor is responsible to protect the concrete from freezing or other thermal damage. Any removal, replacement, and/or repairs resulting from thermal damage will be made at the Contractor's expense.

501.09 Joints –

1. Transverse Sawed Joints –

   a. Saw the joints at the specified spacing (typically 15 feet) to a depth of T/3 + ¼" (T = Pavement Thickness) and a width of 1/8".

   b. Begin joint sawing as soon as the concrete can support the saw and operator with no damage to the pavement surface.

   c. Time the sawing so that the concrete does not ravel behind the blade and so that random cracking does not occur.

   d. Determine the timing of the sawcutting based on weather, temperature, and his/her judgment. Center the sawcuts over the load transfer dowels. Following transverse sawcutting, provide crack free pavement except for the cracks under the designed sawcut joints.

2. Longitudinal Sawed Joints –

   a. Following the transverse joint sawcutting, perform longitudinal sawcutting on pavement placed in multi-lane (or lane and shoulder) pulls. Saw the joints to

a depth of T/3 + ¼” and to a width of 1/8” over the tie bars spaced at 30 inches center to center.

b. Determine the timing of the sawcutting based on weather, temperature, and his/her judgment. Center the sawcuts over the tie-bars. The resulting pavement following longitudinal sawcutting shall be crack free except for the cracks under the designed sawcut joints.

3. Transverse Construction Joints –

a. Construct this joint at the end of a day’s paving run, or when tying into existing concrete pavement

b. Prior to beginning paving operations, a formed bulkhead must be provided for use in an emergency necessitating a non-planned paving stoppage exceeding 30 minutes.

c. Submit for approval the proposed method of building the transverse construction joint. The resulting joint must create a vertical face perpendicular to the pavement conforming to the designed cross slope having load transfer dowels spaced the same as the load transfer devices. The top edge shall be finished with a ¼” rounded edging tool. If the proposed construction method involves drilling and grouting load transfer dowels, they must be of the same material and dimensions as those provided as part of the load transfer devices. Drilling and grouting procedures, and related materials must accompany the submission if applicable. A grout retainer ring will be required if dowels will be installed by drilling and grouting.

d. When placing concrete pavement abutting the transverse construction joint, use a ¼” rounded edging tool to finish the top edge of the concrete in contact with the previously constructed joint. If tying into a non-rounded edge of existing pavement, sawcut a ¼" bevel on the existing pavement edge prior to placing the new adjoining concrete pavement.

4. Longitudinal Construction Joints –

a. Construct these joints directly over Hook Bolts or W-Bolts installed in a previously placed run of pavement. If tying into concrete placed under a previous contract, drill and grout tie-bars (#5 rebars) into the existing concrete pavement if so noted in the Contract Documents.

b. Form the joint by finishing the concrete abutting the existing concrete with a ¼” rounded edging tool. If tying into a non-rounded edge of existing

pavement, sawcut a ¼" bevel on the existing pavement edge prior to placing the new adjoining concrete pavement.

5. Unless detailed otherwise in the Contract Documents, no joint sealant material is required in any of the joints covered in this section.

501.10 Opening the Road to Traffic –

No sooner than 14 calendar days after initial placement or when the compressive concrete strength has reached at least 3,500 psi.

501.11 Performance Measures

Acceptance and final payment for this item will be based on the Contractor's ability to acceptably construct a concrete pavement meeting the following criteria:

1. Alignment and cross-slope
   a. Maintain a pavement edge within 0.15 feet of the specified horizontal alignment. Pavement width provided must be no less than that specified.
   b. Provide the cross-slope at the specified percent plus or minus 0.5%.
2. Consolidation as verified by visual observation of pavement edges, pavement cores, and/or other non-destructive testing devices as determined by the Engineer.
3. Thickness as verified by cores. Payment to be adjusted in accordance with Subsection 501.16-2 below.
4. Ride Quality as specified in Subsection 501.16-3 below with payment adjustments as specified therein.
5. Pavement free of Random Cracks – Any uncontrolled random cracks must be repaired or removed and replaced prior to final acceptance and payment. Remove and replace areas of pavement with uncontrolled random cracks per the Full Depth Pavement Patching Standard Construction Details.
6. Provide a vertical pavement edge having no more than ¼ inch edge slump, exclusive of rounding of the finishing tool, when measured under a 10 foot straight edge.
7. Provide load transfer dowels located as specified in Subsection 501.04-2-b above.

8. Provide concrete meeting the required compressive strength requirements subject to payment adjustment as outlined in Subsection 501.16-4 below.

501.12 Test Strip to Verify Performance (unless otherwise noted, applies only to projects having 3,000 Square Yards or more of concrete paving, exclusive of ramps)

1. Initially place approximately 500 linear feet of representative mainline multiple lane paving or lane plus shoulder width concrete paving. The dimensions may vary based on project details if approved by the Engineer. The test strip may be a section of permanent pavement. Upon completion of the test strip paving including sawing of applicable transverse and longitudinal joints, the Engineer will perform the following performance measure evaluation:

    a. Verify specification compliance of horizontal alignment, cross slope, pavement width, and vertical edge slump using survey or other means determined by the Engineer.

    b. Verify specified consolidation and thickness by drilling 2 ea, 2 inch diameter cores at random locations selected by the Engineer. The cores must demonstrate uniform consolidation and thickness within specification requirements. (See Subsection 501.13 below) These cores will be considered informational only and will not be used to determine final payment based on thickness. Independent cores will be taken for this purpose at a later time. Core holes will be patched by the Engineer.

    c. Verify specification compliance of Load Transfer Dowel Bar location and alignment using non-destructive testing devices.

2. Performance Testing by the Engineer for the items listed in 501.12-1 above – Start performance testing as soon as possible following sawing of required transverse and longitudinal joints in the test strip pavement. Clear the pavement of all construction debris, dirt, and equipment. Notify the Engineer in writing that the pavement is ready for performance testing to begin. All testing will be completed by the Engineer no more than 5 Working Days (exclusive of weekends and Holidays) following notification. Immediately schedule a field meeting with the Contractor and the Department to review the testing results. Do not place any additional concrete pavement until the performance testing has been completed and approval to continue is received from the Engineer. Work may continue on load transfer device placement or other related activities not requiring concrete placement.

3. If corrective work is required, provide a repair method and, upon approval by the Engineer, make repairs to the test strip to demonstrate acceptable results.

4. Following acceptable testing results as determined at the field meeting, and following acceptance by the Engineer of any required repairs, paving may continue in accordance with the Contractor's schedule. The Engineer reserves the right to spot check for any of the above listed performance measures at any time, but will not hinder the Contractor's paving schedule unless results verify the pavement to be out of specification compliance on an item that cannot be readily repaired.

5. The Engineer reserves the right to request additional test strips if changes are made to the concrete mix design, major paving equipment, or other parameters that clearly alter the performance characteristics of the finished pavement.

6. The Test Strip requirement may be waived by the Engineer if the concrete paving Contractor has paved an adjoining DelDOT contract having the same or similar pavement details as the current contract and if the same equipment and concrete mix are being utilized.

7. No costs for delay of any kind related to construction of the test strip, or time in obtaining test results will be considered by the Engineer unless such delays are beyond the timeframes specified above.

501.13 Tolerance in Pavement Thickness

1. The Engineer will divide the PCC Pavement for the entire contract into 1,000 S.Y. (square yard) lots, determine the random core locations, drill the cores, determine pavement thickness according to AASHTO T 148, and patch the resulting holes in the PCC Pavement.

2. Uneven lots less than 1,000 S.Y. may occur due to the pavement geometry. If this is the case, these irregular lots will be considered a complete lot when evaluating the pavement thickness, regardless of their actual size.

   If a random core measurement is deficient by more than 0.20" when compared to the plan pavement thickness, two additional randomly selected cores will be taken within the same lot. Cores measuring 0.20" or more in excess of the plan pavement thickness will be considered to measure exactly 0.20" greater than the planned thickness when computing the average of the three cores. The average thickness of the three cores will be considered the pavement thickness for the lot being evaluated.

This lot thickness will be used to determine payment for the entire lot in accordance with Table 501.16-A.

3. Remove and replace the entire lot represented by the short cores when any average lot thickness is deficient by more than 1" when compared to the plan pavement thickness. The Engineer will provide the limits of the lot in question.

501.14 Pavement Smoothness Testing

1. General Description – Test finished surfaces of concrete pavements, bridge decks, approach slabs, and transition slabs using an Inertial Profiler unless otherwise stated in the Contract. Correct surface variations that exceed the tolerances specified in Subsections 501.14-7-a and 501.14-7-d below, and correct excessive roughness before accepting the work. Perform all smoothness testing, except for "Quality Assurance" as specified in Subsection 501.14-8 below, that will be performed by the Engineer.

a. Inertial Profiler Testing - For the purpose of measuring pavement smoothness, the Contractor shall have available a high speed or lightweight inertial profiling system meeting the standards set forth in AASHTO M-328 that is capable of simultaneously collecting data in both wheelpaths of a travel lane. Use the data collected by the inertial profiling system to calculate both IRI and deviation locations using on-board computer software. Payment adjustments, both plus and minus, are described under Subsection 501.16-3 below. Calculate deviations, as defined in this Special Provision, using a rolling 10' straight edge simulation program capable of isolating deviations greater than or equal to 0.25" in 10'. If software is not available to calculate the parameters for a rolling 10' straight edge simulation, then use, at the Engineer's discretion, a rolling 10' straightedge capable of isolating deviations greater than or equal to 0.25" in 10'.

b. Straight Edge Surface Testing – In the absence of the requirement for Inertial Profiler smoothness testing, surface testing will be performed with a rolling straightedge or a conventional straightedge furnished by the Contractor. Finished concrete pavement and/or bridge surfaces will be tested by the Contractor and witnessed by the Engineer for trueness in each wheel lane at the completion of the required curing or protection period. Test the surface with a rolling 10′ straightedge, or a 10′ straightedge placed parallel to the center line of the pavement, parallel to the grade line, and touching the surface. Surface variations of the pavement measured by the 10′ rolling straightedge or measured from the base of the straightedge to the surface of

the pavement shall not exceed 0.25″. An approved 10 foot long straight edge shall be available at all times during concrete paving operations.

