STATE OF DELAWARE

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You must request a CD from
DelDOT in order to bid.

DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T201011302.01

FEDERAL AID PROJECT NO. NH-2015 (26)

US 13 AND PORT PENN ROAD INTERSECTION IMPROVEMENTS

NEW CASTLE COUNTY

ADVERTISEMENT DATE: January 25, 2016

COMPLETION TIME: 789 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 **March 1, 2016**

Contract No.T201011302.01
Federal Aid Project No. T201011302

US 13 AND PORT PENN ROAD INTERSECTION IMPROVEMENTS
NEW CASTLE COUNTY

GENERAL DESCRIPTION

LOCATION

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

DESCRIPTION

The improvements consist of furnishing all labor and materials for US 13 and Port Penn Road Intersection Improvements and other incidental construction in accordance with the location, notes and details shown on the plans and as directed by the Engineer.

COMPLETION TIME

All work on this contract must be complete within 789 Calendar Days. The Contract Time includes an allowance for 126 Weather Days. It is the Department's intent to issue a Notice to Proceed such that work starts on or about April 15, 2016.

PROSPECTIVE BIDDERS NOTES:

1. BIDDERS MUST BE REGISTERED with DelDOT and request a cd of the official plans and specifications in order to submit a bid. Contact DelDOT at dot-special@state.de.us, or (302) 760-2031.
2. QUESTIONS regarding this project are to be e-mailed to dot-special@state.de.us no less than six business days prior to the bid opening date in order to receive a response. Please include T201011302.01 in the subject line. Responses to inquiries are posted on-line at http://www.bids.delaware.gov.
3. THE BID PROPOSAL incorporates a cd containing **Expedite**, **version 5.9a** and its installation file. Bidders are to use the cd provided to enter their bid amounts into the Expedite file. The Expedite bid file must be printed and submitted in paper form along with the cd and other required documents prior to the Bid due date and time.
4. SURETY BOND - Each proposal must be accompanied by a deposit of either surety bond or security for a sum equal to at least 10% of the bid.
5. **DRUG TESTING** - Regulation 4104; The state Office of Management and Budget has developed regulations that require Contractors and Subcontractors to implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds pursuant to 29 **Del.C.** §6908(a)(6). **Refer to the full requirements by following the below link:** http://regulations.delaware.gov/register/september2015/final/19%20DE%20Reg%20207%2009-01-15.htm
   Please note a few of the requirements listed below; for FAQs click here.
   * At bid submission - submit with the bid a signed affidavit certifying that the Contractor has in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for their Employees that complies with this regulation;
   * Upon DBE participation submission - submit a separate signed affidavit from each DBE Subcontractor certifying they have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for their Employees that complies with this regulation;
   * Two business days prior to contract execution - The awarded Contractor shall provide to DelDOT copies of the Employee Drug Testing Program for the Contractor and each participating DBE firm;
   * Subcontractors - Contractors that employ Subcontractors on the jobsite may do so only after submitting a copy of the Subcontractor's Employee Drug Testing Program along with the standard subcontractor information. A Contractor or Subcontractor shall not commence work until DelDOT has concluded the Employee Drug Testing Program complies with this Regulation as per Section 3.2;
   * Testing Report Forms shall be submitted to DelDOT no less than quarterly (forms will be provided).
   * Penalties for non-compliance are specified in the regulation.
6. Supplemental Specifications to the August 2001 Standard Specifications were issued November 24, 2014 and apply to this project. They can be viewed here. The ***Specifications Note*** document is for the use by the bidders to reference the new numbers to the past numbers used for bidding purposes on previous Department contracts.

7. **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)*.
8. No RETAINAGE will be withheld on this contract.
9. 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.
10. **BREAKOUT SHEETS** MUST be submitted either with your bid documents; or within seven (7) calendar days following the bid due date by the lowest apparent bidder. Refer to instructions adjacent to the Breakout Sheets in this document.
11. **PROPOSSED TRAINEE PLANS** - The number of trainees to be trained will be 0 , as listed in the Training Special Provisions within Contract General Notices. The program(s) must be submitted within 10 Calendar Days of notification of apparent low bidder status. Contract Award will not take place until acceptable On-the-Job (OJT) program plans are received by the Civil Rights Group of the Department.

    Failure of the apparent low bidder to present copies of an acceptable OJT Trainee Programs within ten (10) calendar days of notification of apparent low bidder status, shall create a rebuttable presumption that the bid is not responsive.
12. **FUEL COST OPTION**. Bidders are advised that a "Diesel Fuel Cost Price Adjustment Option" is included as referenced in Special Provision 763626, and that the form should be completed and submitted with the bid.
13. **PREQUALIFICATION**. As a prequalification to submit a bid on the US 301 project, all Contractors and Subcontractors must certify that their company, either independently or through agreement with other organizations, is providing craft training for journeyman and apprentice levels through a bona fide program approved by and registered with the State of Delaware and/or United States Department of Labor, to comply with 29 Del C. 6962(c)(11). The provided form, "Prequalification for US 301 Contracts", is required to be completed and submitted by each prime contractor and their subcontractors no later than 10 a.m. local time on the date of bid opening along with supporting program documentation. DelDOT will review this information to prequalify bidders in advance of the bid opening. If the prequalification package is missing any portion of the certification or program documentation, the bidder will be deemed not have met the prequalification requirement and their bid will not be accepted. The contact for certified craft training programs is Kevin Calio, Delaware DOL, 302-451-3419 or, Kevin.Calio@state.de.us. A Delaware Business License is not needed as part of the pre-qualification to bid. A Delaware Business License will be required as part of the Contract award and execution process. In order to establish a bona fide Apprenticeship & Training program approved by and registered with the Delaware Department of Labor (DDOL):

    Step 1 - The contractor and/or subcontractor will submit a completed Sponsor Application form along with their Worker's Compensation Insurance Declaration page to DDOL. The contractor and/or subcontractor can also become a sponsor as part of a Joint Apprenticeship Committee (JAC), which is a group of contractors establishing an Apprenticeship & Training program.

    Step 2 - DDOL will review the information provided to confirm the truth/accuracy of all information provided on the application.

    Step 3 - Once DDOL has approved the application, they work with the sponsor to execute the Standards of Agreement, either with the contractor and/or subcontractor or with the JAC. Once the Standards of Agreement are signed by all parties, the sponsor and/or JAC has a bona fide program recognized by DOL and will receive a Certificate of Registration. If the contractor and/or subcontractor provide all of the required information, Steps 2 and 3 are expected to take one to two weeks to complete.

    Along with the "Prequalification for US 301 Contracts" form, the Certificate of Registration should be submitted as the supporting documentation. A letter from the DDOL stating that the contractor and/or subcontractor is not eligible for the Apprenticeship and Training Program due to the nature of the contractor's and/or subcontractor's work should also be submitted as the supporting documentation when applicable.

    'Prequalification for US 301 Contracts' forms and documentation can be sent via hardcopy or electronic submission:

    Send electronic submissions to: dot-special@state.de.us Subject: QUAL DOCS

    Send hardcopy overnight delivery to: DelDOT Contract Administration; 800 Bay Road, Dover, DE 19901 RE: *QUAL DOCS*

If a contractor has previously submitted the Prequalification information to DelDOT for other US 301 contracts, and the information has been accepted, then the contractor does not need to resubmit the Prequalification information to DelDOT for this contract. A list of contractors that have submitted acceptable Prequalification information can be found at:

http://www.deldot.gov/information/business/bids/const_proj_bid_info.shtml

14. **DESIGN FILE AVAILABLE** Upon request, a design file will be made available to the Contractor during the bid period upon email submission of the provided form titled "Electronic File Sharing Release." The form must be signed by a person having authority to enter into contracts for the company. The signed form can be included with the Request for Bid Proposal, or may be sent via email to dot-special@state.de.us. The file will be shipped regular mail. A UPS or FED-EX account number may be provided for faster shipment.

    In addition to the electronic project files listed under the general notes in the construction plans, the Delaware Department of Transportation (DelDOT) will provide the contractor with a design file, in microstation .dgn format, that contains 3D feature lines for the proposed design. The 3D feature lines are for the final proposed top surface elevation only. These electronic files may only be used per the requirements for Machine Control Grading in Item 763501-Construction Engineering.

    Upon request, the design file will be made available to the contractor during the bid period after the electronic file sharing release form has been signed and submitted to DelDOT by the contractor.

    It is the contractor's responsibility to convert the design file to a file format that is compatible with the software used on the contractor's machine grade control equipment. It is also the contractor's responsibility to verify that the 3D information is correct after any and all software conversions. DelDOT will not be responsible for checking any of the contractor's software conversions. There may be some areas of the project not included in the design file. It is the contractor's responsibility to review the design file and determine the limits of the project included.

15. **ATSSA SUPERVISOR:** The Contractor shall have an ATSSA Supervisor assigned to this project who shall provide supervision of the installation, operation and maintenance of Traffic Control Devices for this project. The ATSSA Supervisor shall meet all requirements and provide all services as described in Section 743.10.L of the most recent edition of the Supplemental Specifications except that the ATSSA Supervisor does not have to be an employee of the General Contractor. Payment for the ATSSA Supervisor shall be paid for under Item 743031. The ATSSA Supervisor may perform other duties when lane closures, MOT planning, etc. are not required and hours for payment under 743031 will be recorded only when the listed duties are being performed as agreed in advance by the Engineer. The Contractor shall be required to follow all requirements of the Contract Documents even if the ATSSA Supervisor is not present. At a minimum, the ATSSA Supervisor shall be utilized for the following services:

    a. Weekly checks of Maintenance of Traffic (MOT) devices when the MOT devices are being used on the project, preparation of a Log of the MOT activities following the weekly check and coordination of any issues arising from the weekly check. The Log shall include all information required in Section 743.10.L.A.ii and shall describe any deficiencies in the MOT application. The Weekly Log shall be submitted to the Contractor's Project Manager and the Engineer by 4:00 PM on Friday of that week. Deficiencies shall be addressed by the Contractor and are subject to the provisions of Section 743.09.

    b. Daily checks of MOT devices when Lane Closures are in effect, preparation of a Log of the MOT activities following the check and coordination of any issues arising from the weekly check. The Log shall include all information required in Section 743.10.L.A.ii and shall describe any deficiencies in the MOT application. These checks shall begin when the lane closures are initially implemented. The Daily Log shall be submitted to the Contractor's Project Manager and the Engineer by 4:00 PM on of that day. Deficiencies shall be addressed by the Contractor and are subject to the provisions of Section 743.09.

    c. Immediate notification of the Contractor's Project Manager and the Engineer of deficiencies that are a threat to the safety of the traveling public or the workers. Deficiencies shall be addressed by the Contractor and are subject to the provisions of Section 743.09.

    d. When approved by the Engineer, planning and preparation in advance of major changes in work phases that affect traffic.

    e. When approved by the Engineer, planning and preparation in advance of lane or road closures on major roadways such as SR 1, US 13, SR 896 and Summit Bridge Road.

f. When approved by the Engineer, during lane or road closures on major roadways such as SR 1, US 13, SR 896 and Summit Bridge Road. The ATSSA Supervisor will be expected to be on site during these lane or road closures until all MOT devices related to the lane or road closure have been removed and traffic restored to the lane configurations shown on the plans.

g. Other times as directed by the Engineer.

16. For protection of the threatened Northern Long-Eared Bat (NLEB), there shall be no clearing of trees between 12:01 AM on April 15 and 11:59 PM on August 30 within the limits of the 'woods line' symbol within areas of the project that have been identified as potential NLEB habitat. No areas within the limits of this contract have been identified as potential NLEB habitat.

17. The Contractor shall name the following as an Additional Insured on all insurance certificates: "United States Department of Transportation, acting by and through the Federal Highway Administration - TIFIA Lender." The Department will also be sharing copies of the final executed contract documents with the Federal Highway Administration - TIFIA Lender.

18. The Contractor shall submit to the Department legible copies of the Bid Documentation as set forth in Section 103.09 Escrow of Bid Documentation.

19. Upon execution of the contract, the Department will provide the Contractor with .pdf files of the awarded Contract Plans and Special Provisions. The Contractor shall be responsible for making all printed copies of these documents for his use and the use of his subcontractors. In the case of any plan revisions that the Department may issue, the Department will provide the Contractor up to five (5) full size sets and five (5) half size sets of the revised plans and specifications. The
Department shall also provide the Contractor .pdf files of the revised plans and specifications and the Contractor shall be responsible for making any additional printed copies for his use and the use of his subcontractors.

20. The Contractor shall make available at least one employee to attend and represent the firm at all scheduled job progress meetings, project working group meetings or other public informational meetings as requested by the Engineer. The person attending shall be knowledgeable of current job progress, the anticipated construction schedule and any ongoing or potential construction or contract issues. Costs are incidental to Item 743000-Maintenance of Traffic.

21. Any requirement to utilize Borrow Types A, B, C, D, or F (or materials meeting the requirements of Borrow Types A, B, C, D, or F) shall be met by using only soil for these materials. Crushed concrete, millings, stone dust, or other non-soil materials will not be accepted, regardless of their gradation.

22. The following earthwork related survey information is critical to computing pay item quantities. The Contractor shall give the Project Resident at least two Working Days' notice whenever any of the listed surfaces are ready for elevations to be taken by the Engineer's Survey crew. No additional excavation or backfill may be performed in these areas until the required survey information has been acquired by the Engineer's crew. Prior to notifying the Project Resident, areas to be surveyed shall be roughly leveled and cleared of debris or obstructions in order to collect accurate data. The Contractor is encouraged to make their survey crew available to take elevations jointly with the Engineer's crew in order to avoid any later quantity disputes. If the Contractor elects not to acquire survey data for the critical elements listed, then the Engineer's survey data will be considered the binding record regarding the pay item quantity computations. The Contractor shall share with the Engineer, upon request, any survey data taken independently that may assist in the pay item quantity computations. The critical elements include, but are not limited to the list below. Other critical elements that are identified by the Engineer shall also follow the above procedure.

a. Surface elevations following Clearing and Grubbing of all roadway, structure, stormwater pond, wetland mitigation, and on-site borrow excavation areas.

b. Top surface (in areas not requiring clearing and grubbing) and bottom surface of topsoil to be stripped in fill areas.

c. Top surface of topsoil to be stripped in cut areas if no Clearing and Grubbing is required.

d. Top and bottom surfaces of undercut areas not measured by the inspection staff.

e. Bottom surfaces of excavations such as ditches, stormwater ponds, mitigation sites, and on-site borrow areas prior to placement of any topsoil or other materials.

f. Interim and final surfaces of infiltration stormwater facilities.

g. Top surfaces (following Clearing and Grubbing if applicable) and bottom surfaces of all structure excavation areas.

h. Top and bottom surfaces (following Clearing and Grubbing if applicable) of other excavation items such as muck excavation, channel excavation, etc.

i. Top surface (following clearing, grubbing, topsoil removal, and overburden removal) and bottom surface prior to placing any backfill or topsoil at any off-site borrow source to be measured by cross section.

23. Under Item 763501 Construction Engineering, Machine Control Grading, the Contractor shall provide the Engineer a total of two (2) Rovers. Each Rover shall be of the same manufacture as the Contractor's base station, shall be dual frequency, and shall be provided with: a survey program that has the baselines of construction pre-loaded; a two (2) meter fixed height rover pole; and a clamp to affix the survey controller to the Rover pole. The contractor will be responsible for localizing each Rover on the job specific control points.

    The automatic level to be provided by the Contractor shall be an automatic (self-leveling) level with a minimum 25X magnification. The Contractor shall also provide a tripod for the automatic level which shall be of wood or wood and fiberglass construction (aluminum legs will not be accepted) and a 25 foot fiberglass survey rod, graduated in tenths and hundredths of a foot.

24. Unless directed otherwise by the Engineer, backfill dry undercut areas with soil material meeting Borrow, Type A and backfill wet undercut areas with soil material meeting Borrow, Type B requirements.

25. Measurement for depth of pipe trench excavation (Item 208000) will be made to the bottom of the main portion of the pipe, not the bell or spigot. Measurement for width of pipe trench excavation will be also be made 18 inches on either side, outside the main portion of pipe, not the bell or spigot. Any additional excavation required for the bell end of the pipe or for the pipe bedding is incidental to the item and will not be measured for payment.

26. Completion dates and Interim Completion dates identified in the Contract documents shall be identified in the Contractor's CPM schedule as Milestones.

27. When the Engineer has determined that substantial completion of the contract has been achieved, as defined by Standard Specification 101.03, for any milestones and the completion of the contract, time charges will be suspended relative to that milestone or completion of the contract and a semi-final inspection will be scheduled. If a semi-final inspection punchlist is generated for completion by the Contractor, a timeframe to complete the list will be established by the Engineer. Failure to complete the list within the required timeframe will result in the resumption of time charges relative to that milestone or completion of the contract until all items on the semi-final punchlist have been completed. Similarly, a Final Inspection will be held following completion of the semi-final punchlist. Any punchlist generated at the Final Inspection will also have a timeframe established for completion. If the Final Punchlist is not completed within the specified timeframe, time charges will again resume relative to that milestone or completion of the contract until all items on the Final Punchlist have been completed by the Contractor.

28. The completion of the Eastern Shore Natural Gas company (ESNG) relocations are critical to the completion of this project and the adjacent contract T200911302, US 301 and SR 1 Interchange. The Contractor for T201011302 shall identify an Interim Completion Date to have the work required to allow the ESNG relocations to begin on or before June 15, 2016. Once the ESNG relocation work has begun, the Contractor shall schedule work so that the ESNG relocation work can proceed uninterrupted. If the Contractor for Contract T201011302 fails to have the work complete to allow ESNG relocations to begin on June 15, 2016, or fails to schedule work so that the ESNG relocation work can then proceed uninterrupted, then for each and every Calendar Day charged beyond June 15, 2016 that the noted work is not completed and for each calendar day that the ESNG relocation work is interrupted by the Contractor's schedule, Liquidated Damages shall be assessed and deducted from monies due the contractor per Section 108.08. The daily charge of liquidated damages to be assessed will be based on Subsection 108.09 Schedule of Liquidated Damages for fifty percent (50%) of the awarded contract value.

29. Construction conflicts occur when a contractor elects to use a crane of sufficient height that violates airport airspace or exceeds 200 feet in height. Contractors are responsible to conform to the appropriate FAA requirements. Contractors can check the equipment that they will be using to determine if they need to notify the FAA using the notice criteria tool at the following web address: https://oeaaa.faa.gov/oeaaa/external/gisTools/gisAction.jsp

30. Concrete shall include a shrinkage reducing/compensating admixture for Items: 602001 Portland Cement Concrete Masonry, Type A (for the structural slab and sleeper slab, Plan Sheets AS-01 through AS-04); and 720629 Bifurcated Concrete Median Barrier. The admixture may be one product or two separate products that provide both expansion and pore water surface tension. The admixture(s) shall have the following characteristics: 1) Expands at a rate that closely compensates for the shrinkage of the concrete mix; 2) Reduces capillary surface tension of the concrete pore water; 3) Provides at least 80% shrinkage reduction as measured and documented by field performance; and 4) is formulated for use in freezing and thawing weather. All admixtures must be compatible with the overall concrete mix design. Calcium chloride is not permitted and no chemical admixtures containing more than 0.1% chloride by weight are permitted. Dosage shall be as recommended by the manufacturer. All costs shall be included in the bid price for the respective items.

31. **Standard Notes for Traffic Officer Usage:**

    a. For night-time closures of any road or ramp, provide one traffic officer at each closure point shown in the applicable detour plans. Traffic Officer shall be placed behind the closure barricade with the front of vehicle facing approaching traffic and all emergency lights shall be activated. Traffic Officer shall provide a report to the Contractor at the end of the day's activity identifying the number of vehicles that attempted to not follow the detour.

    b. The Contractor shall provide three traffic officers for a four-hour period twice per month to perform speed enforcement along roadways within the project limits. At the end of the day's enforcement activity, the Traffic Officers shall provide a report to the Contractor identifying the number of vehicles stopped, number and type of citations given and the range of speeds of those vehicles stopped. Enforcement locations will be determined by the Engineer.

    c. The Contractor shall provide one Traffic Officer for nighttime mobile pavement marking operations on US 301.

    d. The Contractor shall provide one Traffic Officer for major phase change traffic switches on existing US 301.

    e. The Contractor shall provide two Traffic Officers for any rolling road block operation in accordance with TA-35H.

    f. See project detour plans for additional Traffic Officer requirements.

    g. The Contractor shall provide one Traffic Officer for any operation where an existing signalized intersection is placed in flash-mode. The Traffic Officer is the only individual that can place a traffic signal in flash-mode and the Traffic Officer must stay on location until the signal is placed back in stop-and-go operation in accordance with DelDOT's Temporary Traffic Control within Intersections memorandum (www.mutcd.deldot.gov).

    h. Additional usage of Traffic Officers outside of the above requirements shall be approved by the Engineer in consultation with the Traffic Safety Section.

32. The entire US301 mainline project from the Maryland State Line to SR1 is being constructed under multiple contracts that will be under construction concurrently with this Contract. As shown in the plans, various traffic control measures will be installed under this Contract to prevent access to the completed sections of roadway until the entire US301 mainline is ready to be open to traffic. The Contractor shall be responsible for these traffic control measures until the end of the contract completion time or until the project is accepted by the Engineer, whichever is later. The Contractor for Contract T200911303, US301 Levels Road to Summit Bridge Road, will be responsible for performing the work to open the entire US301 mainline section to traffic. If directed by the Engineer, the Contractor shall coordinate with the Contractor for Contract T200911303 to have the traffic control measures replaced with devices owned by the Contractor for Contract T200911303 so that continuous maintenance of traffic is provided. All costs associated with replacing the traffic control devices and coordinating the replacement shall be included in the unit price bid for the appropriate traffic control device and operation.

33. For stormwater management ponds, topsoiling shall be performed where seeding is specified on the stormwater management plans. The contractor shall refer to the "Pond Construction Sequence and Notes" in the contract plans for seeding limits. Any notes directing that the pond bottom is not to be seeded includes the forebay bottom as a pond bottom and since these areas are not to be seeded, they are also not to be topsoiled.

34. DelDOT does not include the boring logs or cross sections as part of the official contract documents. For informational purposes only, boring logs and cross sections are available on the US301 Project website under the Contractor Information tab for this Contract. The website for the unofficial US301 Contractor Information is: http://www.deldot.gov/information/projects/us301/ContractorInfo/index.shtml

35. Updates to DelDOT's Erosion and Sediment Control Standard Specifications and Pay Items have been issued under the Supplemental Specifications to the August 2001 Standard Specifications, as Revised November 24, 2014 and the work shall be performed with respect to these Supplemental Specifications and any other updates issued up to the date of advertisement. References in the Contract Documents to the following sections or pay items shall be understood to be performed under the corresponding revised section or pay item and the Contractor shall comply with the new specifications at no additional cost to DelDOT:

Contract Item #	Revised Item #	Item Description
202572	900501	BORROW AREA EROSION AND SEDIMENT CONTROL AND DEWATERING
202574	906005	WELL POINT SYSTEM
250000	INCIDENTAL	SEDIMENT REMOVAL
251000	905001	SILT FENCE
251001	905002	REINFORCED SILT FENCE
251502	905500	SUPER SILT FENCE
252000	905004	INLET SEDIMENT CONTROL, DRAINAGE INLET
252001	905005	INLET SEDIMENT CONTROL, CURB INLET
254000	907011	STONE CHECK DAM
255000	905003	SEDIMENT TRAP
255501	905006	INLET SEDIMENT CONTROL, CULVERT INLET
258000	907500	TEMPORARY SWALE, TYPE A-1
258001	907501	TEMPORARY SWALE, TYPE A-2
258002	907502	TEMPORARY SWALE, TYPE A-3
258004	907503	TEMPORARY SWALE, TYPE B-2
259000	907504	PERIMETER DIKE/SWALE, TYPE A-1
259001	907505	PERIMETER DIKE/SWALE, TYPE A-2
260000	907506	EARTH DIKE, TYPE A-1
260001	907507	EARTH DIKE, TYPE A-2
260003	907508	EARTH DIKE, TYPE B-1
260004	907509	EARTH DIKE, TYPE B-2
261000	907012	TEMPORARY SLOPE DRAIN, 12"
261001	907013	TEMPORARY SLOPE DRAIN, 18"
NEW	907014	TEMPORARY SLOPE DRAIN, 21"
261003	907015	TEMPORARY SLOPE DRAIN, 24"
261004	907016	TEMPORARY SLOPE DRAIN, 30"
262000	909006	STILLING WELL
263000	906003	SUMP PIT (Used to be Sump Pit, Type I)
265000	909003	GEOTEXTILE LINED CHANNEL DIVERSION
265500	909005	STREAM DIVERSION
266000	909001	SANDBAG DIKES
266001	909002	SANDBAG DIVERSIONS
268000	908023	STABILIZED CONSTRUCTION ENTRANCE
269000	909004	TURBIDITY CURTAIN, FLOATING
269001	909500	TURBIDITY CURTAIN, STAKED
270000	906001	PORTABLE SEDIMENT TANK

270500	906002	DEWATERING BAG
271000	910008	STORMWATER MANAGEMENT POND
272000	910006	OUTLET STRUCTURE
272501	910007	OUTLET STRUCTURE
272500	906004	SKIMMER DEWATERING DEVICE (Used to be Skimmer Dewatering Bag)
272503	INCIDENTAL	TRASH RACK
274000	910004	CLAY BORROW, STORMWATER MANAGEMENT POND, CUT OFFTRENCH
274001	910005	CLAY BORROW, STORMWATER MANAGEMENT POND, POND LINER
302516	910001	INFILTRATION STONE, NO.3
302517	910002	INFILTRATION STONE, NO. 8
302518	910003	INFILTRATION STONE, NO. 57
718513	910009	INFILTRATION TRENCH
732000	908003	TOPSOIL, 4" DEPTH
732002	908004	TOPSOIL, 6" DEPTH
732003	908005	TOPSOIL, 12" DEPTH
732004	908001	TOPSOIL (TON)
732005	908002	TOPSOIL (CY)
732509	910500	BIORETENTION SOIL, MIX I
733001	908009	TOPSOILING, 4" DEPTH
733002	908010	TOPSOILING, 6" DEPTH
733003	908011	TOPSOILING, 8" DEPTH
733004	908007	TOPSOILING
733006	908012	TOPSOILING, 12" DEPTH
733007	908008	TOPSOILING, 2" DEPTH
733008	908013	TOPSOILING, 18" DEPTH
734013	908014	PERMANENT GRASS SEEDING, DRY GROUND
734015	908015	PERMANENT GRASS SEEDING, WET GROUND
734016	908016	PERMANENT GRASS SEEDING, SUBDIVISION
734017	908017	TEMPORARY GRASS SEEDING
734521	908503	WETLAND MITIGATION GRASS SEEDING
734531	908019	STREAMBANK SEED MIX
734551	908501	NATIVE GRASS SEEDING: NO MOW MIX
734552	908502	WET GROUND EROSION CONTROL GRASS SEEDING - FLATS
734553	908503	WETLAND MITIGATION GRASS SEEDING
734554	908505	MEADOW ESTABLISHMENT & WILDFLOWER SEEDING, MARYLAND
734555	908506	TEMPORARY VEGETATVIE STABILIZATION, MARYLAND
734556	908507	PERMANENT VEGETATIVE STABILIZATION, MARYLAND
734557	908508	RIPARIAN SEED MIX, STREAM RESTORATION

735535	908020	EROSION CONTROL BLANKET MULCH
735536	908021	TURF REINFORCEMENT MATTING, TYPE I
735537	908022	TURF REINFORCEMENT MATTING, TYPE II
735538	908504	COIR FIBER MATTING
735542	908509	FABRIC ENCAPSULATED SOIL LIFT
737503	*In 2A for Levels Site*	BEDDING FOR REFORESTATION

Contract No.T201011302.01

CONSTRUCTION ITEMS UNITS OF MEASURE

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

*Not used for units of measurement for payment.

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GENERAL NOTICES

SPECIFICATIONS:

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

CLARIFICATIONS:

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

ATTESTING TO NON-COLLUSION:

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

QUANTITIES:

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

EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS:

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

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

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

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

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

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

TAX CLEARANCE:

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

LICENSE:

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

SUBCONTRACTOR LICENSE: 29 DEL. C. §6967:

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

DIFFERING SITE CONDITIONS,

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CONFLICT WITH FEDERAL STATUTES OR REGULATIONS:

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

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

FEDERAL LABOR AND EMPLOYMENT REQUIREMENTS

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

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

CONVICT PRODUCED MATERIALS:

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

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

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

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

TO REPORT BID RIGGING ACTIVITIES:

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

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

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

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

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

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

Goals for Minority Participation In Each Trade	Goals for Female Participation In Each Trade
12.3% (New Castle County) 14.5% (Kent & Sussex Counties)	6.9% (Entire State)

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

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

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

4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is 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).

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TRAINING SPECIAL PROVISIONS

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

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

The number of trainees to be trained under the special provision will be 1 . In the event the contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year apprenticeship or training.

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

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

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

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

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

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

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

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

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

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

The contractor will 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 8 % 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
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

I. GENERAL

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

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

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

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

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

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

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

II. NONDISCRIMINATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6. Training and Promotion:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

III. NONSEGREGATED FACILITIES

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

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

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

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

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

1. Minimum wages

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

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

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

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

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

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

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

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

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

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

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

2. Withholding

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

3. Payrolls and basic records

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

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

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

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

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without

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

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

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

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

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

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

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

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

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

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program,

the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

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

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

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

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

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

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

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

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

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

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

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in

accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

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

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

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

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

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

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

3. Withholding for unpaid wages and liquidated damages. The FHWA or the 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.

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

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

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

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

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

CERTIFIED : 1/12/16 BY:
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

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

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

NON- REGISTERED APPRENTICES MUST BE PAID THE MECHANICS RATE.

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

Re: Contract # T201011302, US 13 and Port Penn Road Intersection Improvements, New Castle County, DE

GENERAL DECISION: DE160011 01/08/2016 DE11

Superceded General Decision Number: DE20150011

State: DELAWARE

Construction Type: HIGHWAY

COUNTY: New Castle County in Delaware

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.15 for calendar year 2016 applies to all contracts subject to the Davis-Bacon Act for which the solicitation was issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.15 (or the applicable wage rates listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2016. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/08/2016

SUDE2015-002 04/23/2015

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

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

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

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

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

Union Average Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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.

THE FOLLOWING SUPPLEMENTAL SPECIFICATIONS ONLY APPLY TO CONTRACT T201011302.01

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 50º 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

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

202515 - COMPACTING INSITU MATERIAL

Description:

Compacting in situ material shall consist of pre-grading and compacting in-place soils which conform to the requirements of Subsection 209.04. Material for use as a component of the pavement section shall be compacted in accordance with Subsection 202.05. Material for use as a footing subgrade shall be compacted in accordance with Subsection 207.05.

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 as outlined in Subsection 202.05 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 202.05 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.

11/23/11

202560 - CONTAMINATED MATERIAL

Description:

Contaminated Material is defined as solids or liquids (including soil) potentially contaminated with a hazardous substance, requiring special handling and/or disposal per state or federal regulation.

This work describes the excavation, removal and treatment/disposal of contaminated materials resulting from project construction including utility and other types of excavation activities in accordance with the locations and notes on the Plans, and as directed by the Engineer or the Department's environmental representative. The Contractor will be notified of the Department's environmental representative at the pre-construction meeting.

Overview of Costs:

Potential contaminated solids may affect contractor's costs as follows;
Additional cost to normal excavation requirements:
-Cost of 8 mil plastic for placement under and over solid contaminated material,
-Maintaining the segregated contaminated solids staging area.
Reduced cost to normal excavation requirements:
-Not required to, or charged for, transport of contaminated material from site.
-Not required to, or charged for, disposal of contaminated soil.

Potential contaminated liquids will affect contractor’s cost as follows;
Additional cost to normal excavation requirements:
-None
Reduced cost to normal excavation requirements:
-None

Construction Methods and Responsibilities:

Contractor's Responsibilities for potential contaminated solids:

The Contractor shall be responsible for providing the appropriate equipment and personnel necessary to excavate, stage, and load contaminated material for off-site disposal, as identified from previous site environmental investigations or identified during construction activities. The work will be performed in accordance with the procedures described in the site specific "Contaminated Material and Water Removal Work Plan" prepared by the Department's environmental representative. The Department will provide a copy of this plan after the project is awarded and before any work begins. The Contractor shall adhere to applicable Occupational Safety and Health standards, Guidelines and/or Laws. This will include compliance with 29 CFR Part 1910.

After award of the Contract, the Contractor shall immediately be responsible for notifying the Department's HAZMAT Program Mananger’s office (760-2463) for scheduling coordination with the environmental representative. The contractor shall submit a proposed schedule of work to the Department for review and approval prior to any commencement of work on this site. The Contractor is required to perform to a high standard of workmanship to assure protection of workers, local water supplies, and the environment. The Contractor shall coordinate with the utility companies prior to excavation. The Department's environmental representative shall be present during all phases of work associated with the excavation and removal of potentially contaminated material. Payment will not be made for any work done when a Department approved Inspector or environmental representative is not present to provide environmental oversight.

Specific tasks to be performed by the Contractor will include excavating soil per the project specifications. The Contractor will segregate "contaminated" soil as designated by the Department or their environmental representative, from "clean" soil and place the "contaminated" soil in a designated on-site staging area constructed by the Contractor. At a minimum the staging area needs to be lined with 8-mil plastic and a berm constructed to minimize storm water run-off. The "contaminated" soil will need to be covered by the

Contractor at the end of each work day. The Contractor will be responsible for loading contaminated soil onto trucks arranged by the Department's environmental representative on the days the contaminated soil is shipped off-site to a licensed disposal/treatment facility. The Contractor will backfill and compact the excavated area(s) according to the project specifications and payment will be made under that item of the Contract.

Department's Responsibilities:

The Department is responsible for providing and paying; the environmental representative; the transportation of contaminated material for disposal; and the disposal of contaminated material.

The "Contaminated Material and Water Removal Work Plan" will identify; the procedures to be used to excavate and stage the contaminated material; the licensed treatment/disposal facility where the Department will ship the contaminated material; the method the material will be transported to the treatment/disposal facility; and any additional health and safety requirements for site personnel.

The Department's environmental representative will conduct a health and safety briefing prior to commencement of activities on the sites to insure an understanding of all applicable standards, guidelines, laws, procedures, etc. consistent with the successful completion of this type of activity. The Department's environmental representative will conduct air monitoring during any excavation activities at the site to identify and mitigate fire, explosion and vapor hazards.

The Department's environmental representative shall coordinate the excavation activities with all applicable local, state, and federal environmental regulatory agencies. The Department's environmental representative will also oversee the excavation, removal and treatment/disposal of the material in the designated area(s) and perform such tests as field screening for soil contamination utilizing vapor monitoring techniques and collect soil samples for laboratory analysis to meet the requirements of the treatment/disposal facility, DNREC and/or the USEPA. The Department's environmental representative's personnel will subcontract with the disposal/treatment facility to provide transportation and disposal/treatment of all contaminated materials to be removed as part of the project. The Department's environmental representative is responsible for measuring the quantity of contaminated material removed, via certified scale weights, for the Department's records.

Method of Measurement:

The quantity of contaminated material will not be measured. It will be included in the excavation quantity.

Basis of Payment:

No additional payment will be made for the handling of contaminated material included in the excavation quantities. Contractor's costs for handling contaminated material as described herein are to be included in the standard excavation pay items included in this contract, and will constitute full compensation for excavation, constructing and maintaining the segregated soil staging area, placement of the contaminated soil in the staging area, providing plastic and daily covering of the segregated soil staging area, and loading of contaminated soil for removal by the Department.

This item is a contingency item and the Department reserves the right to delete from the Contract. The Contractor shall make no claims for additional compensation because of deletion of the item.

04/04/2014

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 sieve shall not exceed 0.5 percent when tested when in accordance with the requirements of AASHTO T11 - Determining the minus 3 mils 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 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 a heat-stable anti-strip adhesive and #57 crushed aggregate within the following mixture requirements:

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 + 40°F is typical. The aggregate for the mixture shall be dried and heated to the required temperature but not to exceed 325°F. 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. 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 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 10 tons steel wheel tandem roller. Mat temperature at time of initial rolling shall be between 150°F and 175°F, 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 8 - 10 tons 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 150 square feet per gallon 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". 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" of the plan thickness and shall be determined from the field measurements taken through the permeable treated base at intervals not exceeding 500' per lane or shoulder width, or as directed by the Engineer. Measurements shall be made to the nearest 1/8". If the measured thickness is not within the specified thickness tolerance, additional measurements shall be made at intervals not to exceed 50' 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 25' 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 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. 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.

10/6/2015

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" 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 100 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 with a work counter approximately 8'L x 2'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 40°F. 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 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 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. 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 150 square feet per gallon.

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" 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' per lane. A set of measurements consists of three holes spaced 5' apart in a triangular pattern with the thickness measured to the nearest 1/4". 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' 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' 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" shall be corrected or removed and replaced at the direction of the Engineer and at the Contractor's expense. The 10' 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 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 yards 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 of cement per square yard of soil cement base course will be determined by the Department based on the approved job mix formula, and will be used to determine the quantity of cement to be paid.

Borrow, Type D shall be provided from excavated on-site material. Payment will be made under item no. 202000 at the time of excavation. Hauling, stockpiling, mixing, etc. is incidental to item no. 202000.

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 or cement will be made prior to final acceptance of the in-place material.

7/27/2015

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, TYPE C, 160 GYRATIONS, PG 64-22 (CARBONATE STONE)
401802 - BITUMINOUS CONCRETE, TYPE C, 205 GYRATIONS, PG 64-22 (CARBONATE STONE)

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

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

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

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

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

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

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

401824 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG-64-22, WEDGE
401825 - BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG-64-22, WEDGE

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

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

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

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

.01 Description:

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

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

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

.02 Materials:

Use materials conforming to standard specifications 823.

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

a) **Asphalt Binder:**

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

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

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

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

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

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

b) **Recycled Materials:**

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

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

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

c) **Shingles:**

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

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

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

d) Mineral Aggregate:

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

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

[1]Coarse Aggregate Angularity is tested according to ASTM D5821.
[2]Fine Aggregate Angularity is tested according to AASHTO TP-33.
[3]Clay Content is tested according to AASHTO T176.
[4]Flat and Elongated is tested according to ASTM 4791 with a 5:1 aspect ratio.
[5] 85/80 denotes that 85% of the coarse aggregate has one fractured face and 80% has two or more fractured faces.

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

TEST METHOD	SPECIFICATION LIMITS
Toughness, AASHTO T96 Percent Loss, Maximum	40
Soundness, AASHTO T104 Percent Loss, Maximum for five cycles	20
Deleterious Materials, AASHTO T112 Percent, Maximum	10
Moisture Sensitivity, AASHTO T283 Percent, Minimum	80

For any roadway with a minimum average daily traffic volume (ADT) of 8000 vehicles and a posted speed of 35 mph (60 kph) or greater, the polish value of the composite aggregate blend shall be greater than 8.0 when tested according to Maryland State Highway Administration MSMT 411 B ALaboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces.@ RAP shall be assigned a value of 5.0. The Contractor shall supply all polish values to the Engineer upon request.

e) **Mineral Filler:**

Conform to AASHTO M17.

f) **Warm Mix Additives:**

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

1. WMA technology and/or additive information.
2. WMA technology manufacturer's recommendation for usage.
3. WMA technology target dosage rate and tolerance envelope. Support tolerance envelope with test data demonstrating acceptable mix production properties conforming to all sections of this specification.
4. WMA technology manufacturer's material safety data sheets (MSDS).

5. Documentation of past WMA technology field application including points of contact.
6. Temperature ranges for mixing and compacting.
7. Laboratory test data, samples, and sources of all mix components, and asphalt binder viscosity-temperature relationships.

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

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

g) **Anti-stripping additives**

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

.03 Bituminous Concrete Production – Quality Control

(a) Process Control - Material Production Quality Control.

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

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

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

- Production Plant - make, type, capacity, and location.
- Production Plant Calibration - components and schedule; address documentation.
- Personnel - include name and telephone number for the following individuals:
- Person responsible for quality control.
- Qualified technician(s) responsible for performing the inspection, sampling, and testing.
- Person who has the authority to make corrective actions on behalf of the Contractor.
- Testing Laboratory - state the frequency of accuracy checks and calibrations of the equipment used for testing; address documentation.
- Load number of QC samples (1-10 if QA sample is not within trucks 1-10)
- Locations where samples will be obtained and the sampling techniques for each test
- Tests to be performed and their normal frequency; the following, at a minimum, shall be conducted:
  - Mixture Temperature: each of the first five trucks, and each load that is sampled for QC or acceptance testing.
  - Gradation analysis of aggregate (and RAP) stockpiles - one washed gradations per week for each aggregate stockpile; RAP: five gradations and asphalt cement contents for dedicated stockpiles where new material is not being added; one gradation and asphalt cement content test per week for stockpiles where material is continually being added to the stockpile.
  - Gradation analysis of non-payment sieves
  - Dust to effective asphalt calculation
  - Moisture content analysis of aggregates - daily.

  - Gradation analysis of the combined aggregate cold feed - one per year per mixture.
  - Bulk specific gravity and absorption of blended material - one per year per mixture.
  - Ignition Oven calibration - one per year per mixture.
  - Hot-Bins: one per year per mixture.
  - Others, as appropriate.
- Procedures for reporting the results of inspection and tests (include schedule).
- Procedures for dealing with non-compliant material or work.
- Presentation of control charts. The contractor shall plot the results of testing on individual control charts for each characteristic. The control charts shall be updated within on working day as test results for each sublot become available. The control charts shall be easily and readily accessible at the plant laboratory. The following parameters shall be plotted from the testing:
  - Asphalt cement content.
  - Volumetrics (air voids, voids in mineral aggregates [VMA])
  - Gradation values for the following sieves:
    - 4.75 mm (#4).
    - 2.36 mm (#8).
    - 0.075 mm (#200).
    - Operational guidelines (trigger points) to address times when the following actions would be considered:
      - Increased frequency of sampling and testing.
      - Plant control/settings/operations change.
      - JMF adjustment.
      - JMF change (See 401644 Section .04(a)(1)).
      - Change in the source of the component materials.
      - Calibration of material production equipment (asphalt pump, belt feeders, etc.).
      - Rejection of material.

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

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

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

The following steps will be taken for violations listed above:

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

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

(b) Material Production Test Equipment.

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

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

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

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

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

(c) Material Production Test Methods

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

.04 Job Mix Formula (JMF)

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

a) Development of JMF

Gradation: Use the FHWA Superpave 0.45 Power Chart to define permissible gradations for the specified mixture. Type C shall be either a No.4 (4.75 mm), 3/8" (9.5 mm), or 1/2" (12.5 mm) Nominal Maximum Aggregate Size bituminous concrete. Unless otherwise noted in the Plans, the Type C shall meet the 3/8" (9.5 mm) Nominal Maximum Aggregate Size. Type B bituminous concrete shall be the 3/4" (19.0 mm) Nominal Maximum Aggregate Size and the Bituminous Concrete Base Course (BCBC) shall be the 1" (25.0 mm) Nominal Maximum Aggregate Size. Target values for percent passing each standard sieve for the design aggregate structure shall comply with the Superpave control points and should avoid the restricted zone. Percentages shall be based on the washed gradation of the aggregate according to AASHTO T11.

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

Superpave Gyratory Compactive (SGC) Effort:

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

Superpave Gyratory Compactive (SGC) Effort:

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

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

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

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

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

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

Gradation Control Points:

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

TABLE 1

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

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

Gradation Classification

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

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

Plant Production Tolerances:

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

The Engineer may elect to evaluate the proposed JMF and suitability of all materials through laboratory trial batches. All materials requested by the Engineer shall be provided at the contractor's expense to the Central Laboratory in Dover in a timely manner upon request.

To verify the complete mixture design and evaluate the suitability of all materials, the following approximate quantities are required:

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

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

1. Submit the proper documentation on Pinepave mixture design software.

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

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

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

.06 Construction.

(a) Pavement Construction Test Equipment.

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

Weather Limitations.

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

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

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

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

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

Compaction:

(b) Pavement Construction - Process Control.

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

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

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

Repair all core holes in accordance with 401699 Appendix A.

Method of Measurement:

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

Basis of Payment:

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

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

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

10/25/2013

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.

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. 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. 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 (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". 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 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" 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 of internal span, with a maximum of 5/8" for all sizes through 7' internal span, and a maximum of 3/4" for internal spans greater than 7'.

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

Position of Reinforcement - The maximum variation in the position of the reinforcement shall be ±3/8", except the cover over the reinforcement for the external surface of the top slab shall not be less than 2" for earth covers less than 3'. 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. 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 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. 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" 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".

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 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 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 excavation, backfilling, materials, labor, tools, equipment and incidentals necessary to construct structures associated with the culvert (footings, wingwalls, parapets, etc.) as specified on the Plans.

3/20/15

602740 - DRILLING FOR CONCRETE SHAFT (IN SOIL), 30" DIAMETER (LF)
602741 - DRILLING FOR CONCRETE SHAFT (IN SOIL), 42" DIAMETER (LF)
602742 - DRILLING FOR CONCRETE SHAFT (IN SOIL), 48" DIAMETER (LF)
602743 - DRILLING FOR CONCRETE SHAFT (IN SOIL), 60" DIAMETER (LF)
602744 - DRILLING FOR CONCRETE SHAFT (IN SOIL), 72" DIAMETER (LF)

602745 - DRILLING FOR CONCRETE SHAFT (IN ROCK), 30" DIAMETER (LF)
602746 - DRILLING FOR CONCRETE SHAFT (IN ROCK), 42" DIAMETER (LF)
602747 - DRILLING FOR CONCRETE SHAFT (IN ROCK), 48" DIAMETER (LF)
602748 - DRILLING FOR CONCRETE SHAFT (IN ROCK), 60" DIAMETER (LF)
602749 - DRILLING FOR CONCRETE SHAFT (IN ROCK), 72" DIAMETER (LF)

602750 - PERMANENT CASING FOR CONCRETE SHAFT, 30" DIAMETER (LF)
602751 - PERMANENT CASING FOR CONCRETE SHAFT, 42" DIAMETER (LF)
602752 - PERMANENT CASING FOR CONCRETE SHAFT, 48" DIAMETER (LF)
602753 - PERMANENT CASING FOR CONCRETE SHAFT, 60" DIAMETER (LF)
602754 - PERMANENT CASING FOR CONCRETE SHAFT, 72" DIAMETER (LF)

Description:

This work shall consist of all labor, materials, equipment, and services necessary to perform all operations to complete the installation of drilled shafts. The work shall be completed in accordance with the plans, The State of Delaware Department of Transportation Standard Specifications for Road and Bridge Construction dated August 2001, including all revisions and addendums thereof, and this Special Provision. Drilled shafts are deep foundation elements constructed by excavating a circular shaft and casting in-place a reinforced concrete section which is straight and vertical with the minimum diameter specified on the drawings excavated to the termination (depth) criteria stated on the plans.