2. Surface Corrections –

Use Diamond Grinding to remove deviations exceeding 0.25” in 10 feet and/or to improve ride quality. The Contractor shall submit, for review, similar types of work performed with the proposed equipment, including references if requested by the Engineer.

3. Definitions

a. ERD File – a file storing numbers in tabular form for plotting and processing purposes. The ERD file format was developed by the Engineering Research Division of the University of Michigan Transportation Institute (UMTRI).

b. Inertial Profiler – a high speed or lightweight device used to measure the pavement profile with an accelerometer to form an inertial reference and a height sensor to measure pavement height relative to that reference.

c. International Roughness Index (IRI) – a statistic, based on computations from a measured longitudinal profile using a quarter-car simulation, calculated to represent the amount of roughness in a pavement surface.

d. Rolling Ten Foot Straightedge - a rigid 10' straightedge mounted to measurement wheels and used to indicate both high and low deviations.

e. Deviation – a hump or depression found to exceed the tolerances defined in this Special Provision within a 10' straightedge.

4. Concrete Surfaces Subject to Smoothness Testing, unless otherwise noted on the plans:

a. Test all finished surfaces of concrete pavement, bridge decks, approach slabs, and transition slabs for smoothness except for those listed in the following paragraph (Subsection 501.14-4-b).

b. Areas not subject to surface smoothness testing are shoulders not intended for use as future travel lanes, driveways, parking areas, tapers, gore areas, sidewalks, or Bike Paths separated from mainline pavement. Any areas of riding surfaces not subject to surface testing using the inertial profiler remain subject to other surface smoothness requirements of this Section.

5. Documentation Required –

Prior to the start of smoothness testing, the Contractor shall provide to the Engineer:

a. Manufacturer, Make, and Model of the test system
b. Equipment Owner (if not the Prime Contractor)
c. Relevant Certifications
d. Manufacturer Calibration Procedures
e. Relevant Operator Training information.

Testing cannot take place until the Engineer has received this information and provided approval of the proposed test equipment and Maintenance of Traffic plan (if applicable).

6. Calibration by Contractor –

Prior to testing, verify that the inertial profiling equipment is calibrated by following the manufacturer's calibration procedure in the presence of the Engineer. Vertical and longitudinal calibrations shall be performed. The Engineer will provide calibration blocks for the Contractor's use at the time of calibration. If the equipment does not pass the calibration procedure, it will not be permitted for use.

7. Testing by Contractor –

Testing of the pavement surface includes measurement and calculation of the IRI parameters and deviations in the longitudinal and transverse directions. Notify the Engineer at least three (3) working days prior to proposed data collection for both initial and final testing.

a. Transverse Directions / Cross Slope

After the PCC pavement has cured sufficiently and at the Engineer's discretion, test the surface for deviations in the transverse direction. Provide, have available at all times, and use appropriately, an approved 10' straightedge to be placed perpendicular to the centerline for checking cross slope. Deviations in the transverse direction shall not equal or exceed 0.25". Either correct such deviations in the transverse direction or be assessed a deviation discount charge (in accordance with the "Acceptance and Payment" portion of this Special Provision) at the discretion of the Engineer.

b. General Testing Requirements for IRI Data Collection

Collect data used for calculation of the IRI by measuring each wheel path using an approved inertial profiling system operated in accordance with ASTM E950 and this special provision. Use longitudinal spacing no greater than 6 inches to collect data for IRI calculation. Remove wavelengths exceeding 300 feet using long wavelength filters. Calculate the International Roughness Index using this data and report it in 0.1 mile (528 foot) segments. Make three (3) passes in each lane and direction requiring testing. Give the data set a filename including the contract number, the location number, the lane tested and direction tested. For example, the Eastbound left lane of Contract XX-XXX-XX, Location 1, run 3 shall be named:

XXXXXXXLoc1LEBr3

Perform testing within fourteen (14) days of the completion of project paving operations.

Perform testing in accordance with the following procedures (to be completed by the Contractor):

1) Clean the roadway path to be measured of all debris and other loose material. Ensure that the roadway surface is dry and free of any standing water.
2) Locate the start of the project limits and mark them to enable automatic start sensors to be activated.
3) Locate the end of the project limits and mark them to enable automatic stop sensors to be activated.
4) Locate any obstructions in the wheelpath / test area and mark them with reflective tape to enable automatic event marking.
5) Establish a pre-test length (150' or the manufacturer's recommended pre-test length, whichever is greater) prior to the start of the project limits.
6) Position the left wheelpath sensor three feet (3') from the left edge marking of each lane tested.
7) Attain a test speed that is within the manufacturers recommendations for the equipment and maintain that test speed throughout the test.

For the initial testing, provide the Department the plot of one profile trace per tested lane and a summary report containing IRI values for each of the

three test runs performed in each direction. Submit the reports for the entire job in a single submission, unless agreed otherwise by the Engineer. Following review by the Engineer, and prior to grinding for smoothness improvement or deviation removal, a meeting to discuss the initial profile traces will be held with DelDOT Materials and Research and DelDOT Construction representatives to agree on the Contractor's proposed means and methods for smoothness improvement.

c. Final Testing

Test the final surface, after all smoothness operations have been completed, in accordance with "General Testing Requirements for IRI Data Collection", above. Submit results of final testing to the Engineer within five (5) working days of test completion in the format specified by the Engineer. Make one submission for the entire project unless otherwise agreed by the Engineer. Results not received within the allotted time frame will be assessed a charge of $1,000.00 per day. Take three measurements for each lane to meet the requirements of this Special Provision. If the pavement surface is longitudinally grooved or tined, more tests may be required in accordance with "General Testing Requirements for IRI Data Collection" of this special provision.

d. Final Testing for Excessive Deviations

All paved areas, whether subject to IRI testing or not, must be tested to locate deviations in each wheelpath in the longitudinal direction and in the transverse direction. A deviation is considered to be a hump or depression greater than or equal to 0.25" within 10'. Locate longitudinal deviations using data collected by an inertial profiling system and processed through a rolling 10'- straightedge simulation, a rolling 10' straightedge, or a rigid 10' straightedge. Locate transverse deviations using a rigid 10' straightedge at the discretion of the Engineer. Perform testing within seven (7) calendar days of the completion of paving.

8. Quality Assurance Testing:

Provide a lane closure at no cost to the contract if the Engineer chooses to perform comparison testing. Determine the length of the lane closure for each project location based on site conditions. Close at least 0.25 mile of roadway, but no more than 1 mile. Close the lane at either end of the project limits as determined on a project basis at the Engineer's discretion. If comparison testing indicates a difference greater than 6 in/mi in IRI measurements per 0.1 mile

section, the Contractor and Engineer shall work to resolve the differences. If the differences cannot be resolved, then reject the equipment for use on the project and all data collected to that point will be deemed invalid for that contract. At that point, the Contractor must propose an alternative piece of testing equipment for use.

9. Data Reporting:

Provide test results to the Department within five (5) working days of the completion of testing. Results not received within the allotted time frame will be assessed a charge of $1,000.00 per day. The Department recognizes that inertial profiler manufacturers use different formats for reporting capabilities. Printouts on 8 ½" by 11" paper or strip charts are acceptable. Provide data collected using the inertial profiling system to the Engineer with the following information clearly displayed on the printout:

a. Profiling Company Name
b. Date of Paving
c. Date of Test
d. Parameters used in the calculation
e. Data file name
f. Testing Personnel

A printout of the pavement profile is required for one (1) of the three (3) runs for each lane and direction tested. Submit a summary chart for the remaining test runs. If excessive deviations are calculated using inertial profiling data runs submitted for IRI analysis, then submit a summary chart as well. Include the station and wheelpath for deviation reporting. If excessive deviations are manually determined (using a rolling ten-foot straightedge or rigid 10' straightedge), the Engineer will be present during testing and will record the data on site. Inertial profiling systems have the capability of producing ERD files. An ERD file is requested for each run performed and can be submitted electronically (via email) or on external media (CD). More information about the format of ERD files can be obtained through the Engineer.

501.15 Method of Measurement

1. Square Yard. Pavement width measurement not to exceed that shown on the plans unless otherwise approved. Longitudinal dimension measured along the centerline of pavement.

2. Areas requiring repairs due to random cracking or failure to meet other performance measures will not be measured for payment until the repairs have been successfully completed. In these cases, the actual repair area (dimensions of the patch or other repair) will be the quantity withheld from payment. In addition, payment for the Test Strip pavement will not be made until testing has been completed and jointly reviewed and accepted by the Contractor and Engineer.

501.16 Basis of Payment

1. Payment includes furnishing all equipment, materials, and incidentals; placing, finishing, texturing, and curing concrete pavement meeting the performance measures outlined in subsection 501.11. Incidental to the item are:

   a. Repairs to random crack areas

   b. Repairs required to meet performance measures

   c. Furnishing a "Thermal Plan" and any accompanying testing equipment

   d. Any added costs for construction of the Test Strip and evaluation by the Engineer (Note that SY payment for the Test Strip will be made at the applicable concrete pavement unit bid price following acceptance by the Engineer of all testing, corrections, repairs, etc.)

   e. Furnishing inertial profiling system, operator, and straight edge, for smoothness testing; provide specified results for same

   f. Performing diamond grinding for specification compliance and/or ride quality improvement

   g. Sawing and constructing all pavement joints

   h. Sealing sawed joints along the completed pavement edge prior to placing adjoining pavement

   i. Constructing the Safety Edge

   j. Cold weather curing materials if necessary

   h. Lighting for work after dark if needed

   i. Template or other approved device for checking dowel bar assembly installation prior to concrete placement. This to be supplied to the Engineer

for use during paving operations and returned to the Contractor at the conclusion of paving.

j. Maintenance of Traffic if required for smoothness testing

k. Polyethylene covering and transverse bulkhead for protecting concrete during a rain event or other emergency

l. Any other incidental items mentioned in the body of this specification

2. Pavement Thickness Adjustments

a. For thickness deficiencies, the Department will adjust the contract unit price according to the schedule provided in Table 501.16-A.

Table 501.16-A
Price Adjustments for Concrete Pavement Thickness Deficiency

Deficiency in Average Pavement Thickness Determined by Cores	*Proportional Part of Contract Unit Bid Price (%)*
0.00 to 0.20 inches	100
0.21 to 0.30 inches	80
0.31 to 0.40 inches	72
0.41 to 0.50 inches	68
0.51 to 0.75 inches	57
0.76 to 1.00 inches	50
Greater than 1.00 inch	Remove and Replace

b. No additional payment over the unit Contract price will be made for any pavement with an average thickness in excess of that shown on the Plans. The maximum pavement thickness value used in this chart for a 1,000 S.Y. lot will be the plan pavement thickness.

3. Pavement Smoothness Acceptance and Payment

Acceptance of the final pavement will be based on the results of IRI values and the number of deviations. A section that has an IRI value greater than 100 in / mi will require corrective actions. Correct deviations equal to or in excess of 0.25” in 10’ in the transverse and longitudinal directions at no expense to the Engineer or have a discount charge of $200.00 per deviation assessed at the discretion of the Engineer.

Use an IRI number in inches per mile for each 0.1 mile (528 foot) section as the basis for payment of the areas subject to this specification. Use the average value of the three accepted test runs as the IRI value for payment. Base payments for each section on the surface area of each section using the length of the section and the width of the lane to calculate the surface area.

IRI Bonus / Penalty = Surface Area (in Square Yards) * UP * (PA-100)/100

Where: UP = Contract Unit Price per Square Yard

PA = Pay Adjustment from Table A below

The total pay adjustment for paving work done at each location will be:

(∑ IRI Bonus / Penalty for each section) - Total Deviations * $200

It is possible to receive bonus for IRI measurements and a discount charge for excessive deviations on the same project. If a 528' section has an IRI value resulting in a deduction of at least 30% of the section pay (i.e. IRI > 100 in / mi), the deviation discount charge for that section is disregarded and the IRI discount charge is the only action taken for that section.

Table A: Payment Adjustments

IRI per 0.1 mile section (in./mi.)	Payment Adjustment
40.0 and under	103
40.1 – 55.0	101
55.1 – 65.0	100
65.1 – 75.0	99
75.1 – 100.0	96
>100	Corrective actions required / 70% pay at Engineers Discretion

Corrections to the paving surface, such as diamond grinding with approved equipment, patching, or other measures may be performed at the Contractor's expense and at the Engineer's discretion to correct pavement surfaces assessed a discount charge. Areas corrected using these methods will not be eligible for bonus payment, but may be assessed a charge based on the resulting surface after correction. Pavement must still meet all thickness requirements of the contract, plans, and specifications after corrective measures. The Engineer reserves the right to require corrective actions such as remove & replace or diamond grinding

if conditions dictate. The Contractor shall be responsible for retesting any and all areas that were subject to corrective actions in accordance to the testing practices defined in this Special Provision.

4. Price Adjustment for Low Strength Concrete.

Concrete which fails to reach full 28 day design strength (f 'c) shall be subject to remedial action and prorated payment as specified in Categories A and B of Section 602.25 of the Standard Specifications. Make prorated payment in accordance with Section 602.27(b). Concrete having compressive strength of 500 psi or more below the designed f 'c of the pavement shall be removed and replaced at the Contractor's expense.

5-6-2015

BID PROPOSAL FORMS

CONTRACT T200911303.01

FEDERAL AID PROJECT NH-2015(23)

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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 ROAD				
0010	201000 CLEARING AND GRUBBING	LUMP	LUMP			
0020	202000 EXCAVATION AND EMBANKMENT	3351106.000 CY				
0030	202508 WETLAND ACCESS ROAD, TYPE II	LUMP	LUMP			
0040	202515 COMPACTING INSITU MATERIAL	223.000 SY				
0050	202555 SUBSOIL TILLAGE	389811.000 SY				
0060	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	20460.000 CY				
0070	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	5152.000 CY				
0080	209001 BORROW, TYPE A	3016.000 CY				
0090	209002 BORROW, TYPE B	31698.000 CY				
0100	209003 BORROW, TYPE C	310.000 CY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0110	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	8014.000 CY				
0120	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP	LUMP			
0130	211004 REMOVAL OF STRUCTURES AND OBSTRUCTIONS (PIPE)	300.000 LF				
0140	211521 ABANDONMENT OF WELLS	4.000 EACH				
0150	302007 GRADED AGGREGATE BASE COURSE, TYPE B	8979.000 CY				
0160	302011 DELAWARE NO. 3 STONE	5872.000 TON				
0170	302012 DELAWARE NO. 57 STONE	1050.000 TON				
0180	304501 PERMEABLE TREATED BASE, 4"	184543.000 SY				
0190	304502 SOIL CEMENT BASE COURSE, 6"	184543.000 SY				
0200	304506 PORTLAND CEMENT	3283.000 TON				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0210	401504 BITUMINOUS CONCRETE PAVEMENT TYPE C, LEVELING COURSE	128.000 TON				
0220	401801 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS PG 64-22 (CARBONATE STONE)	1154.000 TON				
0230	401810 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22	1657.000 TON				
0240	401813 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 70-22	2517.000 TON				
0250	401816 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 76-22	1150.000 TON				
0260	401819 BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22	3095.000 TON				
0270	401827 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22 (NON-CARBONATE STONE)	4174.000 TON				
0280	401833 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 76-22, (NON-CARBONATE STONE)	440.000 TON				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0290	501006 PORTLAND CEMENT CONCRETE PAVEMENT, 12"	184543.000 SY				
0300	601506 MAINTENANCE OF STREAM FLOW	LUMP	LUMP			
0310	601514 RAILROAD AT GRADE CROSSING	80.000 LF				
0320	602507 CONCRETE ENCASEMENT	9.000 CY				
0330	605500 CANTILEVER SIGN SUPPORTS AND FOUNDATION	LUMP	LUMP			
0340	605501 GROUND MOUNT BREAKAWAY TYPE SIGN SUPPORTS AND FOUNDATION	LUMP	LUMP			
0350	612021 REINFORCED CONCRETE PIPE, 15", CLASS IV	627.000 LF				
0360	612022 REINFORCED CONCRETE PIPE, 18", CLASS IV	14833.000 LF				
0370	612023 REINFORCED CONCRETE PIPE, 24", CLASS IV	4459.000 LF				
0380	612025 REINFORCED CONCRETE PIPE, 30", CLASS IV	568.000 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
0390	612030 REINFORCED CONCRETE PIPE, 18", CLASS V	782.000 LF				
0400	612031 REINFORCED CONCRETE PIPE, 24", CLASS V	505.000 LF				
0410	612032 REINFORCED CONCRETE PIPE, 15", CLASS V	690.000 LF				
0420	612039 REINFORCED CONCRETE PIPE, 36" CLASS V	72.000 LF				
0430	612041 REINFORCED CONCRETE PIPE, 54", CLASS V	124.000 LF				
0440	612043 REINFORCED CONCRETE PIPE, 42", CLASS V	293.000 LF				
0450	612051 REINFORCED CONCRETE PIPE, 60", CLASS V	120.000 LF				
0460	612205 REINFORCED CONCRETE ELLIPTICAL PIPE, 19"X30", CLASS IV	1957.000 LF				
0470	612208 REINFORCED CONCRETE ELLIPTICAL PIPE, 43"X68", CLASS IV	236.000 LF				
0480	612215 REINFORCED CONCRETE ELLIPTICAL PIPE, 38"X60", CLASS IV	867.000 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
0490	612216 REINFORCED CONCRETE ELLIPTICAL PIPE, 14"X23", CLASS IV	3694.000 LF				
0500	612219 REINFORCED CONCRETE ELLIPTICAL PIPE, 24"X38", CLASS IV	224.000 LF				
0510	612220 REINFORCED CONCRETE ELLIPTICAL PIPE, 29"X45", CLASS IV	1154.000 LF				
0520	612221 REINFORCED CONCRETE ELLIPTICAL PIPE, 48"X76", CLASS IV	215.000 LF				
0530	612229 REINFORCED CONCRETE ELLIPTICAL PIPE, 53"X83", CLASS IV	827.000 LF				
0540	614588 DUCTILE IRON PIPE, 18"	50.000 LF				
0550	614665 DUCTILE IRON PIPE CLASS 52, CEMENT LINED, 24"	264.000 LF				
0560	614764 DUCTILE IRON PIPE, 36"	215.000 LF				
0570	617002 REINFORCED CONCRETE FLARED END SECTION, 15"	7.000 EACH				
0580	617003 REINFORCED CONCRETE FLARED END SECTION, 18"	47.000 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
0590	617005 REINFORCED CONCRETE FLARED END SECTION, 24"	15.000 EACH				
0600	617007 REINFORCED CONCRETE FLARED END SECTION, 30"	3.000 EACH				
0610	617164 REINFORCED CONCRETE FLARED END SECTION, 19" X 30"	13.000 EACH				
0620	617165 REINFORCED CONCRETE FLARED END SECTION, 14" X 23"	5.000 EACH				
0630	617171 REINFORCED CONCRETE FLARED END SECTION, 29" X 45"	2.000 EACH				
0640	617174 REINFORCED CONCRETE FLARED END SECTION, 24" X 38"	3.000 EACH				
0650	617518 DRAINAGE HEADWALLS, MODIFIED	LUMP	LUMP			
0660	701010 PORTLAND CEMENT CONCRETE CURB, TYPE 1-8	316.000 LF				
0670	701011 PORTLAND CEMENT CONCRETE CURB, TYPE 2	170.000 LF				
0680	701013 PORTLAND CEMENT CONCRETE CURB, TYPE 1-2	1917.000 LF				