Materials:

Materials shall meet the following requirements:

A. **Hydraulic Cement Concrete**

Portland cement concrete shall be 4500 psi minimum and conform to the requirements of Section 812 and Table 812-A, for Class A concrete with the exception that the Contractor shall determine and submit the mix design along with supporting testing for approval. In addition, the mix design shall use No. 8 stone as the aggregate with the addition of high range water reducers (superplasticizers). Where not otherwise specified, ACI 336.1-89 shall be followed. Water used in mixing concrete or slurry shall conform to the requirements of Section 803 of the Standard Specifications.

Concrete shall remain workable and maintain a 4-inch slump for a minimum of four hours after the addition of water or the duration of the pour whichever is greater. Workability shall be verified by an on site slump loss test for concrete placed by tremie method under water or drilling fluid. Concrete shall have a slump value not less than 6 inches or a slump value greater than 1 inch beyond that designated in the concrete mix submittal immediately prior to it being placed in the shaft. A minimum slump of 8 inches is required for concrete placed under a drilling fluid or water. An acceptable water reducing and retarding admixture shall be added to the concrete to produce the specified slump. Under no circumstances shall the admixture cause segregation of the concrete material components. If any admixtures are added to the concrete at the site, the admixture must be added to the concrete by a qualified technician furnished by the Contractor. Immediately after the addition of the admixture, the drum shall be turned a minimum of 30 revolutions, at high mixing speed, until the concrete is thoroughly mixed. The technician shall then test the slump and consistency of the concrete mixture. Under no circumstances shall the Contractor add additional water to the concrete mixture to reach the desired slump. The mix design including any water reducing and retarding admixtures to be used shall be submitted to the Engineer for approval at least 30 days prior to concrete placement.

B. **Reinforcing Steel**

Deformed reinforcing bars shall be in accordance with the sizes, spacing, dimensions, and details shown on the plans and shall conform to ASTM A615, Grade 60, and the requirements of Section 824 and Section 603 of the Specifications.

C. **Temporary and Permanent Casing**

Temporary and Permanent Casing pipe shall conform to ASTM A 252, Grade 2 as minimum for temporary or permanent application. Casing shall be metal, smooth, clean, watertight, and of ample strength to withstand both handling and driving stresses and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified diameter of the shaft. With the exception of casing used only to provide safety for persons entering the shaft, the casing shall be of a diameter to fit tightly against the wall of the shaft. The Contractor shall determine the diameter and thickness of casing however no extra compensation will be allowed for concrete required to fill an oversized casing or oversized excavation.

D. **Slurry**

1. Slurry shall be a stable suspension of mineral or polymer in potable water. The Contractor is responsible for and shall modify the slurry mix as required so as to maintain a stable suspension and stable borehole at all times.

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

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

4. Slurry shall be mineral or polymer type with the following density, viscosity, and pH. Requests for deviations from the values listed in 1 shall be submitted along with manufacturer recommendations or prior experience documentation to the Engineer for approval.

6. Slurry Testing - Density shall be measured by 68 degrees F by the mud density balance, test method FM 8-RP13B-1. Viscosity shall be measured by the Marsh Cone Method, test method FM 8-RP13B-3. The pH shall be measured by test method FM8-RP13B-4. The sand content shall be measured by American Petroleum Institute method API-13B-1.

Notes for Table 1:
a. Increase density values by 2 lb/ft3 in salt water.
b. Slurry properties shall be monitored at multiple points in the shaft.
c. Higher sand contents during concreter placement will be permitted provide the % sand remains constant for 1 hr prior to concrete placement without agitation.
d. The Contractor shall be responsible to performing slurry testing.

Table 1: Range of Values (at 68° F) for Slurry

Property (Units)	At the Time of Slurry Introduction in the Drilled Shaft	Before Concrete Placement in the Drilled Shaft	Test Method
Density	63 pcf min	75 pcf max	Density Balance
Viscosity (mineral) (polymer)	 N/A N/A	 45 sec/quart max 50 sec/quart max	Marsh Cone
pH	7 to 11	7 to 11	pH paper or meter
Sand Content % (mineral) (polymer)	N/A	 4% max 1% max	200 Sieve Retain % by volume

E. Access Tubes for Crosshole Sonic Log Testing

Access tubes shall be 2 inch I.D. Schedule 40 steel pipe. PVC tubes shall not be used. The selected pipes must have a round, regular internal diameter free of defects or obstructions, in order to permit a free, unobstructed passage of the source and receiver probes. The pipes must be watertight and free from corrosion with clean internal and external faces to ensure smooth passage of the probes and to secure a good bond between the concrete and tubes. The pipes shall each be fitted with a watertight shoe on the bottom and a removable cap on the top.

Contractor Qualifications:

This work shall be performed under the supervision of the Contractor's Supervisor for the drilled shaft operation, who will be fully knowledgeable and experienced, as defined herein, in the construction of drilled shaft foundations of similar size and in similar geotechnical conditions using the proposed method of drilled shaft installation. Further, the Contractor performing the drilled shaft work and the Contractor's supervisor for the drilled shaft work shall have at least five years experience within the last eight years constructing drilled shafts. The Contractor's equipment proposed for use at the site shall have the demonstrated capacity to successfully complete the work within the specified contract time.

At least 30 days prior to the start of drilled shaft construction, the Contractor shall provide the following documentation of his qualifications, experience record, prior project references, and the availability of the equipment suitable to perform the required work. All references shall be currently available personnel who can verify the quality of the Contractor's previous work and shall include current name, address, and telephone number(s). This documentation shall reference the experience of the drilled shaft Contractor and the drilled shaft Contractor's field supervisor in responsible charge of the drilled shaft operations. As a minimum, this documentation shall include:

1. Experience in the successful installation of drilled shafts of the sizes shown in the plans and employing construction methods similar to those proposed at this site. The minimum experience shall consist of five similar-sized projects in the past five years. At least three of the projects shall be sites with similar ground conditions. The person in responsible charge of day-to-day drilled shaft operations shall have prior experience constructing shafts similar to those described in these plans and specifications. That person shall have at least five years in the past eight years constructing drilled shafts and at least two years with the current firm.

2. Experience of subcontractor performing the crosshole sonic logging testing. The crosshole sonic logging subcontractor shall have previous experience in conducting crosshole sonic logging tests on at least 5 drilled shaft projects of similar size in the past five years.

This submission shall be made in conjunction with the submittals of the Drilled Shaft Installation Plan. Upon review of the Contractor's qualifications and the Drilled Shaft Installation Plan described hereafter, the Department expressly reserves the right to not approve the drilled shaft Contractor if, in the opinion of the Department, the Contractor's experience, qualifications or equipment is suspect in its ability to complete the work in a timely manner and in accordance with the specifications.

Equipment:

The Contractor shall furnish all equipment and instrumentation necessary for installation of the shafts.

The excavation and drilling equipment shall have adequate capacity including power, torque, and down thrust to excavate a hole of the maximum diameter shown on the plans and to a depth of 15-feet or 30 percent beyond the estimated depths shown in the contract documents, whichever is greater. Equipment used for constructing shafts supporting building or bridge structures or installing shafts greater than 60 inches in diameter shall have a minimum torque of 75,000 ft-lbs and apply a minimum of 35,000 lbs of crowd. The drilling equipment shall be outfit with sufficient instrumentation to monitor the depth, crowd and torque on the drilling tool.

The excavation and overreaming tools shall be of adequate design, size, and strength to perform the work shown in the contract documents or described herein. Overreaming may be accomplished with a grooving tool, overreaming bucket, or other method approved by the Engineer.

When the material encountered cannot be drilled using conventional earth augers with soil or rock teeth, drilling buckets, and/or overreaming tools, the Contractor shall provide special drilling equipment including but not limited to: rock core barrels, rock tools, air tools, drop hammers, and other equipment as necessary to construct the shaft excavation to the size and depth required.

The Contractor shall provide equipment suitable for cleaning the bottom of the shaft including flat bottom cleanout buckets, pumps, airlifts, hand equipment or other tools necessary to remove loose material from the bottom of the shaft. The Contractor shall have equipment available to clean the bottom of the shaft both in the dry and under water.

When bottom cleaning and shaft inspection cannot be performed to the satisfaction of the Engineer by the top-hole methods, the Contractor shall provide appropriate safety equipment for their personnel and the Engineer to access, clean and inspect the bottom of the shaft. Equipment shall include but is not limited to: full length safety casing, harnesses, fall arrester equipment, two means of lifting personnel from the shaft, and air monitoring equipment.

When slurry methods are proposed the Contractor shall provide equipment that produces a stable slurry suspension and provides mechanical agitation. The Contractor also shall provide a temporary pipeline or other safe methods to transport slurry and provide equipment that removes detrimental quantities of excavated material from the slurry.

Site Information:

Boring logs from the subsurface investigation are included in the contract documents for use by the Contractor. Data on subsurface conditions are not intended as representations or warranties of continuity of such conditions. It is expressly understood that the Department will not be responsible for interpretations or conclusions drawn from the subsurface information by the Contractor. The data is made available for convenience of the Contractor. The Contractor may make additional test borings and other exploratory operations at no additional cost to the Department.

Prior to bidding, the Contractor shall visit and examine the work site and all conditions thereon and take into consideration all such conditions that may affect this work, in accordance with the requirements of Section 102.05 of the Standard Specifications.

Submittals:

The Contractor shall submit the following to the Engineer for review and approval. Items A through J shall be submitted not less than 30-days before the start of work.

A. List of proposed equipment to be used including cranes, drills, augers, bailing buckets, final cleaning / inspecting equipment, desanding equipment, slurry pumps, sampling equipment, tremie or concrete pumps, casing, and other appurtenances. Include weight of Kelly bar, and O.D. dimensions of down-hole excavating tools.

B. Details of overall construction operation sequence and the sequence of shaft construction in bents or groups.

C. Submit project experience and resumes of the Contractor, Contractor's Drilled Shaft Supervisor, and Subcontractor Qualification.

D. Details of shaft excavation methods, including anticipated lengths and diameters of casings to be installed. Indicate if the intent is to pull or leave the casing in-place. Indicate if the intent is to pour the shaft in a dry or wet condition.

E. When slurry will be utilized, data from the supplier giving the physical and chemical properties of the slurry, details of the method proposed to mix, circulate, desand, and test the slurry.

F. Method of monitoring verticality of the shaft excavation during excavation and details of proposed corrective measures to be implemented as necessary.

G. Methods to clean and inspect the shaft excavation.

H. Details of reinforcement placement including support and centralization methods.

I. The Contractor shall submit a Concrete Placement Plan, including the concrete mix design, including admixtures to be used. Details of concrete placement, curing, and protection. Include method of collecting slurry or water from the excavation.

J. Details of the method to perform integrity testing by Ultra Sonic Crosshole Testing in accordance with ASTM D6760 "Standard Test Method for Integrity Testing of Concrete Deep Foundations by Ultrasonic Crosshole Testing".

K. Test Reports and logs:
   i. Shaft Installation log including Excavation Log and Shaft Concreting Log
   ii. Pile Integrity Testing Reports.

L. Other information shown on the plans or requested by the Engineer.

The Contractor shall not start the construction of drilled shafts until the Engineer has approved Items A through J. Such approval by the Engineer will not relieve the Contractor of responsibility for results obtained by the use of the Installation Plan or any of his other responsibilities under the contract.

Construction Methods:

A. Protection of Existing Structures

All reasonable precautions shall be taken to prevent damage to existing structures and utilities, in accordance with the requirements of Section 107 of the Standard Specifications. These measures shall include but are not limited to, selecting construction methods and procedures that will prevent excessive caving of the shaft excavation, monitoring, and controlling the vibrations from the driving of casing or sheeting, drilling of the shaft. Casing shall be installed to a minimum depth of 10 feet when the edge of the shaft is within 10 feet of any structure or roadway. Casing instructed to be left in place by the Department will be paid for in accordance with the appropriate bid item.

B. Construction Sequence

The Design Geotechnical Engineer in addition to the Department's Inspection personnel shall be onsite to observe the excavation of the first shaft excavated by each drill rig. Observation of the cuttings, penetration rates, and drilling pressure will be used in conjunction with the previously obtained subsurface information to verify the indented bearing strata have been penetrated. The Contractor shall notify the Department 2 weeks prior to drilling the first shaft to coordinate inspection.

Excavation of adjacent drilled shafts or other structures or utilities within a radius of three shaft diameters will not be permitted until concrete has been in place for at least 48 hours and the concrete has reached a minimum strength of 500 psi.

Concrete shall be placed immediately after the shaft has been excavated to the required depth, cleaned, inspected by the Engineer and the reinforcement has been placed. The Contractor shall sequence construction to avoid uncased excavated shafts from being open over weekends or breaks in a work week. Uncased excavations shall be completed within 3 days from the start of excavation.

C. Methods of Drilled Shaft Installation

Excavations required for shafts shall be performed through whatever materials are encountered, to the dimensions and elevations shown on the plans or otherwise required by the Special Provisions. The method used shall be suitable for the intended purpose and materials encountered. Generally, either the dry method or wet method, and either temporary casing method, or permanent casing method shall be used as necessary to produce sound, durable concrete foundation shafts free of defects. The permanent casing method shall be used only when authorized by the Engineer. The Contractor shall select and use the method, as determined by site conditions and subject to approval of the Engineer, which is needed to properly accomplish the work. The Engineer shall be notified prior to switching construction method; additional submittals may be required.

1. Dry Construction Method

The dry construction method shall be used only at sites where the groundwater table and site conditions are suitable to permit construction of the shaft in a relatively dry excavation (i.e., less than 3-inches of water accumulates above the final base elevation over a 1-hour period when no pumping is permitted), and where the sides and bottom of the shaft are stable and may be visually inspected by the Engineer prior to placing the concrete. The dry method consists of drilling the shaft excavation, removing accumulated water and loose material from the excavation. Where caving occurs or if there is excess seepage into the drilled shaft, the drilling shall be done using an alternate method of construction. Concrete shall be placed in accordance with this provision.

2. Wet Construction Method

The wet construction method, or slurry method, may be used at sites where a dry excavation cannot be maintained for placement of the shaft concrete. This method consists of using water or slurry to maintain stability of the hole walls while advancing the excavation to final depth, placing the reinforcing cage, and shaft concrete. Temporary surface casings shall be provided to aid shaft alignment and position, and to prevent sloughing of the top of the shaft excavation, unless it is demonstrated to the satisfaction of the Engineer that the surface casing is not required.

Slurry shall be premixed thoroughly with clean fresh water and adequate time allowed for hydration prior to introduction into the shaft excavation. Adequate slurry tanks will be required. Excavated slurry pits will only be allowed with written permission of the Engineer. Adequate desanding equipment will be required to maintain slurry properties as required by the Materials section of this Special Provision. Steps shall be taken as necessary to prevent the slurry from loosing its fluid properties in the shaft excavation, such as, agitation, circulation, and adjusting the properties of the slurry. The level of the slurry shall be maintained at a height sufficient to prevent caving of the hole. In uncased holes the slurry level at all times shall be at least 6-feet higher than the elevation of groundwater.

The Contractor shall carry out control tests on slurry to determine density, viscosity, and pH as required by this Special Provision. Tests to determine density, viscosity, and pH values shall be done during the shaft excavation to establish a consistent working pattern. Testing shall be performed at a minimum of twice per day and as requested by the engineer.

Prior to placing shaft concrete, the Contractor shall clean the excavation and collect slurry samples from the bottom, 10 feet from the bottom and the mid height of slurry. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be eliminated. The slurry shall be within specification requirements immediately before shaft concrete placement. Concrete shall be placed in accordance this Special Provision.

3. Temporary Casing Construction Method

The temporary casing construction method may be used at all sites where excessive caving or seepage could occur. This method typically consists of advancing the excavation through caving material by the wet construction method as in this provision. When a nearly impervious formation is reached, a temporary casing shall be placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method to the projected depth. If it is not possible to maintain the seal of the casing, caving or raveling occurs, then the excavation shall be completed using an alternative method. As an alternative to use of the wet excavation method, temporary casing may be installed by drilling, driving or vibratory procedures in advance of excavation to the lower limits of the problem material.

Slurry may be omitted at the discretion of the Engineer if it can be demonstrated that the casing can be installed with only minor caving of the hole. Minor caving shall be considered less than 25% increased volume over theoretical shaft volume, for a section not to exceed 10 feet of shaft. If slurry is omitted, casing shall be installed to the final base elevation to allow for inspection of the bearing stratum.

If slurry is omitted while using the temporary casing method, the casing, drilling tools and methods shall be selected such that the diameter of the shaft excavation is no more than 4-inches greater than the outside diameter of the temporary casing. Under no circumstances shall the Contractor intentionally excavate a shaft with a diameter more than 4-inches greater than the outside diameter of the temporary casing being used. In

the event that, prior to setting the intended temporary casing, the diameter of the shaft excavation becomes more than 4-inches greater than the outside diameter of intended casing, the shaft shall be excavated or overreamed to a larger diameter which will accommodate installation of the next largest typical casing diameter. If oversized excavations repeatedly develop due to raveling, caving or other ground conditions, the Contractor shall utilize slurry in conjunction with temporary casing.

Clean the excavation and test the drilling fluid for compliance according to the Department specifications. Lower the reinforcing steel cage in place and fill the excavation with concrete. Before the casing is withdrawn and while the casing is being withdrawn, the level of fresh concrete in the casing shall be such that all the fluid trapped behind the casing is displaced upward without contaminating the shaft concrete. The concrete level shall be maintained a minimum of 10 feet above the bottom of the lowest casing while pulling. Concrete placement and pulling of the temporary casings shall be conducted in accordance with the requirements of this provision.

4. Permanent Casing (Left In-place) Construction Method

When permanent casing is not specifically required on the plans and the Contractor intends to leave casing in the ground, the Engineer shall be notified prior to the start of drilling. Permanent Casing shall only be left in-place when reinforcement arrangements inhibit extraction of the casing. The Permanent Casing method shall not be used for sign structure foundations.

This method consists of driving or drilling a casing to a prescribed depth before excavation begins and leaving the casing in place after concrete placement. If the casing cannot be advanced to the prescribed depth prior to beginning excavation operations, the Engineer may require the Contractor to facilitate casing installation by either (1) excavating the material within the casing to the depth that the casing was advanced, or (2) drilling a pilot hole, of a diameter less than 60% of the shaft diameter, down to the final casing depth. In some cases, overreaming to the outside diameter of the casing may be required in order to advance the casing to the prescribed depth. Excavating in advance of the casing will only be permitted when the sides are sufficiently stable and do not ravel, such that the casing is tight against and cut into the undisturbed soil when advanced. Excavating in advance of casing which will be left in-place shall only be performed when approved by the Engineer.

The casing shall be continuous between the elevations. Overlapping of varying diameter casing will be permitted provided the overlap is sufficient to prevent excessive water infiltration and the intrusion of the surrounding soil.

After the installation of the casing and the excavation of the shaft are complete, the top of the casing shall be cutoff at the prescribed elevation, final shaft cleaning done, and the reinforcing steel and shaft concrete placed within the portion of the casing left in place. Concrete shall be placed in accordance with this provision.

5. Alternative 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. Excavations

The Design Geotechnical Engineer shall be on site to observe the installation of the first drilled shaft which supports a building or bridge structure. The bottom elevation of the drilled shaft and rock socket, as shown on the plans, may be adjusted during construction when the Design Geotechnical Engineer determines that the foundation material encountered during excavation is unsuitable or differs from that anticipated in the design of the drilled shaft.

Excavated materials, which are removed from the shaft excavation, and any drilling fluids used, shall be disposed of offsite in accordance with federal, state and local environmental regulations or as directed by the Department.

Sidewall overreaming shall be required when the sidewall of the drilled shaft excavation is determined by the Engineer to have softened due to excavation methods, swelled due to delays in concreting, or degraded because of slurry cake buildup. The thickness and elevation of the sidewall overreaming shall be as directed

by the Engineer. Overreaming thickness shall be a minimum of 1-inch. The Contractor shall bear all costs associated with sidewall overreaming. Any drilled shaft concrete over the theoretical amount required to fill any overreaming for shafts, as dimensioned on the plans, shall be furnished at the Contractor's expense.

The Contractor shall provide the necessary equipment to remove and dispose of any materials encountered in forming the drilled shaft and rock socket excavation to the dimensions shown on the plans or as directed by the Engineer.

Bedrock will be defined as a continuous subsurface material which slows the advance rate of the drill rig to less than 4 inches in 10 minutes under 40,000lbs of down pressure (including the Kelly bar and drilling tools) for shafts 48-inches in diameter and less and 60,000 lbs of down pressure (including the Kelly bar and drilling tools) for shafts larger than 48-inches in diameter. When measuring penetration rate, the drilling tools shall be a double cut auger fitted with bullet or chisel teeth and rotated between 20 and 40 rpm.

Drilled shaft and rock socket excavation shall also include removing surface and subsurface obstructions at drilled shaft locations. Such obstructions may include man-made materials, such as old concrete foundations, and natural materials, such as boulders and cobbles. Thin lenses of rock or obstructions less than 12 inches in thickness will not be paid as rock.

Special tools and/or procedures shall be employed by the Contractor after the hole cannot be advanced more than 1-foot in thirty minutes using approved equipment operating at maximum power, torque, and down thrust, using conventional augers fitted with soil or rock teeth, drilling buckets and/or under reaming tools. Such special procedures/tools may include, but are not limited to: chisels, boulder breakers or rock breakers or hammer grabs to break up or lift the boulders intact, core barrels, air tools, hand excavation, temporary casing, and increasing hole diameter. Blasting will not be permitted.

E. Lost Tools

Drilling tools that are lost in the excavation shall be considered obstructions and shall be promptly removed by the Contractor without compensation. All costs due to lost tool removal shall be borne by the Contractor including but not limited to costs associated with hole degradation due to removal operations or the time the hole remains open.

F. Cleaning and Excavation Inspection

The Contractor shall provide equipment for checking the dimensions and alignment of each shaft excavation. The Contractor shall determine dimensions and alignment under the observation and/or direction of the Engineer. Final shaft depth shall be measured after final cleaning.

Shaft cleanliness and the bearing surface will be evaluated and approved by the Engineer. The Contractor shall provide safe access and egress to the Engineer for inspection of the bottom of the excavation prior to placement of reinforcing steel and concrete. After the Contractor has prepared the bottom of the shaft excavation, the Contractor shall notify the Engineer. The Contractor shall coordinate schedules for excavation inspection by the Engineer.

Bottom elevations of drilled shafts and rock sockets shown on the plans are based on design criteria developed by the Engineer and on subsurface conditions depicted on the Engineering Geology sheets included in the plans. The bottom elevations may be adjusted by the Engineer to obtain the required design capacity based on the bearing material encountered during installation of each drilled shaft. The Engineer will be the sole judge as to the classification of the material encountered during drilled shaft excavation.

The Contractor shall not permit any worker to enter the shaft excavation for any reason unless: both a suitable casing has been installed and the water level has been lowered and stabilized below the level to be occupied, and functional and appropriate safety equipment and procedures have been provided to workers entering the excavation as covered under 29 CFR 1910.146. The Contractor shall submit a written permit space program for confined-entry-space in accordance with OSHA 1910.146 to the Engineer for review and approval prior to constructing the drilled shafts.

Prior to placement of reinforcing steel and concrete, the Contractor shall ensure that loose material from the bottom and sides of excavation has been removed, including sediment and water, and that the shaft is within the construction tolerances, listed in this Special Provision.

The Contractor shall test the slurry for compliance with these specifications, collecting slurry samples from the bottom, 10 feet up and at mid height of the slurry prior to placing concrete.

Down hole inspection will not be required for shafts less than 36 inches in diameter or sign foundations.

When wet construction methods are utilized to construct shafts for building or bridge type structures, the Contractor shall provide a submersible inspection devise to verify the bottom conditions for the first shaft installed by each Drilled Shaft Supervisor on the project using these methods. The inspection device shall be capable of capturing a color image of the bottom of the shaft. The device shall consist of a weighted enclosure which can be set on the bottom of the shaft and can evacuate the drilling fluids. The device shall have a vertical scale with ¼" increments. Once the acceptable bottom cleaning methods have been demonstrated, subsequent bottom inspections shall be performed weighted tape, probe rods, or other top hole inspection devices.

Labor and equipment associated with a submersible inspection device, top hole or bottom hole inspection shall be considered incidental to the installation of the drilled shafts.

G. Reinforcing Steel Cage Construction and Placement

The reinforcing steel cage consisting of the steel shown on the plans plus cage stiffener bars, spacers, centralizers, and other necessary appurtenance shall be completely assembled and placed as a unit immediately after the shaft excavation is inspected and accepted and prior to shaft concrete placement. Prior to installation of the steel cage in the shaft excavation, inspect and clean the reinforcing steel of materials that may prevent effective bonding. The assembled rebar cage outside diameter shall be at least 6-inches smaller than the drilled hole diameter of the shaft and rock socket, which corresponds to at least 3-inches of concrete cover over the rebar.

The reinforcing steel in the shaft shall be tied and supported so that the reinforcing steel will remain within allowable tolerances until the concrete will support the reinforcing steel. When concrete is placed by tremie methods, temporary hold-down devices shall be used to prevent uplifting of the steel cage during concrete placement. Concrete spacers or other approved non-corrosive spacing devices shall be used at sufficient intervals not exceeding 5-feet along the shaft excavation. When the size of the longitudinal reinforcing steel exceeds 1-inch in diameter, the spacing may be increased but shall not exceed 10-feet.

Access tube requirements shall be fastened to the reinforcement cage.

H. Concrete Placement, Curing, And Protection

All concrete placement, consolidation and curing activities shall conform to the requirements of Section 602 of Specifications, and the Contractor's approved concrete placement plan, except as otherwise specified herein or as directed by the Engineer

Concrete shall be placed as soon as possible after reinforcing steel cage placement. Concrete placement shall be continuous in the shaft to the top elevation of the shaft. Placement shall continue after the shaft is full until good quality concrete is evident at the top of the shaft.

Concrete to be placed in dry shafts less than 60-feet in length may be placed by allowing the concrete to free fall into the excavation. Limit the segregation of the concrete by placing the concrete through the use of a tube, sectionalized pipe or other means to direct the free fall of the concrete so that it does not strike the sides or reinforcement of the shaft. Concrete placement by free fall shall be allowed only when the dry method of construction is utilized or the Contractor demonstrates that no more than 3-inches of water accumulate in the base of the excavation over a 1-hour period. If water has infiltrated the base of the excavation, it shall be removed prior to placement of the concrete. No more than 1-inch of standing water shall be allowed in the base of an excavation to prevent segregation of the concrete. If water, trapped in the annular space outside of a temporary casing, enters the shaft as temporary casing is withdrawn, the contractor shall take necessary steps to completely remove all water and sediment from the shaft as well as remove any concrete which has become contaminated or diluted prior to resuming concrete placement by free fall. If water cannot be expediently and completely removed, or the consistency and integrity of the surface of the fluid concrete within the shaft is in question, the Contractor shall switch to placing concrete by tremie or concrete pump. Contaminated concrete shall be removed from the top of the piers at the time of concrete placement.

Concrete to be placed in water or slurry shall be placed through a tremie or concrete pump. The tremie shall be supported so as to permit free movement or permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be sealed closed at the start of work so as to prevent water or slurry from entering the tube before the tube is filled with concrete. After placement has started the tremie tube shall be kept full of concrete to the bottom of the hopper. If fluid enters the tube after placement is started, the tremie shall be withdrawn, the discharge end resealed, and the placement restarted. The flow of concrete shall be continuous until the work is completed. The discharge end of the tremie and pump line shall always be located a minimum of 6-feet below the level of the already placed concrete. As concrete is placed in the excavation, the slurry should be collected and properly disposed of as approved by the Engineer. Tremie pipes shall be a minimum of 10-inch diameter and use with a minimum slump of 8-inches. Tremie pipes shall not have aluminum parts that will react with concrete. Pump hoses shall be a minimum of 4-inches in diameter. All tremie pipe, pump hoses and connections shall be watertight and the end of the line must be rigid and straight.

The concrete placing rate shall be not less than 30 cubic yards of concrete per each 1-hour period. The concrete mix shall be of such design that the concrete remains in a workable plastic state throughout the placement of the concrete and the concrete slump at the end of the shaft pouring still measures at least 4-inches.

Temporary casings shall be removed while the concrete remains fluid and workable. The removal of temporary casing shall not be allowed until the level of the concrete placed in the shaft is high enough to withstand the pressure exerted by the surrounding soil, water or drilling fluid. After concreting begins, removal of the temporary casing should begin before the concrete begins to set. Telescoping casing may be used but the bottom end of temporary casing shall be located a minimum of 10-feet below the level of already placed concrete. If the concrete begins to set prior to removal of the casing, the removal of the casing should cease and the casing should be cut off at its current elevation and remain in the ground permanently.

When the top of shaft elevation is above ground, the portion of the shaft above ground shall be formed with a removable form or a permanent form when specified.

All concrete, except for that placed under water, shall be vibrated to a depth of 5-feet below the ground surface except where soft uncased soil or slurry remaining in the excavation will possibly mix with the concrete. After placement, any exposed surfaces of the shaft concrete shall be protected to allow proper curing. Portions of drilled shafts exposed to a body of water shall be protected from the action of water by leaving the forms in place for a minimum of 7-days after concrete placement.

For at least 48-hours after shaft concrete has been placed, no construction operations within 3 shaft diameters from any side of the shaft that would cause soil movement adjacent to the shaft, shall be conducted.

Drilled shaft concrete shall not have any evidence of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing).

I. Construction Tolerances

The following construction tolerances shall be maintained in constructing drilled shafts.

1. The drilled shaft shall be within 3-inches of the plan position in the horizontal plane at the plan elevation for the top of the shaft.

2. The vertical alignment of the shaft excavation shall not vary from the plan alignment by more than 2.5-inch per 10-feet of depth.

3. After all the shaft concrete has been placed, the top of the reinforcing steel cage shall be no more than 6-inches above and no more than 3-inches below plan position.

4. When casing is used, its outside diameter shall not be less than the shaft diameter shown on the plans. When casing is not used, the minimum diameter of the drilled shaft shall be the diameter shown on the plans for diameters 24-inches or less, and not more than 1-inch less than the diameter shown on the plans for diameters greater than 24-inches.

5. After all concrete has been placed, the top elevation of the shaft shall be within 1-inch of the plan top of shaft elevation.

6. The bottom of the shaft excavation shall be normal to the axis of the shaft within 1/2-inches per foot of shaft diameter.

Completed drilled shaft excavations constructed in such a manner that the concrete shaft cannot be completed within the required tolerances are unacceptable. The Contractor shall submit correction methods for the Engineer's approval. Approval will be obtained before continuing with the drilled shaft construction. Materials, engineering and work necessary to effect correction for out-of-tolerance drilled shaft excavations shall be furnished at no cost to the Department.

J. Record Information

The Contractor shall provide the Department with the drilled excavation information as recorded. For each drilled shaft foundation installed, the Contractor shall record on drilled shaft installation logs the location, alignment, dimensions, elevation of the top and bottom, depth of the bearing stratum penetration, description of the materials encountered at all elevations, description of any change in excavated material, elevation of the water table during excavation, condition of the bottom of the excavation and bearing surface, slurry test data, concrete data, verticality and deviation from plan location, drilling time for all changing layers, length, diameter and thickness of any casing left in-place, and other pertinent information to the drilled shaft. The Contractor shall also record the theoretical volume of excavation, volume of concrete placed versus depth, and total volume of concrete placed. The Contractor shall report any observed irregularities to the Engineer immediately upon discovery.

K. Acceptance of Completed Drilled Shafts

The acceptance of each drilled shaft will be the decision of the Engineer, based on the results of the shaft integrity testing report(s) and other information on the shaft installation. Rejection of a shaft based on the shaft integrity testing shall require conclusive evidence that a defect exists in the shaft that will result in inadequate or unsafe performance under service loads. If the integrity test records are inconclusive, the Engineer may require coring or excavation of the shaft to verify shaft conditions. If a defect is confirmed, the Contractor shall pay for all coring or excavation costs and completing grouting of all core holes. If no defect is encountered, the Department shall pay for all coring or excavation costs, including grouting of all core holes.

If testing discloses voids or discontinuities in the concrete which, as determined by the Engineer, indicate that the drilled shaft is not structurally adequate, the shaft shall be rejected and construction of additional drilled shafts shall be suspended until the Contractor repairs, replaces or supplements the defective work, and the Engineer approves the remedial work. Suspension of drilled shaft construction shall remain in effect until the Engineer approves the Contractor's written changes to the methods of drilled shaft construction as necessary to prevent construction deficiencies.

In the case that any shaft is determined to be unacceptable, the Contractor shall submit a plan for remedial action to the Engineer for approval. Any modifications to the foundation shafts and load transfer mechanisms caused by the remedial action will require calculations and working drawings stamped by a registered professional engineer for all foundation elements affected. All labor, calculations, drawings or other documentation and materials required to perform remedial shaft action shall be provided at no cost to the Department and with no extension of the contract time.

Method of Measurement:

Drilled shafts, complete in place, will be measured by the linear foot for each diameter of shaft for the appropriate ground conditions penetrated as listed in the estimated quantities. The length in soil will be determined as the difference between the top of the shaft elevation shown on the plans and either the final bottom of the drilled shaft excavation elevation or the elevation which bedrock, as defined in the Excavation section of this Special Provisions, minus any length of shaft encountering an obstruction, as authorized, complete, and accepted by the Engineer. The length in rock will be determined as the difference between the elevation which bedrock is first encountered in any portion of the shaft and the final tip elevation of the shaft, as authorized, complete, and accepted by the Engineer.

Pre-existing obstructions encountered above the top of bedrock will be measured as a drilled shaft in rock per linear foot of shaft the obstruction is encountered. Lenses of soil encountered below the top of rock or an obstruction, less than 24 inches in thickness will be measured as rock. Lenses of soil greater than 24 inches in thickness will be measured as soil.

Permanent Steel Casing will be measured by the linear foot for each diameter of shaft as listed in the estimated quantities. The length will be measured as the actual length of casing left in-place not to exceed the length measured for the top of the drilled shaft to the bottom of the deepest casing left in-place. Lengths of overlapping casing will be measured as one length of casing.

Basis of Payment:

Drilled Shafts will be paid for at the contract unit price per linear foot, complete-in-place, and accepted by the Engineer. Such payment will be considered to be full compensation for all costs involved with shaft excavation, using slurry when necessary, removal from the site and disposal of excavated material, the furnishing and placing of concrete and reinforcing steel including all labor, materials, equipment, temporary casing, installing anchor bolts, installing anchor plates, templates, furnishing and installing cross sonic logging steel access tubes in each caisson (all drilled shafts shall include 4 tubes for testing), installing PVC conduits and drain tubes, and incidentals necessary to complete the drilled shafts to the diameters and depths under the Contract Documents for type of ground penetrated. Additional compensation will not be allowed for concrete required to fill oversized excavations and casings. Unless otherwise specified, all testing required by this specification shall be performed by the Contractor with costs incidental to the various drilled shaft items.

Permanent Steel Casing will be paid at the contract unit price per linear foot, complete-in-place as approved by the Engineer. Such payment will be considered to be full compensation for all costs involved supplying, installing, and cutting off the casing. The unit price for each drilled shaft diameter shall apply for all casing left in-place for that shaft diameter regardless of the actual diameter or thickness of casing installed.

10/07/2011

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. 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
Type B	47,000 - 57,000 lb

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. The hinge plates shall have tensile breaking strength ranges as follows:

HI-10	11,450 - 13,900 lb
HI-1	16,400 - 19,700 lb
HI-2	6,700 - 8,100 lb

Nuts, Bolts and Cap Screws shall meet AASHTO M 164. 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.

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"
605730 - PREFRABRICATED EXPANSION JOINT SYSTEM, 1"

Description:

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

Materials:

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

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

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

Construction Methods:

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

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

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

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

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

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

Before placing the deck slab, the anchorage attached to the abutment backwall, sleeper slab, approach slab, 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.

7/29/15

614508 - WATER MAIN AND ACCESSORIES

Description:

This work consists of furnishing, transporting, installing, and testing the proposed water service pipe and accessories in accordance with the locations, details and notes on the Plans, and as directed by the Engineer. The work shall be performed in accordance with these Special Provisions and DelDOT Standard Specifications.

This work will also include the supply and installation of a new prefabricated concrete water meter vault. The proposed water meter and couplings will be supplied by Artesian Water Company and the Contractor shall be responsible for installing the water meter.

The Owner of the 8-inch DIP water main pipe on this project is DelDOT. All coordination and requests for information shall be directed to DelDOT's Area Engineer or his/her designated representative.

A "Breakout Sheet" is included in the contract to establish unit prices for the items listed below. The total of these unit prices multiplied by the estimated quantities will establish the total Lump Sum price to be submitted with the bid. Each listed item will be measured as a unit price item in the field. The final Lump Sum payment for Item 614508 will be adjusted by change order, either plus or minus, to match the final totals of all unit price items established in the Breakout Sheet. Failure to complete and submit the Breakout Sheet with the bid will cause the bid to be considered unresponsive.

General Requirements:

All materials and work, or part thereof, which are unsatisfactory as to any or all requirements of DelDOT and/or as specified herein, shall be removed and replaced or repaired in an acceptable manner by the Contractor at his/her own expense.

The Contractor shall guarantee that all workmanship, materials, and work performed under the contract, shall be in strict accordance with the Drawings, Specifications, and other Contract Documents. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the work. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee, or which in any way fail to comply with or fail to be in strict accordance with the terms and provisions and requirements of the Contract during such one year period. In addition to the one-year warranty a Maintenance Bond representing 15% of the total price bid for Item 614508 shall be furnished to the Owner upon successful completion of the item and shall be in effect for three (3) Calendar Years. All costs to provide the warranty and furnish the Bond shall be included in the Lump Sum price bid for item 614508.

Submittals:

The Contractor shall submit sources of supply and catalog cuts to DelDOT for all materials furnished as part of Item 614508 as required by DelDOT Standard Specifications, Section 106.

The Contractor shall provide DelDOT with a set of as-built drawings for the on-site water distribution system including the following:

- Manufacturer's literature on the materials installed, including piping, fittings, valves, and hydrants
- A set of drawings showing the horizontal and vertical locations of the water main, service pipes, and valves. The drawings shall be delivered to the DelDOT Area Engineer with two (2) hard copies and two (2) CDs with a Microstation (.dgn) drawing format. The Contractor shall be responsible for marking the construction drawings showing coordinates in accordance with the Delaware State Plane Coordinate System.
- A summary sheet listing the length and size of DIP water pipe installed, fittings, valves and additional items listed on the breakout sheet

All as-built documentation shall be submitted to DelDOT within thirty (30) days after completion of the required work performed as applied for payment under this contract. If as-built documentation is not submitted to the satisfaction of the DelDOT Area Engineer within this time frame, the work will be performed by DelDOT and 10% of the cost for Item 614508 will be deducted from payments to the Contractor to cover the cost of the additional work.

Materials:

All the materials including pipe, fittings, and all other accessories as listed under this Special Provision, shall conform to the material and quality requirements of the DelDOT Standard Specifications. The Contractor shall furnish all materials and equipment necessary for the complete and satisfactory construction of the water service pipe, including but not limited to the concrete water meter vault, fire hydrant, pipe, steel casing, concrete encasement, fittings, valves, and appurtenances. The Contractor shall be responsible for verifying dimensions for all materials (valves, fittings, pipe, etc.) necessary to make permanent connections to existing utility facilities of whatever material type encountered.

The Contractor shall transport, handle, and store pipe and fittings as recommended by the manufacturer.

New pipe and fittings that are damaged before or during installation shall be repaired or replaced, as recommended by the manufacturer or required by DelDOT. The costs of such repair or replacement shall be borne by the Contractor and be accomplished prior to proceeding with the project.

The Contractor shall deliver, store and handle other materials as required to prevent damage. Materials that are damaged or lost shall be repaired or replaced by the Contractor at no additional expense to DelDOT.

A. WATER PIPE MATERIALS

All water pipe, hydrants, valves, fittings and all appurtenances shall be new materials and shall be of the type, size, strength, and quality as shown on the plans and as specified herein and/or as indicated in the Special Provisions. The contractor may be required to secure and deliver to the Engineer a written statement from the manufacturer assuring the quality and compliance to the applicable specification of all materials furnished and installed under this improvement project. This shall in no way relieve the Contractor of any responsibility as to the quality of materials furnished and installed.

For the purposes of this project all pipe and fitting material shall be ductile iron as specified herein or shown on the construction plans. All fittings and associated connections shall be furnished and installed as such, unless otherwise noted.

1. DUCTILE IRON WATER PIPE - All underground pipe shall be restrained ductile iron manufactured in accordance with the requirements of AWWA C151 and conforming to AWWA C150, minimum thickness of Class 50. The ductile iron pipe shall be centrifugally cast in lengths not less than 12 feet and no more than 20 feet, conforming to ANSI/AWWA C151/A21.51-81. The Contractor shall provide a minimum cover depth of 48 inches between finished grade and the top of the proposed pipe. All joint gaskets shall conform to the latest edition of AWWA C111 and shall be provided by the pipe manufacturer. Below grade restrained joint pipe fittings shall be TR Flex, as manufactured by United States Pipe and Foundry Company, Flex-Ring, as manufactured by American Cast Iron Pipe Company, or approved equal. All below grade mechanical joint pipe and fittings shall be restrained with ductile iron retainer glands as manufactured by EBBA Iron Inc., Tyler Union, or approved equal. All fittings shall be manufactured in accordance with the requirements of AWWA C110. Fittings shall be designed to withstand a minimum working pressure rating of 150 psi.

   All pipe in the proposed concrete water meter vault, shall be flanged ductile iron and shall be furnished in accordance with ANSI A21.15 and AWWA C115. The pipe in the concrete water meter vault shall have a minimum wall thickness of Class 53, as shown in table 50.15 of ANSI/AWWA C150 A21.50-91. All joint gaskets shall conform to the latest edition of AWWA C111 and shall be provided by the pipe manufacturer. Flanged joints, spool pieces, and fittings shall be ductile iron in accordance with the latest edition of AWWA C115. Flanges shall be drilled and faced for Class 125 in accordance with ANSI B16.1. All flanged joint systems (bolts, nuts, gaskets, etc.) and installation are to be suitable for the intended service and have a minimum pressure rating of 250 psi. Flanged fittings shall be furnished in accordance with ANSI A21.10, AWWA C110, and rated for a working pressure of 150 psi.

The interior of all ductile iron pipe and fittings shall be double cement mortar lined in accordance with the requirements of ANSI/AWWA C104/121.4-80, double thickness. A bituminous seal coating shall be applied to the exterior of all pipe and fittings in accordance with AWWA C151 and shall meet EPA approval.

Where required, the Contractor shall provide ductile iron specials, which may consist of spool pieces, closures, non-standard lengths of flanged mechanical joint, spigot end, or bell end pipe, or a combination of ends and non-standard fittings. The specials shall conform in material, thickness, and finish to the pipe in which they are installed. Tapped reinforced bosses shall be provided as an integral part of pipe or pipe fittings, if required.

Each pipe delivered to the construction site shall have clearly marked the weight, class designation, and sampling period. In addition, each pipe shall have cast on the face of the bell the manufacturer's mark and the year the pipe was produced.

The Contractor shall install pipe made of virgin materials. The new pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

All standards and specifications referenced shall be the latest edition and version thereof. This includes AWWA, ASTM, ANSI, NSF and Federal specifications and standards. All construction work related to the installation of potable water pipe shall be performed by a licensed and bonded Contractor. Permits and licenses must be obtained prior to construction.

2. PIPE BEDDING MATERIAL - The pipe bedding material shall be Del. No. 57 stone in accordance with Section 813 of the DelDOT Standard Specifications with a minimum depth of six (6") inches as shown in the pipe trench details. The pipe bedding shall be installed and compacted prior to placing the proposed pipe.

3. GATE VALVES - The proposed gate valves shall be ductile iron in accordance with AWWA C509 for Resilient Wedge Gate Valves. The valves shall have a ductile iron body, bonnet, and O-ring plate and the wedge shall be completed encapsulated with resilient material. The resilient sealing material shall be permanently bonded to the wedge in accordance with ASTM D429. All internal parts shall be accessible without removing the body from the line and the waterway shall be smooth, unobstructed, and free of pockets, cavities and depressions in the seat area.

   The valve body, bonnet, and O-ring shall be coated internally and externally with fusion bonded thermosetting plastic in accordance with AWWA C550 and NSF 61. Each valve shall be suitable for water working pressures of 250 psig and shall pass a hydrostatic pressure factory test for 500 psig, in accordance with AWWA C509.

   The non-rising stem (NRS) assembly shall be cast bronze with integral collars with two O-ring seals above the thrust collar and one O-ring below the thrust collar. Stem O-rings shall be replaceable with valve fully opened and subjected to full operating pressure. The operation nut shall be a 2-inch square wrench nut with an arrow showing the direction of opening and the word "OPEN" cast on the flange of the opening nut.

   Each valve shall have the manufacturer's name, pressure rating, and year in which it was manufactured cast in the body. The gate valves shall be Mueller A-2360-20, American 2500 series, or approved equal.

4. SLIP JOINT VALVE BOXES - Each buried gate valve shall be provided with a cast iron, two piece, adjustable, slip-type valve box. Valve boxes shall be 5 ¼-inch shaft with a round base and shall be provided with extra deep covers with the word "WATER" cast on and an arrow indicating direction of opening. The length of valve boxes and size of base shall be adjusted to suit each particular installation and shall have approximately eight (8") inches of adjustment available after setting final grade. Valve boxes shall be Mueller H-10360, Tyler Union 6855 series, or approved equal.

5. BOLTS, NUTS & RODDING - All underground installed bolts, T-bolts, nuts and any rodding required shall be stainless steel, Type 316, meeting the requirement of ASTM A-536 for all water pipe fittings including mechanical joints, hydrants, valves, tees, bends, taps, etc. No other type of bolts, nuts or rodding will be allowed unless approved in writing by the Engineer. Bolt end protection shall be provided for all exposed bolt ends both inside and outside structures. Plastic caps for all bold end protectors shall be shop

or field filled with anticorrosion compound or lubricant. Approved manufacturers shall be Sap-Seal Products, Inc., Advanced Product & Systems, Inc., or approved equal.