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0690	701015 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 1-2	103.000 LF				
0700	701016 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 1-4	13075.000 LF				
0710	701022 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 3-8	1681.000 LF				
0720	705001 P.C.C. SIDEWALK, 4"	9117.000 SF				
0730	705002 P.C.C. SIDEWALK, 6"	5196.000 SF				
0740	707005 UNDERDRAIN OUTLET	50.000 EACH				
0750	708050 DRAINAGE INLET, 34" X 18"	44.000 EACH				
0760	708051 DRAINAGE INLET, 34" X 24"	43.000 EACH				
0770	708052 DRAINAGE INLET, 48" X 30"	80.000 EACH				
0780	708053 DRAINAGE INLET, 48" X 48"	24.000 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
0790	708055 DRAINAGE INLET, 66" X 48"	1.000 EACH				
0800	708056 DRAINAGE INLET, 66" X 66"	5.000 EACH				
0810	708057 DRAINAGE INLET, 72" X 24"	8.000 EACH				
0820	708058 DRAINAGE INLET, 72" X 48"	15.000 EACH				
0830	708107 MANHOLE, ROUND	8.000 EACH				
0840	708111 MANHOLE, 48" X 30"	1.000 EACH				
0850	708112 MANHOLE, 48" X 48"	1.000 EACH				
0860	708113 MANHOLE, 66" X 30"	1.000 EACH				
0870	708114 MANHOLE, 66" X 48"	1.000 EACH				
0880	708512 DRAINAGE INLET, SPECIAL I	8.000 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
0890	708513 DRAINAGE INLET, SPECIAL II	13.000 EACH				
0900	708514 DRAINAGE INLET, SPECIAL III	1.000 EACH				
0910	708515 DRAINAGE INLET, SPECIAL IV	4.000 EACH				
0920	708516 DRAINAGE INLET, SPECIAL V	1.000 EACH				
0930	708517 DRAINAGE INLET, SPECIAL VI	1.000 EACH				
0940	708518 DRAINAGE INLET, SPECIAL VII	1.000 EACH				
0950	708582 MANHOLE,SPECIAL I	9.000 EACH				
0960	708583 PERSONNEL GRATE FOR PIPE INLET	19.000 EACH				
0970	708596 MANHOLE, SPECIAL II	2.000 EACH				
0980	708597 MANHOLE, SPECIAL III	5.000 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
0990	708598 MANHOLE, SPECIAL IV	1.000 EACH				
1000	708653 DRAINAGE INLET, SPECIAL VIII	2.000 EACH				
1010	708654 DRAINAGE INLET, SPECIAL IX	1.000 EACH				
1020	708655 DRAINAGE INLET, SPECIAL X	2.000 EACH				
1030	708656 DRAINAGE INLET, SPECIAL XI	1.000 EACH				
1040	708657 DRAINAGE INLET, SPECIAL XII	1.000 EACH				
1050	708664 CONVERTING EXISTING JUNCTION BOX TO CATCH BASIN	1.000 EACH				
1060	712005 RIPRAP, R-4	2882.000 SY				
1070	712006 RIPRAP, R-5	2001.000 SY				
1080	712007 RIPRAP, R-6	583.000 SY				
1090	712020 RIPRAP, R-4	704.000 TON				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1100	712521 RIPRAP, SPECIAL	311.000 SY				
1110	712528 ROCK, SPECIAL	175.000 TON				
1120	712531 CHANNEL BED FILL	264.000 CY				
1130	713001 GEOTEXTILES, STABILIZATION	53099.000 SY				
1140	713003 GEOTEXTILES, RIPRAP	8308.000 SY				
1150	714000 LATERAL OR LONGITUDINAL DITCHING	2100.000 LF				
1160	715000 PERFORATED PIPE UNDERDRAINS, 4"	770.000 LF				
1170	715001 PERFORATED PIPE UNDERDRAINS, 6"	55897.000 LF				
1180	715500 UNDERDRAIN OUTLET PIPE, 6"	3740.000 LF				
1190	715505 TEMPORARY DRAINAGE PIPE, 15"	200.000 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
1200	715506 TEMPORARY DRAINAGE PIPE, 24"	120.000 LF				
1210	715508 TEMPORARY DRAINAGE PIPE, 18"	669.000 LF				
1220	715515 TEMPORARY DRAINAGE PIPE, 60"	70.000 LF				
1230	720050 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	21795.000 LF				
1240	720055 CURVED GUARDRAIL SECTION	175.000 LF				
1250	720557 PERMANENT P.C.C. PRECAST BARRIER TOLL BOOTH	4.000 EACH				
1260	720585 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1-31	25.000 EACH				
1270	720586 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2-31	3.000 EACH				
1280	720588 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3-31	2.000 EACH				
1290	720626 CONCRETE SINGLE FACE BARRIER, TYPE I	150.000 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
1300	725001 GUARDRAIL TO BARRIER CONNECTION (EXIT TYPE 31)	14.000 EACH				
1310	725002 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31	27.000 EACH				
1320	725003 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-31	5.000 EACH				
1330	725005 GUARDRAIL TO BARRIER CONNECTION (EXIT TYPE 27)	1.000 EACH				
1340	726001 END ANCHORAGE 31	15.000 EACH				
1350	727000 RIGHT-OF-WAY FENCE	52222.000 LF				
1360	727001 RIGHT-OF-WAY FENCE GATE	12.000 EACH				
1370	727014 CONSTRUCTION SAFETY FENCE	10595.000 LF				
1380	727015 MONUMENTS	202.000 EACH				
1390	727552 RESOURCE PROTECTION FENCE	15728.000 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
1400	732505 SOIL COMPOSTING	8053.000 CY				
1410	735501 HERBICIDE APPLICATION, NOXIOUS WEEDS	50.000 ACRE				
1420	737503 BEDDING FOR REFORESTATION	276801.000 SY				
1430	737523 PLANTINGS	LUMP	LUMP			
1440	743000 MAINTENANCE OF TRAFFIC	LUMP	LUMP			
1450	743003 ARROWPANELS, TYPE C	330.000 EADY				
1460	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	330.000 EADY				
1470	743006 PLASTIC DRUMS	109270.000 EADY				
1480	743007 TRAFFIC OFFICERS	350.000 HOUR	75.00000		26250.00	
1490	743009 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE I	270.000 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
1500	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	120.000 EADY				
1510	743015 FURNISH AND MAINTAIN PORTABLE PCC SAFETY BARRIER	1393.000 LF				
1520	743023 TEMPORARY BARRICADES, TYPE III	41980.000 LFDY				
1530	743024 TEMPORARY WARNING SIGNS AND PLAQUES	35342.000 EADY				
1540	743029 FURNISH TEMPORARY IMPACT ATTENUATOR - NON-GATING, REDIRECTIVE, TEST LEVEL 3	3.000 EACH				
1550	743030 RELOCATE TEMPORARY IMPACT ATTENUATOR	3.000 EACH				
1560	743050 FLAGGER, NEW CASTLE COUNTY, STATE	520.000 HOUR	50.66000		26343.20	
1570	743062 FLAGGER, NEW CASTLE COUNTY, STATE, OVERTIME	110.000 HOUR	73.46000		8080.60	
1580	744506 CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE	25.000 EACH				
1590	744530 CONCUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/ POLYMER LID-FRAME	128.000 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
1600	744531 CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/ POLYMER LID-FRAME	78.000 EACH				
1610	745500 GALVANIZED CONDUIT IN/ON STRUCTURE, 1"	55.000 LF				
1620	745522 SUPPLY OF 3" SCHEDULE 80 PVC CONDUIT	18017.000 LF				
1630	745524 SUPPLY OF 4" SCHEDULE 80 PVC CONDUIT	232.000 LF				
1640	745528 SUPPLY OF 2" GALVANIZED STEEL CONDUIT	121.000 LF				
1650	745530 SUPPLY OF 1" GALVANIZED STEEL CONDUIT	269.000 LF				
1660	745543 INSTALLATION OF CONDUIT UNDER EXISTING PAVEMENT-OPEN CUT	53.000 LF				
1670	745544 INSTALLATION OF CONDUIT IN UNPAVED TRENCH	17475.000 LF				
1680	745547 INSTALLATION OF ADDITIONAL CONDUITS IN TRENCH OR OPEN CUT PAVEMENT	1799.000 LF				
1690	745579 SUPPLY OF 2 1/2" SCHEDULE 80 PVC CONDUIT	576.000 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
1700	745602 FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)	70.000 LF				
1710	745603 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (OPEN CUT)	145.000 LF				
1720	745604 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)	27124.000 LF				
1730	745606 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (TRENCH)	11515.000 LF				
1740	745610 FURNISH & INSTALL UP TO 4" NONMETALLIC POLE RISER SHIELD	60.000 LF				
1750	746509 RELOCATING LIGHT POLE	2.000 EACH				
1760	746511 CABLES, 1/#4 AWG	19363.000 LF				
1770	746512 CABLES, 1/#6 AWG	48193.000 LF				
1780	746515 INSULATED GROUND CABLES, 1/#6	13542.000 LF				
1790	746516 SERVICE INSTALLATION	3.000 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
1800	746517 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 30' POLE	18.000 EACH				
1810	746519 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 40' POLE	56.000 EACH				
1820	746527 CABLES, 1/#2 AWG	1164.000 LF				
1830	746539 REMOVAL OF EXISTING POLE	2.000 EACH				
1840	746553 POLE BASE, SPECIAL	2.000 EACH				
1850	746564 INSULATED GROUND CABLES, 1/#4	5031.000 LF				
1860	746567 CABLES, 1/#1/0 AWG	1522.000 LF				
1870	746569 RELOCATING ELECTRIC UTILITY	LUMP	LUMP			
1880	746590 FURNISH & INSTALL GROUND ROD	145.000 EACH				
1890	746595 ALUMINUM LIGHTING STANDARD, 40' POLE	3.000 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
1900	746598 INSULATED GROUND CABLE , 1/#2	501.000 LF				
1910	746653 ELECTRICAL TESTING	LUMP	LUMP			
1920	746717 ELECTRIC SERVICE ON PEDESTAL WITH SERVICE RISER	3.000 EACH				
1930	746787 REMOVAL OF CABLE FROM CONDUIT OR POLE	350.000 LF				
1940	746830 REMOVAL OF CONCRETE POLE BASES AND CABINET FOUNDATIONS	2.000 CY				
1950	746852 POLE BASE, TYPE 6	84.000 EACH				
1960	746876 UNDERPASS LIGHT FIXTURE	4.000 EACH				
1970	747506 CABINET BASE	4.000 EACH				
1980	747508 LIGHTING CONTROL CENTER - 100 A	1.000 EACH				
1990	747509 LIGHTING CONTROL CENTER - 200A, 277/480V	3.000 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
2000	747512 LIGHTING DISCONNECT SWITCH PEDESTAL	3.000 EACH				
2010	747514 CABINET BASE, TYPE F	2.000 EACH				
2020	747516 CABINET BASE, TYPE P	2.000 EACH				
2030	747517 CABINET BASE, TYPE R	6.000 EACH				
2040	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	1840.000 SF				
2050	748026 TEMPORARY MARKINGS, PAINT SYMBOL/LEGEND	91.000 SF				
2060	748032 TEMPORARY MARKINGS, PAINT, 5"	51996.000 LF				
2070	748502 RAISED/RECESSED PAVEMENT MARKER	1030.000 EACH				
2080	748509 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, 12"	228.000 LF				
2090	748513 RETROREFLECTIVE PREFORMED PATTERNEDMARKINGS, 12"	229.000 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
2100	748529 RETROREFLECTIVE PREFORMED PATTERNEDMARKINGS, SYMBOL/LEGEND	70.000 SF				
2110	748530 REMOVAL OF PAVEMENT STRIPING	16830.000 SF				
2120	748548 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"	133297.000 LF				
2130	748549 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"	4548.000 LF				
2140	748557 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"	48119.000 LF				
2150	748565 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 10"	59.000 LF				
2160	748566 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 8"	10955.000 LF				
2170	748567 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 13"	1274.000 LF				
2180	749500 SIGN PANEL	252.000 SF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2190	749556 INSTALLATION OF SIGN ON GROUND MOUNT POSTS	3619.000 SF				
2200	749557 REMOVAL OF SIGN ON GROUND MOUNT POSTS	96.000 SF				
2210	749687 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	38.000 EACH				
2220	749690 INSTALLATION OR REMOVAL OF TRAFFIC SIGNS ON MULTIPLE SIGN POSTS	1283.000 SF				
2230	759508 FIELD OFFICE, TY II.122 SPECIAL COMPLEX	40.000 EAMO				
2240	759509 FIELD OFFICE, TYPE II.122.C, SPECIAL COMPLEX	42.000 EAMO				
2250	760003 PAVEMENT - MILLING, HOT-MIX, VARIABLE DEPTH	2760.000 SY				
2260	760006 PAVEMENT - MILLING, HOT-MIX, 2" DEPTH	11696.000 SY				
2270	760016 RUMBLE STRIPS, HOT-MIX	4972.000 LF				
2280	760017 RUMBLE STRIPS, CONCRETE	93347.000 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
2290	760507 PROFILE MILLING, BITUMINOUS CONCRETE	2018.000 SYIN				
2300	762001 SAW CUTTING, BITUMINOUS CONCRETE	4870.000 LF				
2310	763000 INITIAL EXPENSE	LUMP	LUMP			
2320	763501 CONSTRUCTION ENGINEERING	LUMP	LUMP			
2330	763503 TRAINEE	3000.000 HOUR	0.80000		2400.00	
2340	763518 ELECTRICAL WORK, TOLL PLAZA	LUMP	LUMP			
2350	763519 MECHANICAL WORK, TOLL PLAZA	LUMP	LUMP			
2360	763568 EMERGENCY GENERATOR	LUMP	LUMP			
2370	763641 ARCHITECTURAL WORK, TOLL PLAZA	LUMP	LUMP			
2380	763654 BEAVER DAM BYPASS	LUMP	LUMP			