6. HYDRANTS - Proposed fire hydrants shall confirm to AWWA C502 in accordance with the most current edition of the Delaware State Fire Code. Hydrants shall be color coded in accordance with DSFPR Regulation 703, Chapter 3, Section 4. This includes both color coding the bonnet and 2-inch reflective tape around the barrel, under the top flange. Hydrant laterals shall be restraining tee, 6-inch resilient gate valve and box with 6-inch restrained ductile iron pipe. The muzzle arrangement shall be two 2 ½-inch hose connections and one 4 ½-inch pump connections, National Standard Thread. Operating nut shall be 1 ½-inch pentagon. Hydrants shall be Mueller A-423, Kennedy Valve Company K81D, or approved equal.

7. STEEL CASING PIPE - Casing pipe shall be A-53 Grade B black steel pipe with 1/2" wall thickness and shall conform to the requirements of API-5L, Grade B. Casing pipe shall be bituminous coated inside and outside and joints shall be welded in accordance with requirements of AWWA C-206. After welding or cutting the pipe, the welded and cut section shall be recoated with bituminous material to the satisfaction of the Engineer.

   The carrier pipe being installed inside steel casing pipe shall be supported by casing spacers sitting on the bottom of the casing pipe or as directed by the Engineer. Casing spacer's risers and runners shall be placed in position to properly support and prevent uplift or sag of the carrier pipe within the casing and maintain a minimum clearance of ¾-inch between the casing inside diameter and the spacer outside diameter. The spacer shall be constructed of circular, 8-inch or 12 inch wide, 14-gauge stainless steel bands, which bolt together forming a shell around the carrier pipe. All hardware shall be 304 stainless steel. The runners shall be of high pressure molded glass reinforced polymer, 2-inches wide and beveled on the ends. Casing spacers shall have excellent dielectric resistance and low moisture absorption. Casing spacers shall be injected-molded polyethylene spacers. Casing spacers shall be manufactured by Advance Products and Systems Inc., BWM Company, or approved equal.

   Each end of the casing pipe shall be closed with end seals. End seals shall be 1/8" synthetic rubber tightly secured to casing and carrier pipe with type 304 stainless steel bands. End seals shall be "Model AC" manufactured by Advance Products and Systems Inc., "Pipe Seal" manufactured by BWM Company, or approved equal.

8. WATER METER VAULT - The proposed water meter vault shall be precast reinforced Portland cement concrete (PCC), Class A (4,500 psi) in accordance with the Section 812 of the DelDOT Standard Specifications. The concrete vault shall be manufactured in accordance with the construction details and details by A.C. Miller Concrete Products, Inc., Gillespie Precast, or approved equal. The top slab, walls, and bottom slab shall be steel reinforced in accordance with manufacturer's recommendations. The exterior of the vault shall receive one heavy coat of bituminous seal coating: Koppers, Bitumastic C4-SP, Carboline, Bitumastic 300M; Tnemec 46H-413 Hi-Build; or approved equal. Minimum thickness and application shall be per the manufacturer's specifications. Coating may be shop applied to pre-cast units. If the shop applied coating is damaged during construction, a field touch-up coat shall be applied and allowed to dry prior to backfilling. The Contractor will be required to provide concrete pipe supports or pipe stands below the proposed water meter and associated appurtenances within the proposed water meter vault. Any proposed concrete pipe supports shall be Class B concrete (3,000 psi) in accordance with 812 of the Standard Specifications. The water meter vault is not required to satisfy the requirements of H-20 loading.

   The top slab of the water meter vault shall be constructed with an opening to accommodate a 42"x42" aluminum dual panel access door. The dual panel access door shall be fabricated with ¼" aluminum diamond plate that is reinforced to support a minimum live load of 300 psf and a maximum deflection that is equal to 1/150th of the span. The door and all its components shall be corrosion resistant and the operation of the door shall be unaffected by temperature. The frame shall be six (6") inches deep extruded aluminum channel-type with bend down anchor tabs around the perimeter. The hinges shall be heavy forged Type 316 stainless steel with a minimum ¼-inch diameter Type 316 stainless steel pin. The hinges shall be designed for horizontal installation and shall be bolted to covers with tamperproof Type 316 stainless steel lock bolts and shall be bolted through the frame with Type 316 stainless steel bolts and locknuts. The door shall have a 1 ½-inch drain coupling in the corner of the channel frame. The door shall open 90 degrees and be equipped with a hold open arm that automatically locks each cover in the open position. The door shall be constructed with the required number and size of compression spring operators

enclosed in telescopic tubes to provide a smooth and controlled operation throughout the entire arc of opening and closing. All springs and spring tubes shall be Type 316 stainless steel. A removable exterior turn/lift handle with a spring latch release shall be protected by a flush, gasketed, removable screw plug. The door shall be milled finish aluminum with bituminous coating applied to the exterior of the frame to prevent hydrolysis with the concrete vault. The access door shall be equipped with a Type 316 stainless steel slam lock with a removable key wrench and cover plug. The dual panel access door shall be a Pennsylvania Insert Corporation "Just Set", Bilco JD-AL, or an approved equal. The Contractor shall comply with the manufacturer's specifications and installation instructions. The water meter vault shall be equipped with an aluminum access ladder as shown on the construction details. The ladder shall be bolted to the concrete walls of the water meter vault with Type 316 stainless steel anchor bolts. The ladder shall be centered on the access opening and free from obstacles that will interfere with the placement of feet or hands.

Artesian Water Company (AWC) shall be responsible for supplying the proposed water meter and accessories as shown on the construction details. The Contractor shall be responsible for installing these items in the water meter vault and shall coordinate with AWC to schedule delivery to the construction site. The Contractor is responsible for supplying all necessary spool pieces (Class 53 DIP), closures, and appurtenances for successful installation.

9. TEMPORARY BYPASS PIPE, HOSE, FITTINGS AND VALVES - Any temporary bypass piping required to complete the proposed water line construction and connections to existing water service facilities shall conform to NSF 61 and withstand a minimum working pressure of 150 psi. Artesian Water Company will be responsible for installing any temporary bypass piping for connections to the existing 12-inch water main outside the limits of the DelDOT water service facilities.

Special Requirements:

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

A. DISRUPTION OF WATER SERVICE

If temporary water service is required by the Contractor, a detailed plan with sketches shall be provided to DelDOT accounting for the means by which the Contractor proposes a temporary by-pass. This submittal must be approved prior to commencement of the temporary by-pass installation. DelDOT will permit minor interruptions to the water service to accommodate setting up of the temporary by-pass system. A minimum of forty eight (48) hours prior notice shall be given to DelDOT for inspection and supervision by the Contractor of his/her intention to begin work involving the water line relocations. No work shall be started by the Contractor until he has received permission from DelDOT to proceed. The Contractor shall immediately notify DelDOT of any delays.

The Contractor, in the performance of his/her work, shall not disrupt the operation of the existing water facilities in any manner or at any time, without the expressed prior approval of DelDOT.

The Contractor will be permitted to close down specific water services for a period of time, not exceeding four (4) hours, after obtaining approval from DelDOT in order to make connections to existing service as shown on the Plans. The schedule for making connections will be arranged so that the water users will be out of service for a minimum period of time. The Contractor will receive no additional compensation for working during off peak hours, including premium time charges. The Contractor shall coordinate with the Engineer and DelDOT Toll Administration to determine the most convenient time to shut down water services.

Before any shutdown, as specified above, the Contractor must give DelDOT and the local 911 Center and Fire Department forty eight (48) hours notice.

Shutdowns shall not be permitted if tapping sleeves and valves are specified for making the connections. Artesian Water Company (AWC) will supply and install all tapping sleeves and valves for connections to the existing 12-inch water main owned by AWC.

Any and all emergency repairs required during the period of this Contract shall be the responsibility of the Contractor. DelDOT will notify the Contractor by telecommunication and the Contractor shall be required to attend to the repair immediately. In the event DelDOT is unable to contact the Contractor for immediate

emergency repair work in length of time as determined by DelDOT, DelDOT reserves the right to attend to any or all emergency repair work, and to submit the costs of repair directly to the Contractor for complete payment.

All materials and work, or part thereof, which are unsatisfactory as to any or all requirements of DelDOT, and/or as specified herein, shall be removed and replaced or repaired in an acceptable manner by the Contractor at his/her own expense.

The Contractor shall guarantee that all workmanship, materials, and work performed under the Contract, shall be in strict accordance with the Drawings, Specifications, Special Provisions, and other Contract Documents. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the work. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee, or which in any way fail to comply with or fail to be in strict accordance with the terms and provisions and requirements of the Contract during such two year period.

Construction Methods:

The construction of the water main shall be completed using open cut excavation.

A. WATER PIPE INSTALLATION

1. WORKING HOURS - DelDOT shall be notified at least 48 hours prior to commencing any work. The Contractor is subject to being shut down and or having work rejected if proper notification is not given to DelDOT. A schedule of work shall be submitted to DelDOT prior to construction defining what portions of the contract will occur at night or during the day. Changes to this schedule should be made throughout the construction and reported immediately to DelDOT. The definition of "Work" also includes the starting of equipment and the delivery of materials to the job site.

2. INSTALLATION OF PIPE AND FITTINGS - Water service pipe shall be placed with a minimum of 48 inches of ground cover from the top of pipe to finished grade. The laying and jointing of water pipe shall be in accordance with the requirements of DelDOT Standard Specifications and as stated herein. All pipe and fittings shall be thoroughly cleaned before laying, in accordance with AWWA Standard C601-81 or the now current standard, and shall be kept clean until acceptance of the work. No pipe may be installed except under the supervision of DelDOT's inspector.

   At the close of the work each day, the end of the pipe shall be tightly closed to prevent dirt, foreign substances, or small animals from entering the line until installation is again resumed.

   Pipe and fittings shall be carefully handled and lowered into the trench. Special care shall be taken to make sure all pipes are well bedded on solid foundation. Any defects due to settlement shall be made good by the Contractor at his/her expense.

   Where the manufacturer's recommended pipe joint deflection is exceeded, mechanical joint bends shall be required and installed to the satisfaction of DelDOT at no extra expense.

   No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when DelDOT shall deem that there is danger of frost penetration at the bottom of the excavation, unless all requirements as to the minimum length of open trench and promptness of refilling are observed. The Contractor shall keep all excavation free from water or other liquids during the progress of the work; and backfilling of trenches shall meet the applicable requirements of Sections 208 and 210 of the Standard Specifications.

   Installation of ductile iron water pipe (DIP) and its appurtenances shall conform to the requirements of AWWA C600 Specifications, the Plans, Specifications and Special Provisions.

3. PIPE LAYING AND JOINTING - Trench excavation and bedding preparations shall proceed ahead of pipe placement so as to permit proper placement and joining of the pipe and fittings at the prescribed grade and alignment without unnecessary hindrance. All foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench, and they shall be kept clean by approved means during and after laying. The water main materials shall be carefully lowered into laying position by the use of suitable restraining devices. Under no circumstances shall the pipe be dropped or

dumped into the trench. At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connections, but they shall be no larger than would be adequate to support the pipe throughout its length. No pipe material shall be laid in water or when the trench or bedding conditions are otherwise unsuitable or improper. When placement or handling precautions prove inadequate, in the Engineer's opinion, the Contractor shall provide and install suitable plugs or caps effectively closing the open ends of each pipe section before it is lowered into laying position, and they shall remain so covered until removal is necessary for connection of an adjoining unit.

Pipe jointing and installation shall be completed in accordance with manufacturer's recommendations. Cutting of pipe, where required, shall be done in a neat and workmanlike manner using an abrasive cutting wheel or other means that will produce a smooth end normal to the pipe axis with the cement lining undamaged. Cut ends shall be beveled to avoid damage to the gasket. All pipe ends shall be thoroughly cleaned prior to jointing and only approved lubricants shall be used. As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material, which shall be thoroughly compacted by tamping around the pipe to a height of at least 12 inches above its top. Any damage to the lining or exterior coating that occurs during the pipe cutting shall be repaired in the field per manufacturer's recommendations at the Contractor's expense.

The Contractor shall mechanically compact trenches in accordance with DelDOT standards. At all times when pipe laying is not in progress, including noon hour and overnight periods, all open ends of the pipe line shall be closed by watertight plugs or other means approved by the Engineer. If water is present in the trench, the seals shall remain in place until the trench is pumped completely dry. When connecting to existing stubs, the Contractor shall take every precaution necessary to prevent dirt or debris from entering the existing lines. All necessary work to make the connection shall be done at no additional compensation, except where noted otherwise.

4. EXCAVATION AND TRENCHING - Excavation shall be performed in accordance with Section 208 Excavation and Backfill for Pipe Trenches, except as amended herein. The bottom of the trench shall be carefully graded, cut true and even, so that the barrel of the pipe will have a bearing for the full length. The trenches for water mains shall be excavated to such depth as will provide pipe elevations as indicated on the water service pipe profile in the construction plans. The Contractor shall provide a bed of Del. No. 57 stone to be installed across the full width of the trench from the bottom of the pipe to a depth six (6) inches below the bottom of the pipe. Additional excavation shall be made under joints to allow for proper jointing. The trenches for water service connections shall be excavated to the minimum standard depth or to such depth as required to connect to existing mains or service pipes. Wherever the existing material at the bottom of the trench is unsuitable, as determined by the Engineer, the Contractor shall excavate and remove all unsuitable material, backfill and compact the trench bottom to the proposed grade using Del. No. 57 stone. All unsuitable excavated material shall be disposed of properly at an off-site location by the Contractor and at the Contractor's expense.

   All excavation and backfill for installation of the proposed 8-inch DIP and removal of the existing water service facilities shall be completed in accordance with Section 208 and 210 of the Standard Specifications and the cost will be incidental to Item 614508.

   DelDOT shall have the right to limit the amount of trench opened in advance of pipe laid, and the amount of pipe laid in advance of backfilling. They shall be empowered at any time to require the refilling of open trenches over completed pipelines, if in their judgment such action is necessary and the Contractor shall therefore have no claims for extra compensation even though to accomplish such refilling, he/she is compelled to temporarily stop excavation or other work at any place.

   If work is stopped on any trench or excavation for any reason and the excavation is left open for an unreasonable length of time, in the opinion of the Engineer, the Contractor shall, if so directed, refill such trench or excavation at his/her own expense and shall not again open said trench until he/she is ready to complete the work therein.

   Where rock is encountered and blasting is required for trenching, all rock excavation work shall be performed in accordance with Subsection 107.08 and Section 206 of the Standard Specifications, and as modified, and the trench shall be excavated an additional six inches (6") below grade. After the excavation is completed, a bed six inches (6") in depth of Borrow Type C shall be placed in the bottom of the trench,

leveled off and thoroughly tamped. In absence of an item for Rock Excavation under this contract, a fixed price of $135.00 per cubic yard shall be paid for rock excavation.

5. CONNECTIONS TO EXISTING PIPE -Artesian Water Company (AWC) or its designated contractor shall supply and install the proposed 8"x12" tapping sleeve and valve for the service connection to the existing 12-inch water main. The Contractor shall make the final connection to the existing 8-inch on-site water service owned by DelDOT. The Contractor shall install and test the proposed 8-inch D.I.P. prior to completing the final pipe connection and removing the existing 8-inch D.I.P. water service. All closures, including connections to existing pipes, shall be mechanical joint solid sleeve with spacers in accordance with AWWA C-110. All couplings and sleeves shall be restrained manufactured by Romac Industries, Inc., American Cast Iron Pipe Company, or equal. The Contractor shall not shut off the water or operate the fire hydrants or gate valves of the existing distribution system without the expressed permission of DelDOT. In case it becomes necessary to delay the cut-off, such instructions shall be given and obeyed without recourse. In making connections to the old distribution system, valves shall be set as shown on the plan, or at such designated place as the Engineer may direct. If due to unforeseen conditions, these locations have to be changed or additional valves or fittings added, the Contractor shall install the valves or fittings at the new locations.

6. WATER TESTING - In order to assure quality materials and workmanship, the following tests shall be required. The Engineer or designee shall be present for all tests and shall be notified at least 48 hours in advance of the specific test. Testing shall be completed after all the utility pipes have been installed in the area to be tested and prior to commencement of the street construction. All tests shall be in accordance with AWWA standards or what is stated within this specification. Individuals qualified to perform and evaluate such tests shall do all testing. The Contractor shall pay for all tests required in these guidelines. Copies of the results shall be submitted to DelDOT. If inspection or test shows defects, including visible leaks, such defective work or material shall be replaced at the expense of the Contractor, and inspection and tests shall be repeated. All repairs shall be made with new material. Failure to meet the tests specified above will be sufficient cause to reject the work until the defects are satisfactorily repaired. All expenses and costs incurred in carrying out the specified tests shall be the Contractor's responsibility at no extra cost to DelDOT and shall be included in the lump sum contract price for the water service installation.

7. PRESSURE TESTING - Hydrostatic pressure testing shall conform with AWWA C600, latest revision. Pressure testing shall be performed on all pipe, valves, hydrants, and fittings. The test shall be conducted on pipe segments from shut valve to shut valve or shut valve to capped end in segments not exceeding 1,000 linear feet. The Contractor shall provide a suitable pump for applying pressure and an accurate gauge for measuring the pressure. The pipe shall be tested by applying one hundred fifty (150) pounds per square inch hydrostatic pressure for a period of four (4) hours with the DelDOT's inspector present and to the full satisfaction of the Engineer. Leakage shall not exceed 10 gallons per inch of pipe diameter per mile of pipe per 24 hours.

   Successful pressure testing shall be performed prior to the installation of the water meter and the Contractor shall test against blind flanges installed in the water meter vault. All defects revealed by the tests shall be corrected at the Contractor's expense. Additional tests and repairs shall be continued by the Contractor until test requirements are met. Repairs to the system shall be made with new materials. No caulking of threaded joints, cracks, or holes will be acceptable. When it is necessary to replace pieces of pipe, the replacement pipe shall be of the same material and thickness as the defective piece. All piping shall be adequately braced and supported during tests so that no movement, displacement or damage will result from the application of the test pressure. All equipment used in the testing shall be provided by the Contractor.

8. DISINFECTION - The Contractor shall completely disinfect all new water service piping prior to connection to the existing system. Disinfection of the water system shall be performed in accordance with the latest edition of AWWA C601 and C651. The Contractor shall submit their selected form of chlorine and method of chlorination, in conformance with the latest edition of AWWA C651, to the Engineer for his/her record. The Contractor shall provide an adequate blow off for use in flushing system. Bacteria tests will be completed on water samples taken from the blow off.

   Before the final connection is made, all surfaces of the new water service pipe and existing water service pipe that will be part of the closing joint, including all gaskets and glands, shall be thoroughly cleaned and treated with a 5% solution of sodium hypochlorite. Extreme care is to be exercised in order to prevent the entrance of any contaminants into the main. All expenses and cost incurred in carrying out the specified

sterilization work shall be borne by the Contractor at no extra cost to DelDOT and shall be included in the lump sum contract price for the water service installation.

9. BACTERIA TESTING - The water service pipe shall be flushed of its concentrated chlorine from the initial filling and then shall sit for 24 hours prior to sampling for bacteria. The contractor shall have water samples taken in the presence of DelDOT and analyzed by a certified laboratory. The laboratory's field technician shall collect the samples. A copy of the tests results must be sent to the Engineer for his/her records. The report must contain the project name and the location where the sample was taken, the parts per million (PPM) of chlorine for each sample, as well as whether they pass or fail. City crews will perform a final flush of the mains and place them in service after successful testing of the system.

10. REMOVING EXISTING WATER PIPE - The existing water service pipe is owned by DelDOT and shall be removed as identified on the utility relocation plan upon completion of the new water service pipe. The Contractor shall coordinate with DelDOT to determine if any of the existing facilities, including gate valves, fire hydrants, and pipe fittings, should be salvaged and returned to DelDOT. The Contractor is responsible for removal and proper disposal of all of the existing facilities not salvaged by DelDOT. All adjacent pipe openings that remain shall be plugged in accordance with subsection 202.04 of the DelDOT Standard Specifications.

Method of Measurement:

A breakout sheet attached to the Proposal lists the different elements of work or materials involved in completing 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 cost for Item 614508 shall be derived from the total sum of the cost of all items listed. The breakout sheet shall be attached to the Bid Proposal. Each item will be measured as a unit price item in the field. The final Lump Sum payment for Item 614508 will be adjusted by change order, either plus or minus, to match the final totals of all unit price items established in the Breakout Sheet. Failure to submit the breakout sheet with the Bid Proposal will result in the bid being declared non-responsive and rejected.

The prices bid for construction of all water main and accessory related items shall include but not limited to the excavation of all materials encountered in the trenches, excavation of hot-mix pavement and base course, pipe, valves, valve boxes, fire hydrant, restraining all pipe, excavation and concrete thrust blocks for bends, fittings, or other appurtenances that may be shown or required, concrete encasement, steel casing pipe, precast concrete water meter vault, any excavation that may be necessary for sheeting or bracing the trench; the placing and removal or cutting off of sheeting or bracing; pumping, dewatering, or other disposal of water; furnishing and placing pipe bedding material; furnishing the backfill (including Type C borrow), backfilling, and removal of surplus material, required testing of all lines, protection of any existing Utilities if necessary, furnishing and placing detectable warning tape.

No separate payment shall be made for salvaging or abandoning or removing and disposing of existing water service facilities and cost for such required work shall be incidental to Item 614508. The measurement of payment for the "Water Main System" shall be for the supply and installation of the materials listed in the breakout sheet in accordance with the units indicated. Payment for this item shall consist of all labor, materials and equipment required to furnish and install the complete "Water Main System" to the respective size(s) and depth(s) as required and shown on the Contract Drawings.

A percentage of the total Lump Sum bid price will be paid based on the work performed in each pay period. The percentage will be calculated by multiplying the total units of each completed Breakout Item times the appropriate unit price; then adding the total dollars of completed work, divided by the total Lump Sum bid price for item 614518, Water Main and Accessories. Final payment may result in less than 100% of the total Lump Sum based on actual work performed. Should the Lump Sum total be exceeded, additional funds will be added by Change Order based on the best available estimate at the time. DelDOT 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. 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. DelDOT reserves the right to delete from the Contract one or more items listed in the breakout sheet 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.

617515 - HEADWALL

Description:

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

Materials:

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

Construction Methods:

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

Method of Measurement and Basis of Payment:

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

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

708585 - JUNCTION BOX, 48" X 30"
708586 - JUNCTION BOX, 48" X 48"
708587 - JUNCTION BOX, 66" X 30"
708588 - JUNCTION BOX, 66" X 48"
708589 - JUNCTION BOX, 66" X 66"

Description:

This work consists of furnishing materials and constructing a junction box of the type specified on the Plans, and as directed. It includes excavation, placing of pipe, concrete masonry, reinforcing and forms all in conformity with the Standard Construction Details, the Plans, and these specifications.

Materials:

Materials used in the construction of the junction box shall conform to Subsections 708.02, 708.03, and 708.04 of the Standard Specifications.

Construction Methods:

Construction methods shall conform to Standard Construction Details and applicable requirements of Section 708 of the Standard Specifications.

Method of Measurement:

The quantity of junction boxes will be measured as the actual number of junction boxes constructed in accordance with these special provisions, complete in place and accepted.

Basis of Payment:

The quantity of junction boxes will be paid for at the Contract unit price for each. Price and payment shall constitute full compensation for furnishing and placing all materials, including bar reinforcement; for all excavation and backfilling around the structures, for the disposal of surplus materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

6/27/01

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

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

Description:

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

Materials and Construction Methods:

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

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

Method of Measurement:

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

Basis of Payment:

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

10/29/01

720559 - POST-MOUNTED DELINEATORS

Description:

The item shall consist of furnishing all materials and installing post mounted delineators in accordance with the locations, notes and details on the Plans and as directed by the Engineer.

Materials:

All post mounted delineators shall meet the general design requirements of delineators in accordance with Part 3 of the Delaware Manual on Uniform Traffic Control Devices (DEMUTCD).

Delineators - The delineators shall be sheet aluminum cover with Type III-a reflective sheeting. The reflective sheeting shall consist of a retro-reflective lens system having a smooth outer surface. The sheeting shall have a precoated adhesive backing protected by a removable liner and be the type specified on the Plans. Types I through IV refer to levels of performance in terms of reflective intensity. The delineator blank shall be 3 1/4" (83 mm) in diameter. Sheet aluminum cover and reflective sheeting are each 0.063" (2 mm) thick. Material for aluminum and hardware shall be approved by Engineer.

Posts - Steel posts for post mounted delineators and hazard markers shall be a "U" channel section weighing approximately 1.12 lb/ft (1.67 kg/m). Posts shall be punched with at least three (3) 3/8-inch (9 mm) holes on the centerline, spaced at 4-inch centers beginning 1-1/2 inches (37 mm) from the top. The holes are to be punched prior to galvanizing of the posts. Posts shall be of steel conforming to the provisions of ASTM A-36, and shall be galvanized after fabrication in accordance with the provisions of ASTM A123.

Samples - Two samples each of the posts, brackets, connecting devices, and driving heads complete with reflector units proposed to be furnished by the contractor shall be submitted to the Engineer for approval. Samples should include steel posts and each color of delineator to be used.

Special Keys and Wrenches - Whenever special keys, wrenches, or special locking instruments are required for the removal, placing, maintenance and repair for any of the component parts of the delineators, the contractor will be required to furnish and deliver to the Engineer one of each type for each 500 delineators or portion thereof.

Construction Methods:

Delineators shall be yellow on the left edge of roadway and white on the right edge of roadway. Red delineators shall be mounted on the back of the post if shown on the Plans.

The posts supporting post-mounted delineators shall be driven to a minimum depth of 18" (450 mm) by the use of suitable driving tools in such manner and by the use of such protective devices that the delineators will not be distorted or damaged. In those areas where a post is located in an area paved with concrete or bituminous material, a hole slightly larger than the post may be made through the paving, the post driven as provided above, and the paving returned to its original condition, all to the satisfaction of the Engineer. In lieu of driving, posts in paved areas may be set in concrete. Delineator posts shall be so erected that the delineators are 4'0" (1.2 m) above nearest pavement edge, a minimum of 2'0" (.6 m) and maximum of 8' from the edge of shoulder or as directed by the Engineer and shall be true to line and grade and truly vertical.

Delineator installation and spacing shall be in accordance with the Part 3 of the Delaware Manual on Uniform Traffic Control Devices (DEMUTCD) in addition to the following requirements.

Mainline delineators are required on the right side of all interstates, expressways and freeways. When Raise Pavement Markers are present they are only required prior to and through curves. For Ramps delineators are needed on the outside of the curve only, however, when the curve reverses there shall be three (3) installations on both sides of the ramp. On tangent ramp sections, the delineators shall be on the right only. All ramp delineators will have a single red delineator on the opposite side of oncoming traffic.

Method of Measurement:

Measurement of these items for payment will be on a per each basis, the quantity to be paid for will be the number of post mounted delineators actually installed and accepted by the Engineer, regardless of color, single or double installations mounted on steel posts.

Basis of Payment:

Payment for delineators will be made at the contract unit price per Each bid for Post Mounted Delineators, which price and payment thereof shall constitute full compensation for furnishing and erecting posts; furnishing and mounting all delineator assemblies; and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete this item of work.

3/19/12

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

Description:

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

Materials:

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

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

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

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

Construction Methods:

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

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

The grading between the edge of pavement and the end treatment shall be 10:1 or flatter for the length of the end treatment. Reflectorized washers are not to be used on attenuators unless specified and/or approved by the manufacturer.

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

Unless otherwise noted on the Plans, the Guardrail End Treatment Attenuator, Type 1 shall be installed with a 25:1 taper beginning 50' (15 m) from the end of the end treatment.

Method of Measurement:

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

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

Basis of Payment:

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

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

8/12/2013

720626 - CONCRETE SINGLE FACE BARRIER, TYPE 1
720627 - CONCRETE SINGLE FACE BARRIER, TYPE 2
720628 - CONCRETE SINGLE FACE BARRIER, TYPE 3
720629 - 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 for cast-in-place barrier and Class B/SF, Section 812 for slip-formed barrier.

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 backfilling of the P.C.C. footer portion of the barrier are included in this item.

1/5/16

720633 - CONCRETE MEDIAN BARRIER MOUNTED SIGN SUPPORT

Description:

This work consists of furnishing and installing all materials for a concrete barrier mounted sign support in conformance with the details and notes shown on the Plans, and as directed by the Engineer.

Materials:

The concrete barrier sign support materials shall conform to the requirements set forth on the plans. The vertical support post shall be a 2 ¼" 12 gauge square perforated tubular steel post. The base plate shall be A36 steel. The vertical support sleeve shall be a 2 ½" 12 gauge square tubular steel post. All structural steel shall be hot dipped galvanized in accordance with ASTM A123. All hardware (bolts, nuts, washers) shall be stainless steel.

Refer to the Plans for anchor bolt requirements.

Construction Methods:

Working Drawings. Working drawings shall be submitted in accordance with subsection 105.04 of the Standard Specifications. Minor variations in details may be permitted; however, any major departure from the design will not be accepted. Fabrications. Loading, transporting, unloading and erection of structural materials shall be done so that the metal will be kept clean and free from injury in handling.

Structural materials shall be stored above the ground upon platforms, skid or other supports and shall be kept free from accumulation of dirt, oil, acids or other foreign matter.

Structural material which has been deformed shall be straightened before being laid out, punched, drilled or otherwise worked upon in the shop. Sharp kinks or bends will be cause for rejection.

When sign support structures are subcontracted, the subcontract shall be in accordance with Subsection 108.01 of the Standard Specifications except that the value of the subcontract will be based on the value of the work for fabrication. All assemblies and members shall be detailed to permit hot dip galvanizing. All cutting, punching, drilling, finishing, and welding shall be complete prior to hot dip galvanizing.

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. However, the repair of galvanized items having one or more damaged areas larger than 1 square inch (650 square millimeters) will not be allowed. Erection. Material shall not be dropped, thrown or dragged over the ground. The Contractor shall supply detailed, written instructions and drawings for the erection of all sign structure components.

Method of Measurement:

The quantity of furnishing and installing "CONCRETE MEDIAN BARRIER MOUNTED SIGN SUPPORT" will be measured for each concrete barrier mounted sign support furnished and installed as specified and accepted.

Basis of Payment:

The quantity of furnishing and installing "CONCRETE MEDIAN BARRIER MOUNTED SIGN SUPPORT" 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 the sign support 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.

1/6/16

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' high, U.V. stabilized high visibility orange, high density polyethylene.
   2. Standard mesh opening size of approximately 1 1/2".
   3. Tensile Strength Min. 5000 PSI
   4. MD Break Load Min 900 lbs/ft
   5. MD Yield Strength Min. 1,100 lbs/ft

C. *Fence Post:*
   1. Length sufficient for 18" embedment in the ground.
      a. Oak wood, a minimum of 2" square.
      b. T-Section steel 1.25" x 1.00".
   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' .
   1. Alternate spacing may be approved only if specified by the fence manufacturer.

C. Use 8" 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" 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 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. 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.

1/5/16

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

744544 – ADJUST OR REPAIR EXISTING CONDUIT JUNCTION WELL

Description:

This work consists of adjusting or repairing existing conduit junction wells, including furnishing all materials, in accordance with this specification, notes and details on the applicable Plans, the Standard Construction Details, and as directed by the Engineer. If Bonding and Grounding of the unit is required, that work will be paid for under "Bonding and Grounding Existing Junction Well".

Materials:

Portland cement concrete shall conform to the requirements of Section 812, Class B.
Mortar shall conform to the requirements of Section 611.
Brick shall conform to the requirements of Section 611.
Concrete block shall conform to the requirements of Section 819.

Construction Methods:

Repair of conduit junction wells includes repairing/patching the masonry walls and resetting existing frames and lids or precast polymer concrete covers.

Adjusting involves raising the elevation of the frame and lid to match the grade of the surrounding area.

Method of Measurement:

The quantity of conduit junction wells adjusted or repaired will be measured as the actual number of conduit junction wells adjusted or repaired and accepted. If a new frame and lid or precast polymer concrete cover is needed, it will be supplied under a separate item.

Basis of Payment:

The quantity of conduit junction wells will be paid for at the Contract unit price per each junction well. Price and payment will constitute full compensation for excavating, backfilling, compacting and disposing of excess materials, for furnishing and placing all materials and for all labor equipment, tools and incidentals required to complete the work.

2/29/12

745601 – FURNISH & INSTALL UP TO 3" FLEXIBLE METALLIC-LIQUIDTIGHT CONDUIT
745602 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)
745603 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (OPEN CUT)
745604 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)
745605 - FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (ON STRUCTURE)
745606 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (TRENCH)
745607 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (BORE)
745608 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (OPEN CUT)
745609 - FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (ON STRUCTURE)
745610 - FURNISH & INSTALL UP TO 4" NONMETALLIC POLE RISER SHIELD

Description:

Furnish and install HDPE, PVC, or Galvanized steel conduits of any size less than or equal to 4 inches in diameter (3 inches or less for Flexible Metallic Liquidtight Conduit) as described below.

Materials:

All conduits shall be UL listed.

HDPE Conduit - 4" or less diameter, high density polyethylene (HDPE) schedule 80, smooth wall conduit with permanently pre-lubricated lining, meeting ASTM D2447, ASTM D3035 and NEMA TC7 specifications.

PVC Conduit - 4" or less diameter, schedule 80 rigid polyvinyl chloride (PVC) conduit, meeting Commercial Standard CS-272-65 (PVC), ASTM D-1785 and U.C. Standard 651 specifications.

Galvanized Steel Conduit - 4" or less diameter, rigid galvanized steel conduit meeting National Electric Code 2002, Article 344.

Nonmetallic Pole Riser Shield – 4" diameter or less nonmetallic pole riser shield with belled ends meeting NEMA TC-19 specifications.

Flexible Metallic-Liquidtight Conduit – meets National Electric Code 2002, Article 350

Weatherhead for galvanized or PVC conduit – material shall match the adjoining conduit

Insulated grounding bushing with knockouts - meet or exceed UL 514 B

Condulets for conduit sizes - material shall match the adjoining conduit

Anchors - A 307, Galvanized per A 153

One hole conduit hangers - Steel City Series 6H or 6H-B, CADDY CD3B Rigid Conduit Hanger, or approved equal

End caps - material shall match the adjoining conduit

LONG sweep sections for conduit sizes - material shall match the adjoining conduit, and shall be manufactured 90 degree sweeping bends.

Construction Methods:

General Installation Requirements - The Department has the right to reject any installation method proposed for a given work site. PVC shall not be installed under existing pavement unless it is on a continuous roll or with the Engineer's written approval.

Conduit installed underground shall be installed in a straight line between terminal points. In straight runs, junction well spacing shall be no more than 600 feet for fiber optic conduit or no more than 300 feet for copper in conduit, or as directed by the Engineer. If bends are required during installation, they must be manufactured sweeping bends. The Engineer will be consulted before any bends are installed to ensure that the proper arc is provided.

Conduit shall have a minimum cover as measured from the finished grade of 24 inches and a maximum cover of 48 inches.

The opening shall be filled half way with the cover material, and tamped down firmly before filling in the remainder of the opening. Additional lifts shall be used as required to install the metallic warning tape at the specified depth. All cover material shall be free of rocks, debris, vegetation or other deleterious material that may damage the conduit. An underground utility warning tape shall be installed as specified in this section and the remainder of the fill shall be added, tamping down the top layer.

Conduit not terminated to a base or in a junction well shall be terminated 2 feet beyond the edge of the pavement unless otherwise directed by the Engineer, and properly capped. Tape is NOT an approved method. Conduit shall not extend more than 3 inches inside a junction well. See Standard Construction Details or applicable Plan Details for typical methods of termination.

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

The color of the metallic warning tape identifying fiber optic cable should be bright orange (preferably AULCC orange), and shall read "WARNING - OPTICAL CABLE" or other wording approved by the Engineer that conveys the same message. The color of the tape identifying all other cables shall be bright red, and shall read "WARNING —BURIED ELECTRIC BELOW" or other wording approved by the Engineer that conveys the same message.

Using conduit tools, rigid metallic conduit shall be cut, reamed, and threaded. The thread length shall be as necessary to ensure that the sections of conduits when screwed into a coupling and tightened correctly will butt together and the joint will be watertight. A three-piece threaded union, as approved by the Engineer, shall be used to join two threaded lengths of conduit in the case where a standard coupling will not work. A threaded union shall not be used in a conduit run that is to be driven. At no time is a threadless coupling or a split-bolt coupling to be used for direct buried conduit.

All lengths of HDPE conduit shall be connected with irreversible fusion couplings. Mechanical and removable couplings will not be accepted.

All lengths of PVC conduit shall be connected by one conduit end fitting inside the flared end of the other conduit section. If this is not possible, then a coupling may be used. Regardless of how connection is made, all joints shall be sealed with the appropriate epoxy to ensure that the two conduit pieces bond to one another to form a solid waterproof link. Using conduit tools, the conduit shall be cut and prepared. If approved by the Engineer, a coupler module may be used where conduit segments do not align properly to allow the flared end of one conduit segment to mate with the normal end of the other segment.

Sealed end caps (with knockouts if empty) shall be placed on the ends of all conduits, after compressed air has been used to clear all foreign matter.

If not already pre-installed by the manufacturer, a polyester or polypropylene pulling rope or tape (fish wire) with a minimum rated strength of 1250 pounds shall be installed in each conduit for future use. In instances where the Contractor installs the cable, the fish wire may be eliminated.

All PVC and HDPE conduits shall have a continuous metallic trace wire installed for the entire length of the conduit run for all fiber installations.

Installation Of Conduit Under Existing Pavement, Directional Bore -

Directional bore shall be used for installation of conduits under existing pavement with a conduit diameter not less than 1-1/2". The size of a bore shall not exceed the outside diameter of the conduit by more than 1 inch. If it does, cement grout shall be pumped into the void. **Only HDPE and/or Galvanized Steel conduit may be installed by Directional Bore methods.**

Installation Of Conduit Under Existing Pavement, Open Cut -

Installation by sawcutting the full pavement depth and removing the existing pavement with an excavator or by hand methods, shall be used only for conduits not less than 1-1/2" diameter. The Engineer must first approve all open cutting of roadways. The width and length of open cut and patch restoration materials shall be as shown on the plan details. The Contractor shall be responsible for the removal of all cut pavement and surplus excavation, and for the replacement and correction of any damaged pavement outside the sawcut limits after the conduit(s) are installed. Asphalt pavement, concrete, base course, sawcutting, and/or borrow from an outside source as required to restore the roadway will be paid for separately under their respective bid items.

Installation Of Conduit Under New Pavement, Unpaved Trench -

Trenching or other approved method shall be used for installation of conduit in unpaved trench or under new pavement. Backfill in conduit trenches shall be compacted thoroughly as it is being placed. At the discretion of the Engineer, sod, that must be removed for the placement of conduit, shall be removed either by the use of an approved sod cutter and then replaced, or 6 inches of topsoil shall be placed and the surface seeded in accordance with Section 908 - Seeding. In areas where new pavement is to be placed or in areas where total reconstruction is taking place, sodding or seeding may not be required by the Engineer. Sodding and/or topsoil from an outside source if required will be paid for separately under their respective bid items. Seeding is considered incidental to the conduit item.

Installation Of Conduit On Structure -

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

Installation of Nonmetallic Riser Shield or Flexible Metallic Liquidtight Conduit -

Riser Shield and/or Flexible Metallic Liquidtight Conduit installed on wood poles, metal poles, structures, and/or mast arms shall be installed in a straight line. The conduit, when attached to poles, shall be attached with 2-hole straps spaced not more than 36 inches apart with the top-most strap being 12 inches from the weatherhead and the lower-most being 12 inches from the condulet. A weatherhead matching the diameter of the conduit shall be installed on the upper end of the conduit. A condulet of the same size as the conduit being installed, but not smaller than 2 inches shall be placed 48 inches above finished grade. Install two, 2-hole straps of the proper size, evenly spaced below the condulet. Nonmetallic pole risers (U-guard) shall be installed on poles to allow interduct to be connected directly to messenger cable. The underground conduit shall be as close to the base of the pole as possible. If the nonmetallic pole riser or metallic liquidtight conduit is not the same size as the conduit, an adapter shall be used at no additional cost to the Department. The nonmetallic pole riser or metallic liquidtight conduit shall be attached to the pole with 1/4" x 1-1/2" galvanized lag bolts with washers. Lag bolts will be used every 36 inches on BOTH sides of the nonmetallic pole riser or liquidtight conduit, and in the top most and bottom most set of slots. Flexible metallic liquidtight conduit shown on the plans to be installed on mast arms or on metal structure shall also include stainless steel banding placed at a maximum of 5 feet intervals.

Method of Measurement:

The quantity of conduit or riser shield installed as specified, shall be measured as the number of linear feet of each conduit or riser shield installed as specified, complete in place, and accepted.

The length of each conduit installed under existing pavement by a directional bore or by open cutting the pavement shall be measured along the path of the bore or open cut, from the point that cannot be trenched to the point that trenching can resume.
The length of any conduit that is reduced or divided (with a junction well or conduit body) shall be measured as part of the larger conduit.

Basis of Payment:

The quantity of conduit or riser shield will be paid for at the Contract unit price per linear foot. Price and payment shall include full compensation for furnishing all conduit and/or riser shield materials, equipment, labor, and incidentals necessary to complete the item.

For conduit installed by Directional Bore, the linear foot payment also includes excavation and backfilling for Bore Equipment, placing the conduit, caps if required, and all other requirements and incidentals listed in the body of this specification.

For conduit installed by Open Cutting existing pavement, the linear foot payment also includes excavating, backfilling, placing the conduit, disposal of excess materials, and all other requirements and incidentals listed in the body of this specification.

For conduit installed in an Unpaved Trench, the linear foot payment also includes excavating, removal of sod if required, backfilling, placing the conduit, disposal of excess materials, replacing excavated on-site sod if required, seeding if required, and all other requirements and incidentals listed in the body of this specification. Sod and/or topsoil furnished from an outside source, will be paid for separately.

For conduit installed on a structure, the linear foot payment also includes furnishing and installing anchors and hangers, removal of excess materials, and all other requirements and incidentals listed in the body of this specification.

For riser shield or flexible metallic conduit installed on poles, mast arms, or structures the linear foot payment also includes furnishing and installing straps, weatherhead, condulet, lag bolts and washers, any other required mounting hardware, and all other requirements and incidentals listed in the body of this specification.

7/20/15

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

Description:

The work consists of furnishing and installing Aluminum Lighting Standard with Single Davit Arm and/or Aluminum Lighting Standard Pole with Double Davit Arms, breakaway transformer base, luminaires, in accordance with the details on the Plans, and/or as directed by the Engineer to make a functional street lighting system. The foundation will be provided under other items in the contract.

Materials and Construction Methods:

All materials shall be of the best quality and free from all defects. No materials shall be installed until approved by the Engineer. Any material not specifically covered in these specifications shall be in accordance with accepted standards and as directed by the Engineer. Any materials deemed unsatisfactory by the Engineer, shall be replaced by the Contractor.

Lighting standards shall meet or exceed the requirements of the latest edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" based on 90 mph wind loads, luminaire weight of 70 lb and luminaire projected area of 3 ft^2. Computations confirming conformance with AASHTO Specifications, with the year of the edition specified, shall be submitted to the Delaware Department of Transportation.

All electrical materials shall conform to the requirements of the National Electrical Code of the national Fire Protection Association, and shall conform to all local and special laws and/or ordinances governing such installations. Where these requirements do not govern, and where not otherwise specified, electrical materials shall conform to the Standardization Rules of the Institute of Electrical and Electronic Engineers.

Shop drawings and catalog cuts for all electrical and related materials shall be submitted by the Contractor for approval.

The bolts are to be supplied by the Contractor. The bolts will be installed using a template, and set so that luminaire arm is perpendicular to the roadway.

Anchor bolts, nuts, couplings, washers, and cap screws shall be of carbon steel conforming to the requirements of ASTM A307, and hot-dip galvanized in accordance with AASHTO M 232..

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" 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" 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'	10'	10"	0.156"
	12'	10"	0.156"
	15'	10"	0.156"
	20'	10"	0.156"
35'	10'	10"	0.156"
	12'	10"	0.156"
	15'	10"	0.156"
	20'	10"	0.188"
40'	10'	10"	0.188"
	12'	10"	0.188"
	15'	10"	0.188"
	20'	10"	0.219"
45'	10'	10"	0.188"
	12'	10"	0.188"
	15'	10"	0.188"
	20'	10"	0.250"

Bracket arms shall be of the davit type consisting of an aluminum shaft having the outer diameter and wall thickness as listed in the table above. The davit arm shall be designed to slip over the top of the lighting standard shaft for a distance of at least 12". The luminaire end of the davit arm shall be fitted with a 2" NPS aluminum pipe not less than 6" 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' if not specified elsewhere. Davit arm less than 10' 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" fabricated from clear anodized 1/16" thick aluminum. The edge shall be smooth and corners rounded and the tag shall be curved to fit the light standard shaft. Tags shall be secured to shafts by means of four (4) 1/8" diameter 18-8 stainless steel round head drive screws of self-tapping screws. The embossed identifying letters and/or numerals shall be not less than 3/4" high with stroke of not less than 3/16". 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" pipe. The luminaire shall be designed with a leveling pad and capable of being adjusted $\pm$5 degrees for proper leveling.

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

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

All major electrical components, including ballast and the photoelectric control, shall be mounted on a removable door assembly and connected to the fixture electrically through a quick disconnect plug. The removal of the door shall be accomplished by loosening the captive screw and unplugging the quick disconnect plug. The luminaire shall employ solderless push-on type connectors for all wiring connections to facilitate the replacement of any component.

The unit shall contain an integral ballast capable of maintaining the wattage of the H.P.S. lamp throughout the life of the lamp. The ballast and the photoelectric control shall be suitable for operating the units in the wattage as shown on the Plans. The wattage of the luminaires for this Contract are listed on the quantity sheet.

No luminaire shall be installed until the lamp socket position has been inspected and approved by the Engineer. If no light distribution pattern is given the socket position shall produce a light pattern as indicated on the Plans, then type III as designated in the specification for the luminaire. All luminaires shall be adjusted up or down on the slipfitter to provide maximum light on the roadway to be lighted. The connections between the luminaire and service cable shall be made with a connector kit using #10 AWG single wire. Installation of the connector kit shall be in accordance with the manufacturers recommendations.

The Contractor shall furnish and install one or more of the following luminaires or an approved equal as specified on the Plans and/or as required by the Utility owner.