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2390	763688 PLUMBING SYSTEM	LUMP	LUMP			
2400	763689 STRUCTURAL WORK, GANTRY	LUMP	LUMP			
2410	900500 ENVIRONMENTAL PERFORMANCE INCENTIVE (DISINCENTIVE)	LUMP	LUMP			
2420	900501 BORROW AREA EROSION AND SEDIMENT CONTROL AND DEWATERING	LUMP	LUMP			
2430	905001 SILT FENCE	44147.000 LF				
2440	905002 REINFORCED SILT FENCE	29498.000 LF				
2450	905003 SEDIMENT TRAP	18057.000 CY				
2460	905004 INLET SEDIMENT CONTROL, DRAINAGE INLET	102.000 EACH				
2470	905005 INLET SEDIMENT CONTROL, CURB INLET	103.000 EACH				
2480	905006 INLET SEDIMENT CONTROL, CULVERT INLET	6.000 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
2490	905501 TEMPORARY STORM WATER INLET COVER	66.000 EACH				
2500	906001 PORTABLE SEDIMENT TANK	7.000 EACH				
2510	906002 DEWATERING BAG	9.000 EACH				
2520	906004 SKIMMER DEWATERING DEVICE	22.000 EACH				
2530	907011 STONE CHECK DAM	226.000 TON				
2540	907012 TEMPORARY SLOPE DRAIN, 12"	463.000 LF				
2550	907013 TEMPORARY SLOPE DRAIN, 18"	1721.000 LF				
2560	907014 TEMPORARY SLOPE DRAIN, 21"	345.000 LF				
2570	907016 TEMPORARY SLOPE DRAIN, 30"	100.000 LF				
2580	907503 TEMPORARY SWALE, TYPE B-2	3012.000 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
2590	907508 EARTH DIKE, TYPE B-1	9979.000 LF				
2600	908003 TOPSOIL, 4" DEPTH	3740.000 SY				
2610	908008 TOPSOILING, 2" DEPTH	26.000 SY				
2620	908009 TOPSOILING, 4" DEPTH	239.000 SY				
2630	908010 TOPSOILING, 6" DEPTH	496924.000 SY				
2640	908013 TOPSOILING, 18" DEPTH	276720.000 SY				
2650	908014 PERMANENT GRASS SEEDING, DRY GROUND	780586.000 SY				
2660	908015 PERMANENT GRASS SEEDING, WET GROUND	162841.000 SY				
2670	908017 TEMPORARY GRASS SEEDING	669093.000 SY				
2680	908019 STREAMBANK SEED MIX, SEEDING	270.000 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
2690	908020 EROSION CONTROL BLANKET MULCH	502480.000 SY				
2700	908021 TURF REINFORCEMENT MATTING, TYPE 1	3528.000 SY				
2710	908022 TURF REINFORCEMENT MATTING, TYPE 2	38.000 SY				
2720	908023 STABILIZED CONSTRUCTION ENTRANCE	973.000 TON				
2730	908501 NATIVE GRASS SEEDING, NO MOW MIX	205806.000 SY				
2740	908503 WETLAND MITIGATION GRASS SEEDING	413404.000 SY				
2750	908504 COIR FIBER MATTING	6140.000 SY				
2760	909005 STREAM DIVERSION	LUMP	LUMP			
2770	910004 CLAY BORROW, CUT-OFF TRENCH	4465.000 CY				
2780	910006 OUTLET STRUCTURE	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
2790	910007 OUTLET STRUCTURE	LUMP	LUMP			
	SECTION 0001 TOTAL					

SECTION 0002 BRIDGE 1-468 STANDARD ITEMS

2800	202505 SETTLEMENT PLATFORM	2.000 EACH				
2810	202518 SETTLEMENT MONUMENT	2.000 EACH				
2820	302012 DELAWARE NO. 57 STONE	172.000 TON				
2830	602003 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS A	207.000 CY				
2840	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	360.000 CY				
2850	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	388.000 CY				
2860	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	69.000 CY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2870	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	98.000 CY				
2880	602772 MECHANICALLY STABILIZED EARTH WALLS	LUMP	LUMP			
2890	604000 BAR REINFORCEMENT, EPOXY COATED	207130.000 LB				
2900	605511 PREFABRICATED EXPANSION JOINT SYSTEM, 3"	250.000 LF				
2910	619501 PRODUCTION PILE RESTRIKE	4.000 EACH				
2920	619502 TEST PILE RESTRIKE	4.000 EADY				
2930	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
2940	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
2950	623000 PRESTRESSED REINFORCED CONCRETE MEMBERS	LUMP	LUMP			
	SECTION 0002 TOTAL					

SECTION 0003 BRIDGE 1-468 PILE ALTERNATE 1

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2960	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	2619.000 LF				
2970	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	368.000 LF				
2980	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	2619.000 LF				
2990	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	368.000 LF				
	SECTION 0003 TOTAL					

SECTION 0004 BRIDGE 1-468 PILE ALTERNATIVE

3000	618041 FURNISH CAST-IN-PLACE CONCRETE PILES, 14"	2395.000 LF				
3010	618046 FURNISH CAST-IN-PLACE CONCRETE TEST PILES, 14"	340.000 LF				
3020	619021 INSTALL CAST-IN-PLACE CONCRETE PILES, 14"	2395.000 LF				
3030	619025 INSTALL CAST IN PLACE CONCRETE TEST PILES, 14"	340.000 LF				
	SECTION 0004 TOTAL					