STANDARD MATERIALS

LUMINAIRE 400 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-25 Regulated Multi-voltage Ballast, Type III Light Pattern, or as shown on Plans, 1 1/2" - 2" Slipfitter

Cooper/Crouse Hinds OVY Swing-down	Cat. #OVY40SWW3ET4
GE M-400A Power/Door	Cat. #M4AR40S0A2GMN32

LUMINAIRE 250 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-26 Regulated Multi-Voltage Ballast, Type III Light Pattern, or as shown on Plans, 38 mm - 50 mm Slipfitter

Cooper/Crouse-Hinds OVY Swing-down	Cat. #OVY25SWW3ET4
GE M-250 A2 Power/Door	Cat. #M2AR25S0A2GMS32

LUMINAIRE 100 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-27 120V Regulator Ballast, Type II Light Pattern, or as shown on Plans, 1 1/4" - 2" Slipfitter

Cooper/Crouse-Hinds OVX Swing-down	Cat. #OVX10SK22ET4
GE M-250A2 Power/Door	Cat. #M24R10S1M1AMS21

LUMINAIRE 70 Watt High Pressure Sodium Alley/Security, 120V with Normal Power Factor Ballast, Photo Cell, 9110-60-28 Lamp and Type II Acrylic Lens for Mounting on 1 1/4" - 2" Bracket (Not Included)

Cooper/Crouse Hinds RMA (Specify Less Bracket w/Type II Lens)	Cat. #RMA70SR222LV5
GE Type 201 SA (Specify Less Bracket w/Type II Lens)	Cat. #SAM07S1N5S4LV5ALC

LUMINAIRE 70 Watt High Pressure Sodium Black Colonial, with 120V Photo Cell Receptacle, 120V Reactor 9110-69-34 Ballast, Type III Acrylic Lens, Black Finish with 3" Slipfitter

Cooper/Crouse-Hinds	Cat. #LXF70SR2334
GE TC 100	Cat. #T10R07S1N2AMS3BL
ITT American Rev.	Cat. #47-570E3-6

Installations of Lighting Standards: Lighting Standards shall be installed and located in accordance with the Plans, to provide continuously aligned lighting.

The bracket arms shall be set perpendicular to the edge of the roadway unless otherwise ordered or specified. If necessary aluminum shims may be used to plumb the pole.

Method of Measurement:

The quantity of aluminum lighting standards with single on double davit arms of the size(s) specified will be measured as the actual number installed and accepted.

Basis of Payment:

The quantity of aluminum lighting standards with single or double davit arms will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials including concrete, labor, equipment, hardware, anchor bolts, washers, shims and nuts, supply and installation of the transformer base, supply and installation of poles and davit arm(s), and supply and installation of the luminaires. This price will also include all miscellaneous hardware, connector kits, and wiring from the supply cables to the luminaire(s), labor, tools, equipment, and incidentals necessary to complete the work.

6/25/13

746537 - RELOCATING EXISTING LIGHT STANDARDS

Description:

This work consists of removing, storing, and installing existing light standard(s) at location(s) shown on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Any material required and furnished under this item, shall be in accordance with the notes on the Plans.

The light standard shall be carefully removed from the existing location to avoid any damage. Should any damage occur to the light assembly, and in the opinion of the Engineer adequate precaution was not exercised by the Contractor during the relocation operation, the Contractor shall at his/her expense replace damaged component in kind or equivalent to the satisfaction of the Engineer.

The Contractor shall contact the manufacturer of the existing light pole and/or transformer base to determine the appropriate anchor bolt size. This will require supplying the manufacturer with existing pole information, dimensions and design criteria. Anchor bolts shall be hot dipped galvanized and meet the requirements of AAHSTO M 314. Anchor bolts shall have a minimum yield strength of 55,000 PSI. Once the manufacturer has determined the anchor bolt size, detailed drawings and design information shall be supplied to the Engineer for approval prior to installation. Design shall be in accordance with the 2009 edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals".

Final acceptance of the light standard shall be made only after its satisfactory operation as determined by the Engineer.

Method of Measurement:

The quantity of light standards relocated will be measured as the actual number of light standards relocated and accepted.

Basis of Payment:

The quantity of light standards relocated will be paid at the Contract for unit price per each. Price and payment will constitute full compensation for removing, storing and installing the entire light standard unit, including but not limited to, pole, luminaire, transformer base, furnishing and installing new anchor bolts, installing new fuse if required by the Engineer, labor, tools, equipments, and all incidentals to complete the work.

4/6/11

746569 - ELECTRIC SERVICE RELOCATION

Description:

This work consists of furnishing and installing all materials and equipment to relocate the Biddles Corner Toll Plaza Administration Building electric service feed in accordance with the locations, notes and details shown on the Plans and as directed by the Engineer.

Installation of conduit in trenches and related incidentals shall be measured and paid for under other pertinent items in the contract. Installation of conductors in conduits and riser shields and related incidentals shall be measured and paid for under other pertinent items in the contract. All other work necessary to complete the electrical service relocation shall be considered part of this item, whether specifically described herein, on the plans, or not.

Materials:

Conduits shall be rated for electrical use and shall be Schedule 80 Rigid Polyvinyl Chloride (PVC) meeting the requirements of Item No. 745524 - SUPPLY OF 4" SCHEDULE 80 PVC CONDUIT (Commercial Standard CS-272-65 (PVC), ASTM D-1785 and UL Standard 651) with the size of the conduit being 6 inches.

Riser shields shall be 6 inches in diameter, nonmetallic with bell ends meeting NEMA TC-19 specifications. Lag bolts for installation of the riser shield on a wooden utility pole shall be stainless steel.

Concrete for encasement shall be 4000 psi and conform to the requirements of Section 812, Class C.

Conductors shall be Prysmian #301223A 25kV 100% aluminum single phase – full neutral concentric or approved equal.

Ground conductors shall be 600 Volt UL approved.

Fuel for the emergency backup generator shall be diesel.

Bar reinforcement for the duct bank reinforcement shall conform to the requirements of Section 603 or 604 as applicable.

Lugs shall be Raychem medium voltage bolted lugs, compatible with electric utility's existing equipment.

Pull strings shall be a polyester or polypropylene pulling rope or tape (fish wire) with a minimum rated strength of 1250 pounds (5560 N).

Marking 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 tape shall be bright red and shall read "WARNING—BURIED ELECTRIC BELOW" or other wording approved by the Engineer that conveys the same message.

Construction Methods:

Excavation and backfill for conduit trenches shall conform to the requirements of the applicable conduit trench installation item. 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 conduit to be encased shall be thoroughly cleaned and sides of trench shall be dampened. The conduit shall be supported by a conduit spacer meeting the requirements and dimensions noted on the plans. The Contractor shall provide a conduit spacer detail to the Engineer for approval prior to installation of the conduit in the trench. Conduits tying into existing conduits shall be coupled using methods approved by the Engineer.

The Contractor shall complete all coordination with DelDOT and the electric utility as required by plans and as directed by the Engineer.

The riser shields shall be bolted to the wood utility pole per the manufacturer's recommendations.

Fuel used in the back-up generator during the electrical service switch over shall be replaced by the Contractor as noted on the plans.

Installation of conductors in conduits and riser shields and termination of conductors as noted on the plans shall conform to the requirements of the applicable cable installation item.

Method of Measurement:

The quantity of **ELECTRIC SERVICE RELOCATION** will not be measured but will be paid for on a lump sum basis.

Basis of Payment:

ELECTRIC SERVICE RELOCATION will be paid for at the Contract lump sum price bid for this item. Price and payment shall constitute full compensation for conductors, ground conductors, conductor slack, conduit, pole riser shields, lag bolts, conduit spacers, bar reinforcement, concrete, fittings, terminations, lugs, generator fuel, fuel measurement, marking tape, test pitting, removal of all existing electrical service equipment, coordination with DelDOT and the electric utility, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Payment for installation of conduits and conductor cables and related incidentals will be made under other pertinent items in the contract.

1/6/16

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

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

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 of the ground rod must be driven into undisturbed soil.

If a utility or a right-of-way conflict is found when a Type 2 or Type 3 base is specified in the Plans, an alternate base of equivalent strength may be used as directed by the Engineer. A Type 2 base has two equivalents, namely Types 2A and 2B. A Type 3 base has two equivalents, namely Types 3A and 3B.

Though the contract calls for the use of a round pole base, the Contractor may use a square base at its discretion.

The end of the conduit sweeps in the ground shall be extended outside the concrete and any forms or sheeting by 12 inches and capped or connected to the existing conduit. If the conduit is to be capped underground for future use, it must be sealed with a galvanized threaded conduit plug. Tape is NOT an approved conduit plug. The location of the conduits shall be marked on the base with arrows drawn in the wet concrete within 6 inches of the outer edge.

Excavation for the pole bases may not exceed the dimension of the foundation by more than 12 inches in any one direction. If a form is used in the excavation more than 18 inches below the ground surface, it is necessary that the area between the form and excavation be filled with Borrow Type C and tamped on all sides in continuous, horizontal layers not to exceed 68 inches in depth, loose measurement.

Where a pole base is to be placed in existing concrete pavement such as a sidewalk, the concrete shall be saw cut in a square pattern or removed to the nearest joint. In other pavement material, a round hole may be cut using an appropriate tool. Any damage to the existing pavement shall be repaired at the Contractor's expense and shall meet the approval of the Engineer. Any removal or replacement of any type of pavement under this item shall be an incidental cost to this item.

The bases shall be edged and have a broom finish.

Where water or highly unstable material is encountered during the excavation for the pole base, pole base sheeting may be required and the following steps shall apply:

1. The condition exists in the upper half of the excavation. Stop all work until the Bridge Design Section reviews the condition.

2. The condition exists below the upper half of the excavation:
   a. For a proposed Type 4A or 4B Base, increase the depth to 4 feet.
   b. For a proposed Type 1, 2, or 3 Pole Base, substitute a Type 3A Pole Base for all but a Type 3B Pole Base. The depth of the base shall be as determined in (d) below, or 9 feet, whichever is greater.
   c. For a proposed Type 6 Pole Base, substitute a Type 2 Pole base and increase the depth in accordance with (d) below.
   d. Determine the depth of the base, which would be in the unsatisfactory area. Multiply that depth by 0.7 and add the result to the original required depth of the base to obtain the final depth of the base. The reinforcing bars shall be extended using the required pattern to match the final depth in accordance with the requirements of Section 603.07 of the Standard Specifications.

Method of Measurement:

The quantity of pole bases will be measured as the actual number of bases constructed, complete in place and accepted. Concrete, excavation and backfilling around the base, ground rods, and the two conduit sweeps in the base are included in this item.

Should excavated material be unsuitable for trench backfill, the Contractor shall furnish material meeting the requirements of Borrow, Type C from other excavations or from borrow sites within the contract limits. Payment will be made using the item under which the material was initially excavated. Hauling, placement, and compaction are incidental to the item being backfilled.

Payment for any additional sweeps shall be paid for separately under the appropriate conduit items. The Contractor's use of square base rather than a specified round base shall not result in any additional cost to the Department.

Basis of Payment:

No payment will be made for backfill material meeting Borrow, Type C requirements that is placed outside of the vertical plans located 18" outside of the neat line perimeter of the vertical face of the pole base foundation.

Any increase in the vertical dimension required herein shall be paid for separately under Item 746614, Pole Base Extension; another item of this contract.

The quantity of pole bases will be paid for at the Contract unit price for each pole base type. If an alternate pole base type is selected by the Engineer, payment will be the Contract unit price for the alternate selected. Price and payment will constitute full compensation for furnishing and placing all materials including concrete, ground rods, and a minimum of two conduit sweeps extending into the base; for excavating, backfilling and compacting around the base; for repairs to damaged existing pavement; for removal or replacement of pavement; and for all labor, equipment, tools, and incidentals required to complete the work.

746872 - LIGHTING CONTROL AND DISTRIBUTION ENCLOSURE

Description:

This work consists of furnishing all materials and installing light panels, meters, control and distribution equipment for the park and ride parking lot lighting.

Materials:

LIGHTING CONTROL AND DISTRIBUTION ENCLOSURE.

Lighting Control and distribution equipment enclosures shall be dead front type weatherproof metal enclosed self-supporting structures, as specified in the Contract Documents. Free standing enclosures shall be fabricated from sheet aluminum and shall be as specified herein. Panel and control equipment cabinets shall be the manufacturer's standard enclosure for the type and application specified.

Circuit Breakers. Circuit breakers shall be molded case type having a minimum rating of 22,000 amp interrupting capacity (AIC) and be quick make, quick break, thermal magnetic, trip indicating, and have common trip on all multiple breakers with internal tie mechanism. They shall have the current and voltage ratings and number of poles as specified in the Contract Documents, and shall be treated to resist fungus and be ambiently compensated for the enclosure and proximity to adjacent breakers. All circuit breakers shall be the bolt in type.

Photoelectric Controls. Photoelectric controls shall be solid state, cadmium sulfide type with hermetically sealed silicone rectifier rated 277 volts, 60 cycle AC and 1000 watts maximum load. Built in surge protection shall be provided, and a fail safe operating feature shall be included so that the lighting circuits will remain energized in the event the photo control components become inoperative. Nominal operating levels of this control shall turn on at a minimum vertical illumination value of 3 FC (32 lux) and turn off at a maximum vertical illumination value of 6 FC (65 lux). These limitations shall be set by the manufacturer, and tolerances of plus or minus 20 percent for the specified value will be acceptable. Photoelectric controls for luminaires and lighting controls shall be twist lock type. A suitable mounting bracket with locking type receptacle and all other necessary mounting hardware
shall be furnished.

Contactors and Relays. Contactors of the current ratings and number of poles specified in the Contract Documents shall be held by permanent magnets. They shall be fully rated for all classes of load to 600 volts AC and shall have an interrupting rating of 600 percent of rated current. A HAND-OFF-AUTOMATIC selector switch shall be provided in the photoelectric cell circuit. Relays shall be the type, size and contact ratings as specified in the Contract Documents.

Panel Boards. Panel boards shall conform to Federal Specification W-P-115 and shall be
suitable for operation on the voltage and type service specified in the Contract Documents. They shall be listed and labeled by the Underwriters' Laboratories, Inc. Panel boards shall be equipped with the number and size circuit breakers specified. Circuit breakers in panel boards shall conform to Federal Specification W-C-375 and shall be bolted to copper busses. Buss ratings shall be as specified. Panel shall be provided with modular Transient Voltage Surge Suppressors. (TVSS).

Lightning Arresters. Lightning arresters shall be secondary type, having the specified number of poles and 0-650 volts RMS. Arresters shall be provided with suitable mounting brackets and all other necessary mounting hardware.

Control Power Transformers. Control power transformers shall be the dry type, two windings, of the size and voltage ratings specified in the Contract Documents.

Enclosures. Enclosures shall conform to the NEMA 3R. They shall have door clamps, solid neoprene gaskets, welded seams, stainless steel external hardware and continuous hinges with stainless steel pins. Enclosures shall have two weepholes in the bottom and shall be equipped for padlocking.

Pad Mounted Enclosures. For ventilation, all cabinets shall be provided with louvered vents in the front door with a removable air filter.

(a) Louvers shall satisfy the NEMA Rod Entry Test for 3R rated ventilated enclosure.

(b) Filters for all cabinets shall be 16 in. long, 12 in. wide, and 1 in. thick. The filter shall cover the vents and be held firmly in place with top and bottom brackets and a spring loaded upper clamp.

(c) Exhaust air shall be vented out of the cabinet between the top of the cabinet and the main access door. The exhaust area shall be screened with a screen type material having a maximum hole diameter of 1/8 in.

Thermostats and Fans. A thermostatically controlled cooling fan shall be provided for all cabinets. The fan and thermostat shall be rated for 125 percent of capacity and they shall be mounted at the top of the cabinet.

(a) Thermostats shall be the inline type, single pole, 120 volts, 10 amps with a minimumrange of 40 to 80F.

(b) The fan shall have a minimum rated capacity of 100 CFM air flow and a minimum rated design life of 100,000 hours.

(c) The thermostat shall be manually adjustable, within a 10 degree range, from 70 to 160F.

Method of Measurement:

This number of Lighting Control and Distribution Enclosure to be measured under these items shall be that actual number in accordance with these special provisions complete in place and accepted.

Basis of Payment:

The number of Lighting Control and Distribution Enclosure as determined above, shall be paid for at the contract unit price bid for each item "Lighting Control and Distribution Enclosure" installed in accordance with the requirements contained herein, complete in place and accepted, which price and payment shall constitute full compensation for furnishing all materials, including panels, control devices concrete pad foundation and for all labor and equipment necessary for the installation of the electrical equipment specified.

10/27/2009

746898 - REMOVE AND RESET EXISTING HIGH MAST LIGHT POLE

Description:

This work consists of removing, transporting, and installing existing high mast light poles of the type, size, and at the locations shown on the Plans in accordance with these Special Provisions, notes on the plans, and as directed by the Engineer. Furnishing of the anchor bolts, anchor plates, templates, conduits, and drain tubes for installation into the drilled shaft foundation will be incidental to this item in accordance with these Special Provisions, the Standard Specifications and the Plans. Ground rods will be furnished and installed under other items in the contract. Drilled shaft foundations will be furnished and installed under other items in the contract.

Materials:

Fasteners

Anchor Bolts: ASTM F 1554, Grade 105
Anchor Nuts: ASTM A 194, Grade 2H or ASTM A 563, Grade D.H.
Anchor Washers: ASTM F 436

Finish

Fasteners and anchor bolts:	Galvanized finish ASTM A 153

Grout

Non-Shrink Grout:	ASTM C 1107

Epoxy Resin

Epoxy Resin and Hardener:	ASTM C 881

Construction Methods:

All existing light poles, baskets, ladders, luminaires, hardware and accessories shall be salvaged and reused. Any anchor bolts, washers and nuts removed to facilitate relocation and resetting of the existing light pole shall be replaced with approved fasteners. New anchor bolts, washers and nuts shall be furnished in accordance with the Special Provisions and the Plans.

The Contractor shall notify the Engineer and the owner at least two weeks in advance prior to relocation of a light pole. Existing lighting surrounding a light pole being relocated shall be maintained at all times. Contractor shall use care during the removal and salvaging of the existing light pole to avoid damage to the structure. Any damage incurred to the structure resulting from the Contractor's operations shall be repaired or replaced at no additional cost to the Department to the satisfaction of the design Engineer.

The Contractor is hereby notified that no structural components shall be welded to any portion of the existing structure to facilitate removal and erection. Bolting to the existing structure will be allowed; however, details of any proposed field bolting to existing steel shall be submitted for review and approval by the Engineer. Working drawings shall be prepared for review outlining all materials and procedures to be used for the removal and erection of the light pole, including a sequence of removal and erection. The design of the removal and erection working drawings shall be prepared by a Professional Engineer licensed in the State of Delaware with supporting calculations submitted to the Engineer for review and approval. The design of any connections shall be in accordance with applicable provisions of the latest edition of the AASHTO Standard Specifications for Highway Bridges (including all interims).

The existing electrical cables within the light pole providing electrical service to the floodlights shall be disconnected in the junction well adjacent to the light pole and safely secured within the light pole during relocation or disconnected at the panel board on the service platform and removed completely.

The Contractor shall remove any existing equipment mounted to the light pole that may detach or become damaged during relocation of the light pole. The Contractor may elect to remove any equipment which hinders the ability to move the light pole.

Following relocation of the light pole to the new foundation, any equipment which was removed shall be reinstalled and all electrical connections shall be restored as proposed with other items in the contract. Any damage to the existing equipment shall be repaired or replaced at the expense of the Contractor to the complete satisfaction of the Engineer.

The relocation and installation of the high mast light pole on its new foundation shall conform to the dimensions and details as indicated on the Plans.

Anchor bolts shall be plumb. A ¼" thick steel template shall be used for the installation of anchor bolts. The installation of the anchor system of the existing high mast light pole to the proposed foundation shall be in conformance with Sections 5.2 and C-5.2 of NCHRP Report 469 – Fatigue-Resistant Design of Cantilevered Signal, Sign and Light Supports, 2002. These sections of this report are included as Appendix A of this special provision.

Method of Measurement:

The quantity of Remove and Reset Existing High Mast Light Pole will be measured for each high mast light pole relocated to a new foundation as specified and as accepted by the Engineer.

Basis of Payment:

The payment for the item "Remove and Reset Existing High Mast Light Pole" as called for by the contract shall be made at the contract price bid per EACH complete in place and accepted, which price and payment will constitute full compensation for preparation/submission/and revision of working drawings, furnishing all materials, removing, salvaging, transporting, erecting and resetting the light pole(s) as detailed on the Plans at designated location(s), furnishing the anchor bolts, nuts, washers, anchor plates, templates, conduits and all accessories required for installation into the drilled shaft foundation, stake out, non-shrink grout, grading, sodding if required to restore the site to existing condition, for all labor, equipment, tools, and all incidentals necessary to complete the work. Payment for Borrow, Type C, shall be made under Item No. 210000 – Furnishing Borrow Type "C" for Pipe, Utility Trench, and Structure Backfill. .

The drilled shaft foundation for the high mast light support shall be paid for under Item No. 602742 – Drilling for Concrete Shaft (In Soil), 48" Diameter..

Appendix A:

Sections 5.2 and C-5.2 of NCHRP Report 469 - Fatigue-Resistant Design of Cantilevered Signal, Sign and Light Supports, 2002.

1/6/16

746899 – LIGHTING STANDARD POLE BASE

Description:

This work consists of furnishing and installing lighting standard pole bases in accordance with the Standard Specifications and the Plans. Pole bases shall be installed at the locations shown on the Plans or as directed by the Engineer. Ground rods will be furnished and installed under other items in the contract.

Materials:

The concrete for pole bases shall conform to Section 812, Class B.

Bar reinforcement shall meet the requirements of Section 603 Grade 60.

Conduit sweeps shall meet the requirements for galvanized rigid steel conduit in Section 745.

Anchor bolts and nuts shall be hot-dipped galvanized steel and shall meet the requirements of AASHTO M 314. Anchor bolts shall have a minimum yield strength of 55,000 psi.

Construction Methods:

The pole bases shall conform to the dimensions and details as indicated on the Plans.

The end of the conduit sweeps in the ground shall be extended outside the concrete and any forms or sheeting by 12 inches and capped or connected to the existing conduit. If the conduit is to be capped underground for future use, it must be sealed with a galvanized threaded conduit plug. Tape is NOT an approved conduit plug. The location of the conduits shall be marked on the base with arrows drawn in the wet concrete within 6 inches of the outer edge.

Anchor bolts shall be plumb. A ¼" thick steel template shall be furnished by the Contractor and used for the installation of anchor bolts.

Excavation for the pole bases may not exceed the dimension of the foundation by more than 12 inches in any one direction. If a form is used in the excavation more than 18 inches below the ground surface, it is necessary that the area between the form and excavation be filled and tamped on all sides in layers not to exceed 6 inches.

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 pole 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. The contractor shall stop all work until the Bridge Design Section reviews the condition.

Method of Measurement:

The quantity of LIGHTING STANDARD POLE BASE will be measured as the actual number of pole bases constructed, complete in place and accepted. Excavation and backfilling around the base and the conduit sweeps in the base are included in this item.

Basis of Payment:

The quantity of LIGHTING STANDARD POLE BASE will be paid for at the contract unit price per each. Price and payment will constitute full compensation for furnishing and constructing all materials, conduit sweeps, anchor bolts, reinforcing steel, concrete, anchor bolt template, excavating, backfilling, removal of excavated material, compacting around the base, repairs to damaged existing pavement, removal or replacement of pavement; and for all labor, equipment, tools, and incidentals necessary to complete the work.