SECTION 0005 BRIDGE 1-470 STANDARD ITEMS

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
3040	202505 SETTLEMENT PLATFORM	4.000 EACH				
3050	202518 SETTLEMENT MONUMENT	4.000 EACH				
3060	302012 DELAWARE NO. 57 STONE	203.000 TON				
3070	602003 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS A	257.000 CY				
3080	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	176.000 CY				
3090	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	194.000 CY				
3100	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	865.000 CY				
3110	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	416.000 CY				
3120	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	88.000 CY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
3130	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	154.000 CY				
3140	602772 MECHANICALLY STABILIZED EARTH WALLS	LUMP	LUMP			
3150	603000 BAR REINFORCEMENT	63740.000 LB				
3160	604000 BAR REINFORCEMENT, EPOXY COATED	364720.000 LB				
3170	605511 PREFABRICATED EXPANSION JOINT SYSTEM, 3"	289.000 LF				
3180	619501 PRODUCTION PILE RESTRIKE	10.000 EACH				
3190	619502 TEST PILE RESTRIKE	6.000 EADY				
3200	619519 DYNAMIC PILE TESTING BY CONTRACTOR	6.000 EACH				
3210	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	6.000 EACH				
3220	623000 PRESTRESSED REINFORCED CONCRETE MEMBERS	LUMP	LUMP			

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
3230	745522 SUPPLY OF 3" SCHEDULE 80 PVC CONDUIT	295.000 LF				
3240	746596 JUNCTION BOX ON STRUCTURE	2.000 EACH				
	SECTION 0005 TOTAL					

SECTION 0006 BRIDGE 1-470 PILE ALTERNATIVE 1

3250	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	7550.000 LF				
3260	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	370.000 LF				
3270	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	7550.000 LF				
3280	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	370.000 LF				
	SECTION 0006 TOTAL					

SECTION 0007 BRIDGE 1-470 PILE ALTERNATIVE 2

3290	618041 FURNISH CAST-IN-PLACE CONCRETE PILES, 14"	2803.000 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
3300	618042 FURNISH CAST-IN-PLACE CONCRETE PILES, 16"	3614.000 LF				
3310	618046 FURNISH CAST-IN-PLACE CONCRETE TEST PILES, 14"	275.000 LF				
3320	618047 FURNISH CAST-IN-PLACE CONCRETE TEST PILES, 16"	78.000 LF				
3330	619021 INSTALL CAST-IN-PLACE CONCRETE PILES, 14"	2803.000 LF				
3340	619022 INSTALL CAST-IN-PLACE CONCRETE PILES, 16"	3614.000 LF				
3350	619025 INSTALL CAST IN PLACE CONCRETE TEST PILES, 14"	275.000 LF				
3360	619026 INSTALL CAST-IN-PLACE CONCRETE TEST PILES, 16"	78.000 LF				
	SECTION 0007 TOTAL					

SECTION 0008 BRIDGE 1-472 STANDARD ITEMS

3370	202505 SETTLEMENT PLATFORM	4.000 EACH				
3380	202518 SETTLEMENT MONUMENT	4.000 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
3390	302012 DELAWARE NO. 57 STONE	156.000 TON				
3400	602003 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS A	180.000 CY				
3410	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	380.000 CY				
3420	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	352.000 CY				
3430	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	58.000 CY				
3440	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	82.000 CY				
3450	602772 MECHANICALLY STABILIZED EARTH WALLS	LUMP	LUMP			
3460	604000 BAR REINFORCEMENT, EPOXY COATED	192100.000 LB				
3470	605511 PREFABRICATED EXPANSION JOINT SYSTEM, 3"	226.000 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
3480	619501 PRODUCTION PILE RESTRIKE	4.000 EACH				
3490	619502 TEST PILE RESTRIKE	4.000 EADY				
3500	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
3510	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
3520	623000 PRESTRESSED REINFORCED CONCRETE MEMBERS	LUMP	LUMP			
	SECTION 0008 TOTAL					

SECTION 0009 BRIDGE 1-472 PILE ALTERNATIVE 1

3530	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	2104.000 LF				
3540	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	304.000 LF				
3550	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	2104.000 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
3560	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	304.000 LF				
	SECTION 0009 TOTAL					

SECTION 0010 BRIDGE 1-472 PILE ALTERNATIVE 2

3570	618041 FURNISH CAST-IN-PLACE CONCRETE PILES, 14"	2104.000 LF				
3580	618046 FURNISH CAST-IN-PLACE CONCRETE TEST PILES, 14"	304.000 LF				
3590	619021 INSTALL CAST-IN-PLACE CONCRETE PILES, 14"	2104.000 LF				
3600	619025 INSTALL CAST IN PLACE CONCRETE TEST PILES, 14"	304.000 LF				
	SECTION 0010 TOTAL					

SECTION 0011 BRIDGE 1-475 STANDARD ITEMS

3610	202505 SETTLEMENT PLATFORM	2.000 EACH				
3620	202518 SETTLEMENT MONUMENT	2.000 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
3630	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	75.000 CY				
3640	302012 DELAWARE NO. 57 STONE	12.000 TON				
3650	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	38.000 CY				
3660	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	86.000 CY				
3670	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	235.000 CY				
3680	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	135.000 CY				
3690	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	75.000 CY				
3700	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	250.000 CY				
3710	602772 MECHANICALLY STABILIZED EARTH WALLS	LUMP	LUMP			
3720	603000 BAR REINFORCEMENT	25000.000 LB				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
3730	604000 BAR REINFORCEMENT, EPOXY COATED	154000.000 LB				
3740	605511 PREFABRICATED EXPANSION JOINT SYSTEM, 3"	85.000 LF				
3750	605581 ELASTOMERIC BRIDGE BEARING PAD	20.000 EACH				
3760	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	900.000 LF				
3770	618083 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 18" X 18"	820.000 LF				
3780	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	170.000 LF				
3790	618093 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 18" X 18"	125.000 LF				
3800	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	900.000 LF				
3810	619063 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 18" X 18"	820.000 LF				
3820	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	170.000 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
3830	619069 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 18" X 18"	125.000 LF				
3840	619501 PRODUCTION PILE RESTRIKE	10.000 EACH				
3850	619502 TEST PILE RESTRIKE	4.000 EADY				
3860	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
3870	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	8.000 EACH				
3880	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP	LUMP			
3890	727004 CHAIN-LINK FENCE, 6' HIGH	302.000 LF				
	SECTION 0011 TOTAL					

SECTION 0012 BRIDGE 1-477 STANDARD ITEMS

3900	202505 SETTLEMENT PLATFORM	4.000 EACH				
3910	202518 SETTLEMENT MONUMENT	4.000 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
3920	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	1900.000 CY				
3930	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	4750.000 CY				
3940	302012 DELAWARE NO. 57 STONE	70.000 TON				
3950	602004 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS B	790.000 CY				
3960	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	66.000 CY				
3970	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	830.000 CY				
3980	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	520.000 CY				
3990	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	815.000 CY				
4000	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	133.000 CY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
4010	603000 BAR REINFORCEMENT	93000.000 LB				
4020	604000 BAR REINFORCEMENT, EPOXY COATED	421000.000 LB				
4030	605511 PREFABRICATED EXPANSION JOINT SYSTEM, 3"	266.000 LF				
4040	605581 ELASTOMERIC BRIDGE BEARING PAD	36.000 EACH				
4050	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	12800.000 LF				
4060	618083 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 18" X 18"	1260.000 LF				
4070	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	260.000 LF				
4080	618093 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 18" X 18"	60.000 LF				
4090	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	12800.000 LF				
4100	619063 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 18" X 18"	1260.000 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
4110	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	260.000 LF				
4120	619069 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 18" X 18"	60.000 LF				
4130	619501 PRODUCTION PILE RESTRIKE	20.000 EACH				
4140	619502 TEST PILE RESTRIKE	8.000 EADY				
4150	619519 DYNAMIC PILE TESTING BY CONTRACTOR	5.000 EACH				
4160	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	10.000 EACH				
4170	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP	LUMP			
4180	712021 RIPRAP, R-5	1075.000 TON				
4190	712531 CHANNEL BED FILL	40.000 CY				
4200	713003 GEOTEXTILES, RIPRAP	900.000 SY				

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4210	715001 PERFORATED PIPE UNDERDRAINS, 6"	360.000 LF				
4220	745522 SUPPLY OF 3" SCHEDULE 80 PVC CONDUIT	515.000 LF				
4230	746596 JUNCTION BOX ON STRUCTURE	4.000 EACH				
4240	908009 TOPSOILING, 4" DEPTH	1600.000 SY				
	SECTION 0012 TOTAL					

SECTION 0013 BRIDGE 1-479 STANDARD ITEMS

4250	202505 SETTLEMENT PLATFORM	2.000 EACH				
4260	202518 SETTLEMENT MONUMENT	2.000 EACH				
4270	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	559.000 CY				
4280	302012 DELAWARE NO. 57 STONE	13.000 TON				

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4290	602004 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS B	252.000 CY				
4300	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	225.000 CY				
4310	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	209.000 CY				
4320	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	341.000 CY				
4330	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	58.000 CY				
4340	603000 BAR REINFORCEMENT	36886.000 LB				
4350	604000 BAR REINFORCEMENT, EPOXY COATED	126860.000 LB				
4360	605512 PREFABRICATED EXPANSION JOINT SYSTEM, 4"	95.000 LF				
4370	605581 ELASTOMERIC BRIDGE BEARING PAD	10.000 EACH				

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4380	619501 PRODUCTION PILE RESTRIKE	6.000 EACH				
4390	619502 TEST PILE RESTRIKE	4.000 EADY				
4400	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
4410	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
4420	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP	LUMP			
4430	712006 RIPRAP, R-5	141.000 SY				
4440	713003 GEOTEXTILES, RIPRAP	141.000 SY				
4450	908009 TOPSOILING, 4" DEPTH	282.000 SY				
	SECTION 0013 TOTAL					

SECTION 0014 BRIDGE 1-479 PILE ALTERNATIVE 1

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4460	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	6073.000 LF				
4470	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	281.000 LF				
4480	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	6073.000 LF				
4490	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	281.000 LF				
	SECTION 0014 TOTAL					

SECTION 0015 BRIDGE 1-479 ALTERNATIVE 2

4500	618041 FURNISH CAST-IN-PLACE CONCRETE PILES, 14"	5253.000 LF				
4510	618046 FURNISH CAST-IN-PLACE CONCRETE TEST PILES, 14"	249.000 LF				
4520	619021 INSTALL CAST-IN-PLACE CONCRETE PILES, 14"	5253.000 LF				
4530	619025 INSTALL CAST IN PLACE CONCRETE TEST PILES, 14"	249.000 LF				
	SECTION 0015 TOTAL					

SECTION 0016 BRIDGE 1-480 STANDARD ITEMS

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4540	202505 SETTLEMENT PLATFORM	4.000 EACH				
4550	202518 SETTLEMENT MONUMENT	4.000 EACH				
4560	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	1685.000 CY				
4570	302012 DELAWARE NO. 57 STONE	105.000 TON				
4580	602004 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS B	529.000 CY				
4590	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	100.000 CY				
4600	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	772.000 CY				
4610	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	438.000 CY				
4620	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	807.000 CY				

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4630	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	165.000 CY				
4640	603000 BAR REINFORCEMENT	89445.000 LB				
4650	604000 BAR REINFORCEMENT, EPOXY COATED	367527.000 LB				
4660	605512 PREFABRICATED EXPANSION JOINT SYSTEM, 4"	212.000 LF				
4670	605581 ELASTOMERIC BRIDGE BEARING PAD	40.000 EACH				
4680	619501 PRODUCTION PILE RESTRIKE	12.000 EACH				
4690	619502 TEST PILE RESTRIKE	6.000 EADY				
4700	619519 DYNAMIC PILE TESTING BY CONTRACTOR	6.000 EACH				
4710	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	6.000 EACH				
4720	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP	LUMP			
4730	712006 RIPRAP, R-5	458.000 SY				

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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
4740	712007 RIPRAP, R-6	1054.000 SY				
4750	712531 CHANNEL BED FILL	125.000 CY				
4760	713003 GEOTEXTILES, RIPRAP	1512.000 SY				
4770	908009 TOPSOILING, 4" DEPTH	2274.000 SY				
	SECTION 0016 TOTAL					

SECTION 0017 BRIDGE 1-480 PILE ALTERNATIVE 1

4780	618081 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	12007.000 LF				
4790	618083 FURNISH PRECAST PRESTRESSED CONCRETE PILE, 18" X 18"	2568.000 LF				
4800	618091 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	266.000 LF				
4810	618093 FURNISH PRECAST PRESTRESSED CONCRETE TEST PILE, 18" X 18"	171.000 LF				

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4820	619061 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 14" X 14"	12007.000 LF				
4830	619063 INSTALL PRECAST PRESTRESSED CONCRETE PILE, 18" X 18"	2568.000 LF				
4840	619067 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 14" X 14"	266.000 LF				
4850	619069 INSTALL PRECAST PRESTRESSED CONCRETE TEST PILE, 18" X 18"	171.000 LF				
	SECTION 0017 TOTAL					

SECTION 0018 BRIDGE 1-480 PILE ALTERNATIVE 2

4860	618041 FURNISH CAST-IN-PLACE CONCRETE PILES, 14"	9600.000 LF				
4870	618046 FURNISH CAST-IN-PLACE CONCRETE TEST PILES, 14"	220.000 LF				
4880	619021 INSTALL CAST-IN-PLACE CONCRETE PILES, 14"	9600.000 LF				
4890	619025 INSTALL CAST IN PLACE CONCRETE TEST PILES, 14"	220.000 LF				
	SECTION 0018 TOTAL					

SECTION 0019 BRIDGE 1-507 STANDARD ITEMS

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
4900	202505 SETTLEMENT PLATFORM	4.000 EACH				
4910	202518 SETTLEMENT MONUMENT	4.000 EACH				
4920	602004 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS B	100.000 CY				
4930	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	448.000 CY				
4940	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	332.000 CY				
4950	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	98.000 CY				
4960	602772 MECHANICALLY STABILIZED EARTH WALLS	LUMP	LUMP			
4970	604000 BAR REINFORCEMENT, EPOXY COATED	194742.000 LB				
4980	605512 PREFABRICATED EXPANSION JOINT SYSTEM, 4"	180.000 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
4990	618069 STEEL H PILES, HP 12 X 84	2734.000 LF				
5000	618070 STEEL H TEST PILES, HP 12 X 84	382.000 LF				
5010	619049 INSTALL STEEL H PILES, HP 12 X 84	2734.000 LF				
5020	619050 INSTALL STEEL H TEST PILES, HP 12 X 84	382.000 LF				
5030	619501 PRODUCTION PILE RESTRIKE	4.000 EACH				
5040	619502 TEST PILE RESTRIKE	4.000 EADY				
5050	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
5060	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
5070	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP	LUMP			
	SECTION 0019 TOTAL					

SECTION 0020 CULVERT 1-508A STANDARD ITEMS

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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
5080	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	2600.000 CY				
5090	302007 GRADED AGGREGATE BASE COURSE, TYPE B	570.000 CY				
5100	602001 PORTLAND CEMENT CONCRETE MASONRY, CLASS A	140.000 CY				
5110	602506 PRECAST CONCRETE CULVERT	LUMP		LUMP		
5120	604000 BAR REINFORCEMENT, EPOXY COATED	26000.000 LB				
5130	712531 CHANNEL BED FILL	280.000 CY				
5140	713001 GEOTEXTILES, STABILIZATION	1060.000 SY				
5150	715001 PERFORATED PIPE UNDERDRAINS, 6"	45.000 LF				
	SECTION 0020 TOTAL					

SECTION 0021 CULVERT 1-508B STANDARD ITEMS

5160	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	1090.000 CY				

CONTRACT ID: T200911303.01 PROJECT(S): T200911303

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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
5170	302007 GRADED AGGREGATE BASE COURSE, TYPE B	210.000 CY				
5180	602002 PORTLAND CEMENT CONCRETE MASONRY, CLASS B	268.000 CY				
5190	602556 PRECAST P.C.C. ARCH	LUMP	LUMP			
5200	604000 BAR REINFORCEMENT, EPOXY COATED	22500.000 LB				
5210	712021 RIPRAP, R-5	620.000 TON				
5220	712531 CHANNEL BED FILL	288.000 CY				
5230	713001 GEOTEXTILES, STABILIZATION	385.000 SY				
5240	713003 GEOTEXTILES, RIPRAP	460.000 SY				
5250	727003 CHAIN-LINK FENCE, 4' HIGH	195.000 LF				
	SECTION 0021 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:**T200911303.01** 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.

SECTION 1			BREAKOUT SHEET - 1		CONTRACT NO. T200911303.01
ITEM 602772 -MECHANICALLY STABILIZED EARTH WALLS					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	4625	SF	Bridge 1-468 over NSRR, NB	$	$
2	3840	SF	Bridge 1-468 over NSRR, SB	$	$
3	7510	SF	Bridge 1-470 US 301 over Summit Bridge Road, NB	$	$
4	7460	SF	Bridge 1-470 US 301 over Summit Bridge Road, SB	$	$
5	4180	SF	Bridge 1-472 US 301 over Armstrong Corner Road, NB	$	$
6	4190	SF	Bridge 1-472 US 301 over Armstrong Corner Road, SB	$	$
7	7500	SF	Bridge 1-475 Bunker Hill Road over US 301	$	$
8	3780	SF	Bridge 1-507 US 301 over Connector Road, NB	$	$
9	3715	SF	Bridge 1-507 US 301 over Connector Road, SB	$	$
Total Lump Sum Bid for Item No. 602772 -MECHANICALLY STABILIZED EARTH WALLS $_____ (LUMP SUM BID PRICE FOR ITEM 602772)					

SECTION 1			BREAKOUT SHEET - 2		CONTRACT NO. T200911303.01
ITEM 605500 - CANTILEVER SUPPORTS AND FOUNDATION					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Cantilever Sign Support and Foundation (SC1415)	$	$
2	1	EA	Cantilever Sign Support and Foundation (SC1417)	$	$
3	1	EA	Cantilever Sign Support and Foundation (SC1418)	$	$
4	1	EA	Cantilever Sign Support and Foundation (SC1419)	$	$
Total Lump Sum Bid for Item No. 605500 - CANTILEVER SUPPORTS AND FOUNDATION $_____ (LUMP SUM BID PRICE FOR ITEM 605500)					

SECTION 1 **BREAKOUT SHEET - 3** **CONTRACT NO. T200911303.01**

ITEM 605501 - GROUNDMOUNTED SIGN SUPPORTS AND FOUNDATION

Sign GM-1

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	30	SF	INSTALLATION OF SIGN ON GROUND MOUNT POSTS	$	$
				SIGN GM-1 TOTAL	$

Sign GM- 2

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	18.75	SF	INSTALLATION OF SIGN ON GROUND MOUNT POSTS	$	$
				SIGN GM-2 TOTAL	$

Sign GM -3

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	3	EA	REINFORCED CONCRETE SIGN FOUNDATION, W-18	$	$
2	33.58	LF	SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-18	$	$
3	3	EA	SUPPLY & INSTALLATION OF BOLT KIT FOR BREAKAWAY COUPLING (1 PER POST)	$	$
4	12	EA	SUPPLY & INSTALLATION OF HINGE PLATE FOR BREAKAWAY COUPLING (4 PER POST)	$	$
5	3	EA	SUPPLY & INSTALLATION OF BREAKAWAY COUPLING SYSTEM (1 PER POST)	$	$
6	3	EA	INSTALLATION OF I-BEAM POSTS	$	$
7	382.50	SF	INSTALLATION OF SIGN ON GROUND MOUNT POSTS	$	$
				SIGN GM-3 TOTAL	$

Sign GM-4

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	3	EA	REINFORCED CONCRETE SIG FOUNDATION, W-18	$	$
2	33.58	LF	SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS	$	$
3	3	EA	SUPPLY & INSTALLATION OF BOLT KIT FOR BREAKAWAY COUPLING (1 PER POST)	$	$
4	12	EA	SUPPLY & INSTALLATION OF HINGE PLATE FOR BREAKAWAY COUPLING (4 PER POST)	$	$
5	3	EA	SUPPLY & INSTALLATION OF BREAKAWAY COUPLING SYSTEM (1 PER POST)	$	$
6	3	EA	INSTALLATION OF I-BEAM POSTS	$	$
7	382.50	SF	INSTALLATION OF SIGN ON GROUND MOUNT POSTS	$	$
				SIGN GM-4 TOTAL	$

Total Lump Sum Bid for Item No. 605501 - GROUNDMOUNTED SIGN SUPPORTS AND FOUNDATION $_____
(LUMP SUM BID PRICE FOR ITEM 605501)

SECTION 1 **BREAKOUT SHEET - 4** **CONTRACT NO. T200911303.01**
ITEM 617518 - DRAINAGE HEADWALLS, MODIFIED

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	5	EA	DRAINAGE HEADWALL, MODIFIED TYPE 1	$	$
2	10	EA	DRAINAGE HEADWALL, MODIFIED TYPE 2	$	$
3	6	EA	DRAINAGE HEADWALL, MODIFIED TYPE 3	$	$
4	1	EA	DRAINAGE HEADWALL, MODIFIED TYPE 4	$	$

SECTION 1			BREAKOUT SHEET - 4 ITEM 617518 - DRAINAGE HEADWALLS, MODIFIED		CONTRACT NO. T200911303.01
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
5	2	EA	DRAINAGE HEADWALL, MODIFIED TYPE 5	$	$
6	1	EA	DRAINAGE HEADWALL, MODIFIED TYPE 6	$	$
Total Lump Sum Bid for Item No. 617518 - DRAINAGE HEADWALLS, MODIFIED $_____ (LUMP SUM BID PRICE FOR ITEM 617518)					

SECTION 1			BREAKOUT SHEET - 5		CONTRACT NO. T200911303.01
			ITEM 623000 - PRESTRESSED REINFORCED CONCRETE MEMBERS		
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Bridge 1-468 over NSRR, NB	$	$
2	1	EA	Bridge 1-468 over NSRR, SB	$	$
3	1	EA	Bridge 1-470 over Summit Bridge Road, NB	$	$
4	1	EA	Bridge 1-470 over Summit Bridge Road, SB	$	$
5	1	EA	Bridge 1-472 US 301 over Armstrong Corner Road, NB	$	$
6	1	EA	Bridge 1-472 US 301 over Armstrong Corner Road, SB	$	$
Total Lump Sum Bid for Item No. 623000 - PRESTRESSED REINFORCED CONCRETE MEMBERS $_____ (LUMP SUM BID PRICE FOR ITEM 623000)					

SECTION 1			BREAKOUT SHEET - 6		CONTRACT NO. T200911303.01
ITEM 623003 - PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T-BEAM					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Bridge 2-8 SB	$	$
2	1	EA	Bridge 2-8 NB	$	$
3	1	EA	Bridge 2-4	$	$
4	1	EA	Bridge 1-477 US 301 over Trib. To Sandy Branch, NB	$	$
5	1	EA	Bridge 1-477 US 301 over Trib. To Sandy Branch, SB	$	$
6	1	EA	Bridge 1-479 Ramp F over Trib. To Sandy Branch, SB	$	$
7	1	EA	Bridge 1-507 US301 over Connector Road, NB	$	$
8	1	EA	Bridge 1-507 US301 over Connector Road, SB	$	$
Total Lump Sum Bid for Item No. 623003 - PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T-BEAM $_____ (LUMP SUM BID PRICE FOR ITEM 623003)					

SECTION 1			BREAKOUT SHEET - 7 ITEM 708658 - DRAINAGE INLETS, MODIFIED		CONTRACT NO. T200911303.01
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	DRAINAGE INLET, DI-14	$	$
2	1	EA	DRAINAGE INLET, DI-110	$	$
3	1	EA	DRAINAGE INLET, DI-294	$	$
4	1	EA	DRAINAGE INLET, DI-301	$	$
5	1	EA	DRAINAGE INLET, DI-302	$	$
6	1	EA	DRAINAGE INLET, DI-303	$	$
7	1	EA	DRAINAGE INLET, DI-321	$	$
8	1	EA	DRAINAGE INLET, DI-322	$	$
9	1	EA	DRAINAGE INLET, DI-323	$	$
10	1	EA	DRAINAGE INLET, DI-325	$	$
11	1	EA	DRAINAGE INLET, DI-326	$	$
12	1	EA	DRAINAGE INLET, DI-327	$	$
Total Lump Sum Bid for Item No. 708658 - DRAINAGE INLETS, MODIFIED $_____ (LUMP SUM BID PRICE FOR ITEM 708658)					

SECTION 1			BREAKOUT SHEET - 8 ITEM 910007 - POND OUTLET STRUCTURE		CONTRACT NO. T200911303.01
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	POND OUTLET STRUCTURE, SPECIAL, 1	$	$
2	1	EA	POND OUTLET STRUCTURE, SPECIAL, 2	$	$
3	1	EA	POND OUTLET STRUCTURE, SPECIAL, 3	$	$
4	1	EA	POND OUTLET STRUCTURE, SPECIAL, 4	$	$
5	1	EA	POND OUTLET STRUCTURE, SPECIAL, 5	$	$
6	1	EA	POND OUTLET STRUCTURE, SPECIAL, 6	$	$
7	1	EA	POND OUTLET STRUCTURE, SPECIAL, 7	$	$
8	1	EA	POND OUTLET STRUCTURE, SPECIAL, 8	$	$
9	1	EA	POND OUTLET STRUCTURE, SPECIAL, 9	$	$
10	1	EA	POND OUTLET STRUCTURE, SPECIAL, 10	$	$
11	1	EA	POND OUTLET STRUCTURE, SPECIAL, 11	$	$
12	1	EA	POND OUTLET STRUCTURE, SPECIAL, 12	$	$
13	1	EA	POND OUTLET STRUCTURE, SPECIAL, 13	$	$
14	1	EA	POND OUTLET STRUCTURE, SPECIAL, 14	$	$
15	1	EA	POND OUTLET STRUCTURE, SPECIAL, 15	$	$
16	1	EA	POND OUTLET STRUCTURE, SPECIAL, 16	$	$
17	1	EA	POND OUTLET STRUCTURE, SPECIAL, 17	$	$
18	1	EA	POND OUTLET STRUCTURE, SPECIAL, 18	$	$

SECTION 1			BREAKOUT SHEET - 8 ITEM 910007 - POND OUTLET STRUCTURE		CONTRACT NO. T200911303.01
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
Total Lump Sum Bid for Item No. 910007 - POND OUTLET STRUCTURE $_____ (LUMP SUM BID PRICE FOR ITEM 910007)					

SECTION 1			BREAKOUT SHEET - 9 ITEM 763654 – BEAVER DAM BYPASS DEVICE		CONTRACT NO. T200911303
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	30	LF	Sch. 80 PVC Pipe, 10” Dia.	$	$
2	12	EA	Sch. 80 PVC Socket Flange, 10” Dia.	$	$
3	3	EA	Sch. 80 PVC End Cap, 10” Dia.	$	$
4	3	EA	Stainless Steel Clamp Pipe	$	$
5	3	EA	Reducer, Ductile Iron Pipe, CL 350	$	$
6	3	EA	Elastomer Sleeve Coupling, 10” Dia.	$	$
7	3	EA	Elastomer Sleeve Coupling, 8” Dia.	$	$
8	120	SF	Stainless Steel Wire Cloth, 14 Gauge, 1” Mesh	$	$
9	200	LF	Stainless Steel Wire Ties, 14 Gauge	$	$
10	6	EA	Stainless Steel Saddle, 6” wide	$	$
11	1201	EA	Stainless Steel Saddle, 9” wide	$	$
12	8	EA	Stainless Steel Threaded Rod, ½” Dia. With Stainless Hex Nuts	$	$
13	8	EA	Concrete Pedestal Supports, 24’ x 84”, Class B Concrete	$	$
Ductile Iron Pipe Run					
14	3	LF	Ductile Iron Pipe, 8” Dia., CL 50	$	$
15	8	EA	Concrete Seep Collars, Class B Concrete with Bar Reinforcement	$	$
16	8	EA	Megalug MJ 8” Restraint Fittings	$	$
Riser Pipe Outlet Assembly					

SECTION 1			BREAKOUT SHEET - 9 ITEM 763654 – BEAVER DAM BYPASS DEVICE		CONTRACT NO. T200911303
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
17	3	EA	Ductile Iron Tee, 8” Dia., CL 350	$	$
18	3	EA	Concrete Pedestal Support, 24” x 84”, Class B Concrete	$	$
19	9	EA	Megalug MJ 8” Restraint Fittings	$	$
20	3	EA	Treaded Tap with 4” Dia. Malleable Iron Threaded Plug	$	$
21	3	EA	Stainless Steel Saddle, 3” wide	$	$
22	3	LF	Ductile Iron Riser Pipe, 8” Dia, CL 50	$	$
23	12	EA	Stainless Steel Anchor Bolts, ½” Dia., with Threaded Coupling	$	$
24	6	EA	Stainless Steel U-Bolts, 1/2” Dia.	$	$
25	3	EA	Elastomer Sleeve Coupling, 8” Dia.	$	$
26	15	EA	SR 1 NB (GM-6)	$	$
Total Lump Sum Bid for Item No. 763654 – BEAVER DAM BYPASS DEVICE $_____ (LUMP SUM BID PRICE FOR ITEM 763654)					

"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: **T200911303.01** 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.

DRAFT
NOT FOR BIDDING
AUGUST 2015

CERTIFICATION

Contract No. T200911303.01
Federal Aid Project No. NH-2015(23)

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.

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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. T200911303.01 , 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