7/20/15

746906 - FURNISH & INSTALL 4-CONDUCTOR #18 AWG SHIELDED OPTICOM CABLE
746907 - FURNISH & INSTALL 1-CONDUCTOR #2 AWG STRANDED COPPER
746908 - FURNISH & INSTALL 1-CONDUCTOR #4 AWG STRANDED COPPER
746909 - FURNISH & INSTALL 1-CONDUCTOR #6 AWG STRANDED COPPER
746910 - FURNISH & INSTALL 1-CONDUCTOR #8 AWG STRANDED COPPER
746911 - FURNISH & INSTALL 1-CONDUCTOR #10 AWG STRANDED COPPER
746912 - FURNISH & INSTALL 1-CONDUCTOR #14 AWG STRANDED COPPER
746913 - FURNISH & INSTALL 2-CONDUCTOR #14 AWG ALUMINUM SHIELDED COPPER
746914 - FURNISH & INSTALL #6 BARE STRANDED COPPER GROUND
746915 - FURNISH & INSTALL #8/2 WIRE UF W/GROUND
746916 - FURNISH & INSTALL #8/3 WIRE UF W/GROUND
746918 - FURNISH & INSTALL #2/0 AWG STRANDED COPPER
746919 - FURNISH & INSTALL #4/0 AWG STRANDED COPPER
746920 - FURNISH & INSTALL 14/4 TRAFFIC CONTROL CABLE
746921 - FURNISH & INSTALL 14/9 TRAFFIC CONTROL CABLE
746922 - FURNISH & INSTALL 14/16 TRAFFIC CONTROL CABLE
746923 - FURNISH & INSTALL 14/5 TRAFFIC CONTROL CABLE

Description:

The pay items listed above include furnishing, installing, and splicing if approved, the various types and sizes of cable in conduit, or overhead and lashed to a span wire. All conduit installation will be paid for under their respective items.

Materials:

Cable - All electrical cables shall be manufactured in conformance with the National Electrical Code, 600-Volt, UL approved.

1. Stranded or solid, single conductor copper cables shall be XLP Insulated; USE or RHW rated

2. Type UF cable shall include ground and the number and size of conductors as shown on the plans. Use cable conforming to ANSI/UL 493.

3. 14/4, 14/5, 14/9, 14/16 AWG Solid copper conductor Traffic Signal cable shall conform to IMSA Specification Number 19-1. Provide wire size and number of conductors as shown on the plans or as directed by the Engineer. Additional material requirements for Traffic Signal Cables are as follow:
   a. If requested, the Contractor shall provide independent test results to verify specification compliance. Costs of testing are incidental to the Cable item being supplied.
   b. All cables shall be supplied on reels with each reel containing one continuous length of cable.
   c. Color code to be used as established by IMSA Specifications. In addition to IMSA, DelDOT requires that individual tracers contrast with the base color to allow easy identification between each base color and the same base color plus tracer.
      To test for sufficient color contrast, remove the sheath for a length of 6 inches. All filler material and tapes shall be removed for the same length. All conductors of the same base color will be placed side by side and all other conductors will be hidden. The conductors will be held against a white or ivory surface and viewed from a distance of 6 feet. The base color, tracer, and tracer color must be identified within a period of three seconds after being placed in position. The same test for contrast will also be made for base colors. If either the base color or tracer color test fails, the material will be rejected.
   d. The tracer line width shall not exceed 3/20 inch when measured perpendicular to the edge of the line. Also, the total width of tracer lines on a conductor may not be equal to or greater than one-half the total circumference of the conductor.

4. Aluminum Shielded Cable shall be shielded two conductor controlled capacitance cable enclosed in an aluminized polyester shield within a polyethylene jacket, rated to 600 volts. The two conductors are AWG # 14 stranded copper. Cable shall meet IMSA 50-2. Referred to as “Home-run Cable”.

5. Opticom Cable – must meet the manufacturer's recommended specifications

Splicing Materials –

1. Insulating (rubber) tape shall be of the self-bonding type and shall be 3M Company, Inc. (Cat. No. 130C, 2228); Plymouth Rubber (Cat. No. 2212); Permacel (Cat. No. 253, P280), or an approved equal.

2. Jacket (plastic) Tape shall be of the waterproof type and shall be 3M Company, Inc. (Cat. No. 33); Plymouth Rubber (Cat. No. 3117); Permacel (Cat. No. P29), or an approved equal.

3. For overhead traffic control cable splices:
   Wire Nuts – Ideal 74B or 76B, 3M Highland H-33, or approved equal

Cable Installation

Installation in Conduit:

This work consists of installing various types, sizes, and number of communications or electrical cable(s) in existing conduits, which may or may not contain an existing communications or electrical cable(s) or wire(s). Conduits may be located underground, within mast arms, on wood poles, or on metal poles.

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

Construction Methods:

All cable must be transported by and unreeled from a cable trailer(s). The laying of reels on the ground and subsequent removal of wire or cable from this position is prohibited. Avoid damaging cable insulation when removing cable from drums or reels, or during installation of the cable.

Hand pulling methods are required for conduit sizes of 1-1/2" or less and are **preferred** for all other sizes. Dynamometer is recommended for use when pulling other than by hand.

Prior to installation, **written approval by the Engineer is required** for the use of any power-assisted methods of pulling communications or electrical cable(s) or wire(s) into conduit. A short piece of material that will part if the strain exceeds the amount specified below shall be used between the pulling grip and the pulling medium, unless industry standards require less:

150 lbs. for all pulls up through 12 pair communications cable; and
300 lbs. for all larger cables

Any and all cable(s) pulled into any conduit without the use of an acceptable pulling grip, Kellems or equal, and without the use of a strain release element or by using methods which may have or did result in pulling forces in excess of strain release material, or using methods which may have or did result in pulling forces in excess of those set forth herein or prescribed by industry standards are **unacceptable.**

Any and all unacceptable cable(s) shall be removed and replaced with new cable(s) using correct methods at no cost to the Department.

The installation of cable(s) in existing conduits shall be accomplished by pulling the cable(s) through the conduits. If required, pulling lubricant of the type recommended by the cable manufacturer will be used. The cable(s) shall be prepared for pulling by reeling them from their respective reels as they enter the conduit or by taking sufficient length from the reel(s) to comprise the set to be pulled. Care shall be taken to avoid damaging insulation and to eliminate any twists or kinks and to marry the cables in a straight lay. Care shall also be taken to prevent entry of moisture into the cable at all times during installation. Cable ends will be sealed using rubber tape and painted with a sealing type of waterproof compound until final splices are made.

The cable(s) shall be hand fed into the conduit. When, in the opinion of the Engineer, additional radius is required to prevent damage to the cable(s) a sleeve shall be used. There shall be no additional payment made for sleeves or their use.

Underground cable runs shall be started at one terminal point and shall be continuous without splices to the final terminal point except for "Home Run Cable" to "Loop Detector Wire". Opticom cable shall not be spliced in any application.

Additional cable(s) shall be left and arranged in a neat and orderly manner as noted:

1. When pulled through junction wells, 6 feet of copper cable, supported on cable rack assemblies
2. At the control box and other splice locations, 6 feet of cable, neatly arranged and laced with cable ties

When cable already exists in a conduit, the Contractor shall ensure that the placement of a fish does not damage or entangle the existing wire or cable(s). The lead end of a fish shall contain a blunt terminal. Bending and/or taping the end of the fish shall not be satisfactory nor shall any termination which contains rough edges or any sort of hook that might engage an existing wire or cable when the fish is extracted.

Where two or more wires occupy the same conduit, they shall be drawn in together and kept parallel to each other by means of a pulling head. Phase legs shall be arranged circumferentially and in sequence around the neutral wires.

All conduit ends shall be duct sealed after cable installations.

Installation on Span Wire Overhead:

This work consists of installing electrical cable on an existing span wire.

Construction Methods:

All electrical cable must be transported by and unreeled from a cable trailer(s). The laying of reels on the ground and subsequent removal of wire or cable from this position is prohibited. Avoid damaging cable insulation when removing cable from drums or reels, or during installation of the cable.

The electrical cable will not be spliced at the top of the pole but will continue on to be taped onto the span wire. The electrical cable shall be oriented so water will not run along its length and run into the steel pole. The electrical cable shall be installed on the underside of the span wire with no crossover or wraps around the span wire.

The electrical cable shall be pulled tight without any kinks and the jacket (plastic) tape wrapped tight around the span wire and electrical cable at least six wraps every twelve to fourteen inches.

At each signal head location, there will be a loop of signal cable 36 inches long.

Splicing:

Traffic Control Cable and Single Conductor Stranded Wire :

General – Traffic signal cable splicing shall only be made above ground in pole hand-holes, transformer bases or on span wire at the signal head. Underground traffic control cable splices (except between loop detector wire and "home-run" cable) or splices in between conduit runs are prohibited. After cables have been installed and pending permanent splicing, the end of each section of cable in the control box and at all splice locations shall be carefully sealed, using rubber tape, and painted with a sealing type of waterproof compound. The circuit number of all cables and wires shall be identified by color coded tape attached to each of the cables and wires in the control box and at all splice locations. The color coded tape shall be secured to the cable or wire with nylon cable ties. Any splices found to be faulty within 90 days of installation shall be remade at the Contractor's expense. Insulation from each conductor to be spliced shall be removed to expose ½ inch of copper. Use of any tool or method which might nick the conductor is prohibited. Each

conductor not being spliced shall be inspected and trimmed so that the conductor does not extend beyond the insulation. After each conductor to be spliced is connected, all conductors both used and not used shall be returned to their original configuration before the insulation was removed and then sealed as specified.

Individual cables shall not extend beyond the splice of the last signal head for each signal phase.

Shielded Opticom cable shall not be spliced.

Shielded Aluminum Cable ("Home-Run cable") may be spliced only with the loop detector wire in a junction well. No splicing of the "home-run cable" outside of this junction well is permitted.

Overhead - Conductors to be electrically connected shall be placed side by side with the exposed copper aligned. The copper shall then be twisted clockwise with pliers until a good mechanical connection shall be effected. A proper size wire nut shall be installed and hand tightened. If necessary to cover all the copper, minor trimming may be done. The copper splice shall be 5/16 inch long when trimmed. Care shall be taken to ensure that no insulation is caught up in the copper area of the splice. It is essential that the splice be kept dry. Therefore, care must be taken during taping and by placement of the completed splice to prevent water from entering the splice between or around the cables.

1. **Termination of cable (Butt Splice) -** The sheath of each cable shall be removed as necessary. When all conductors to be joined have been completed, the splice shall be prepared for taping. The cables shall be placed in a butt position and all wires and wire nuts shall be positioned to ensure that no shorts exist and that the splice area is reduced to as small a diameter as possible. Taping shall begin with rubber tape two inches over the intact sheath. Taping shall proceed toward the other cable overlapping half of the tape width until a point two inches on the other cable sheath has been reached. Taping shall then be repeated in the other direction starting one tape width wider than the previous wrap. Where necessary to cover all areas of the splice, overlapping shall be increased. Every area of the splice shall have rubber tape at least four layers (two fully overlapped passes) deep. The rubber tape shall be covered with plastic tape applied in the same fashion.

2. **Taps or Tee Splices -** The sheath of the through cable shall be removed for a distance of 8 inches centered on the point of splice. The sheath of the branch cable(s) shall be removed for a distance of 4 inches. The through cable conductors which are to be joined to the conductors of the branch cable(s) are to be separated out from the others and cut. No other conductors shall be cut for any purpose. Depending upon the need, the branch cable(s) may be placed beside one of the through cables and the splicing proceed or the through cable may be doubled back so that the parts of the through cable and the branch cable(s) are placed side by side. When all conductors to be joined have been completed, the splice shall be prepared for taping. The cables shall be placed in approximately their final position and an inspection for shorts shall be made. After all wire nuts and wires are properly positioned, taping shall begin on the through cable 2 inches from the end for the sheath. It shall proceed with 1/2 inch width overlap across the splice area and onto the other through sheath for a distance of 2 inches. The taping shall start at the end point and return back across the splice to the branch cable(s). It shall proceed along the branch cable(s) and onto the sheath for a distance of one inch. A return along the branch back to the main cable shall be made and the remaining part of the splice shall be taped continuing as before. Every area of the splice shall have rubber tape at least four layers (two fully overlapped passes) deep. The cables shall be placed in their final position and taped with two fully overlapped passes of plastic tape. Plastic tape need not cover the interior areas covered by the rubber tape. The splice shall be placed so that the branch cable(s) enters the splice from below to prevent water from flowing along the branch cable(s) into the splice area.

3. **Termination End of Cable –** Dead ended cables shall have 3" of sheath removed. Each individual cable shall be rubber taped then bundled and re-taped with vinyl tape and coated with waterproofing compound.

Method of Measurement:

The quantity of cable will be measured as the actual number of linear feet of cable furnished and pulled through conduits (underground, in mast arms, or on poles) or installed on a span wire in accordance with these specifications, complete in place, and accepted.

All required cable slack left at termination points or in junction wells shall be measured as part of this item.

Basis of Payment:

The quantity of cable furnished and pulled through all conduit (underground, in mast arms, or on poles) or furnished and installed on a span wire will be paid for at the Contract unit price per linear foot of the applicable pay item. Splice installations and all costs related to the splice shall be incidental to the linear foot payment of the cable being spliced. Price and payment will constitute full compensation for all labor, equipment, tools, materials, material testing, splicing, taping, and incidentals required to complete the work as specified above.

7/14/14

746926 – FURNISH & INSTALL ELECTRICAL UTILITY SERVICE EQUIPMENT 120/240

Description:

Electrical service equipment consists of the equipment necessary to connect a utility company service to a traffic control device cabinet, lighting control cabinet, traffic monitoring station cabinet, or other traffic control device cabinet. Provide electrical service equipment at the phasing and amperage specified in the Contract Documents. This work includes coordinating the connection with the local utility company.

Materials:

Meter Sockets:

Provide either ringed or ringless type meter sockets as required by the utility company. If a meter is not required, provide a ringless socket with suitable shunts and a metallic cover plate. Provide stainless steel hardware for attaching the meter socket to a cabinet, wood post, or other structure.

Disconnect Switches:

Disconnect switches shall be NEMA standard KS 1-1990. The disconnect switch enclosure shall be Type 4 stainless steel, with external operating handle, enclosure cover interlock, and external switch mechanism handle with provisions for securing in both the ON and OFF positions by padlock. The switch mechanism shall be of heavy duty design with quick make, quick break type operations and visible blades. The disconnect switch shall be fusible with integral fuse puller. Single phase disconnect switches shall have 2 poles with solid neutral and shall be rated at 240 Volts. Three phase disconnect switches shall have 3 poles with solid neutral and shall be rated at 600 Volts. The design of the neutral bar may be factory or field installable.

Construction Methods:

Utility Connection - Before any control equipment or material is ordered, arrange a meeting with the utility company representatives, Signal Construction Inspection representatives and the Engineer to establish a schedule for utility connections. Do not disconnect, de-energize, reconnect, tamper with, or otherwise handle any of the utility company's facilities. Make the utility service connection to the point of service supplied by the utility company. Make the necessary arrangements with the utility companies to ensure having needed utilities available at the time of turn on. Delays due to utility energization, connection, or disconnection will not be a basis for time extension. Report any difficulties in securing utility company services to the Engineer as soon as possible.

General Installation - Electrical Utility Service Equipment shall be installed per the standard construction or applicable plan details.

Measurement and Payment:

Electrical Utility Service Equipment will be measured and paid for at the Contract unit price per each at the phasing and amperage specified. The payment will be full compensation for the disconnect switch, meter socket, meter, shunts, cover plate, ground rods, wiring, conduit risers, elbows, conduit nipples and adapters, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Underground conduit will be measured and paid for separately under the applicable conduit item(s).

Service lateral cable will be measured and paid for separately under the applicable cable item(s).

Utility connection coordination with the utility company will not be measured, but the cost will be incidental to other pertinent items. Utility company energizing, connection, and disconnection costs will be the responsibility of the Department.

2/29/12

746939 - TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL AND MAINTENANCE, TYPE I
746940 - TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL AND MAINTENANCE, TYPE II
746941 - TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL AND MAINTENANCE, TYPE III

Description:

This work shall consist of pickup of DelDOT furnished materials, removal and/or returning of existing equipment, and maintenance of existing equipment as specified in the Contract Documents or as directed by the Engineer.

Materials:

Not applicable

Construction Methods:

Equipment Turn On - Notify the Engineer and Signal Construction Inspection representative at least 10 working days before completion of the project to allow DelDOT to install any additional traffic control device(s).

Notify the Engineer and Signal Construction Inspection representative five working days prior to the completion of the project to schedule a final inspection and turn-on.

Stakeout, with the Engineer and Signal Construction Inspection representative present, the proposed construction as indicated on the plan(s).

Pick-Up of Administration Furnished Materials - Notify the Signal Construction warehouse representative a minimum of 72 hours in advance of the anticipated pick up or delivery of materials. The Signal warehouse is located at:

14 Sign Shop Road
Dover, Delaware 19901
Signal Warehouse: Phone 302-760-2565

The Contractor shall be responsible for the transportation, labor, equipment, tools and incidentals necessary to obtain and load any DelDOT furnished materials.

Materials not furnished by DelDOT shall be furnished by the Contractor.

Removal and Disposal of Existing Material and Equipment - Removal of all structures as specified. Remove concrete foundations as specified. All holes caused by this removal shall be backfilled, compacted and restored to surrounding conditions.

Remove all existing abandoned junction wells or manholes shown on the plans, the holes shall be backfilled, compacted and restored to surrounding conditions. Cap and abandon conduit(s). The sidewalk where junction wells are removed shall be reconstructed to the nearest tooled joint or expansion joint.

Existing inductive loop detectors and magnetic detectors not shown on the plans shall be disconnected and or removed, all cables shall be removed form all conduit raceways, span wires, signal structures, junction wells and cabinets. Remove any existing signalization cables within the intersections that have been disconnected or are unused. This includes removal from all conduit raceways, span wires, signal structures, junction wells and cabinets.

Dispose of all material not salvaged or returned. Non-galvanized green painted structures may contain lead and the contractor will be responsible for proper disposal of such material.

Storage of Materials - Materials shall be bundled, stored, and protected in conformance with the manufacturer's recommendations or as approved by the Engineer.

Return of Material to DelDOT – After their removal in the field, the following materials shall be returned to the DelDOT sign shop:

Traffic Signal Poles and Pedestrian Signal Poles, Pedestal Poles, Lighting Poles, Salvaged Cable, Controllers and Cabinet enclosures, Junction Well Frames and Lids, Signal Heads, Pedestrian Signal Heads, Opticom Detector Units, and Signs that were mounted on mast arms, poles, or structures.

Maintenance of Materials and Equipment - The maintaining agency will continue maintenance of any existing signals until the Contractor places new equipment into operation.

When the work requires adjustments to the traffic control devices to maintain the minimum DelDOT standards, the adjustments to the traffic control devices shall be made within 4 hours of verbal notification by the Engineer.

Existing signals shall remain in their original condition until the new signals have been completed, satisfactorily tested and its operation accepted by the Engineer.

Maintain all vehicular and pedestrian detectors in continuous operation. If any detector is damaged by the Contractor, it shall be replaced within 72 hours after notification by the Engineer. All traffic signals and existing interconnect cable shall remain operational and actuated as specified in the Contract Documents.

Plan the work to minimize interference with any existing traffic control device.

Measurement and Payment:

The Per Each payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work for a “Type I”, “Type II”, or “Type III” location as specified in the Contract Documents and defined below.

Equipment Turn On - Equipment Turn On will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.

Pick-Up of Administration Furnished Materials - Pick-up of Administration furnished materials will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.

Removal and Disposal of Existing Material and Equipment - Removal and disposal of concrete foundations, junction wells, structures, and all other specified equipment will be measured and paid for at the Contract Bid Item price for Remove and Dispose of Existing Materials Type I, II or III as follows:

Remove, and Dispose Type I -

Removal, return to DelDOT, and disposal of existing TCD material for minor signal modification, cables, junction wells, signal heads, signs and all other specified equipment. No concrete foundation removal is anticipated.

Remove and Dispose Type II -

Removal, return to DelDOT, and disposal of existing TCD material for signal modification, cables, junction wells, concrete foundations, structures, signal heads, signs and all other specified equipment. 2 to 4 concrete foundations and structures and/or cabinet removals are anticipated.

Remove and Dispose Type III -

Removal, return to DelDOT, and disposal of existing TCD material for full signal reconstruction, cables, junction wells, concrete foundations, structures, cabinets, signal heads, signs and all other specified equipment.

Maintenance of Existing Signal Equipment - Materials storage, cable sealing and handling, adjustments to maintain minimum DelDOT standards on existing signals made necessary by new signal or geometric modifications and Contractor repair of any damaged detector caused as a result of Contractor's error will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.

3/1/12

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 (2 ea)
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 apron 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.

1/8/15

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

748505 - TEMPORARY RAISED PAVEMENT MARKER

Description:

This work consists of furnishing, installing and removing temporary raised pavement markers in accordance with the notes, details on the Plans and as directed by the Engineer.

Materials and Construction Methods:

The temporary pavement marker shall have housing made of high impact plastic with acrylic reflector. The size of the marker shall be 4" x 4" x .07" high with a minimum reflective area of 1.6 square inches per side; and the angle of reflector from road surface shall be 25 . The color of the marker shall be amber and/or white as required by the Plans.

The markers shall be installed on a clean, dry surface in strict conformance with the manufacturer's recommendations. After the completion of the work and as determined by the Engineer, the markers shall be removed and disposed of by the Contractor.

Method of Measurement:

The quantity of temporary railed pavement markers will be measured as the actual number of raised markers installed and accepted.

Basis of Payment:

The quantity of temporary raised markers will be paid for at the Contract unit price per each. Price and payment shall constitute full compensation for furnishing and installing all materials, cleaning the surface areas, removing and disposing of the markers, for all labor, tools, equipment, and necessary incidentals to complete the work.

10/28/98

748506 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 4"
748507 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 6"
748508 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"
748509 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"
748510 - PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT
748535 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 4"
748536 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 6"
748537 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 8"
748538 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 10"
748539 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 12"
748540 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 16"
748548 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"
748549 -PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"
748557 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"
748559 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 5"
748568 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 9"
748569 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 14"

Description:

This work consists of striping layout,furnishing and applying white or yellow, epoxy reflectorized pavement markings or black epoxy contrast pavement markings at the locations and in accordance with the patterns indicated on the Plans, or as directed by the Engineer, and in accordance with these specifications.

The white/yellow epoxy marking material shall be hot-applied by spray methods onto bituminous and/or Portland cement concrete pavement surfaces as required by the Plans. Following an application of double drop glass beads of two sizes and upon curing, the resultant epoxy marking shall be an adherent reflectorized stripe of the specified thickness and width that is capable of resisting deformation by traffic. All marking materials shall be certified lead free and free of cadmium, mercury, hexvalent chromium, and other toxic heavy metals.

The black epoxy marking shall be a two-component, hot-spray applied epoxy resin pavement marking material to be used for pavement marking on Portland cement concrete pavement surfaces. Following an aggregate drop, and upon curing, it shall produce an adherent stripe of specified thickness and width capable of resisting wear from traffic. Black contrast pavement markings will be required on all Portland cement concrete pavements.

Materials Requirements:

A. White and Yellow Reflectorized Epoxy

1. Epoxy Composition Requirements:

   The epoxy resin composition shall be specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures. The type and amounts of epoxy resins and curing agents shall be at the option of the manufacturer, providing the other composition and physical requirements of this specification are met.

   The epoxy marking material shall be a two-component (Part A and Part B), 100% solids type system formulated and designed to provide a simple volumetric mixing ratio (e.g. two volumes of Part A to one volume of Part B).

   Component A of both white and yellow shall conform to the following requirements:

	% BY WEIGHT	
	WHITE:	**YELLOW:**
Pigments	Titanium Dioxide - 18% Min. (ASTM D476, Type II)	Organic Yellow - 6%-10%
Epoxy Resin	75% Min., 82% Max.	70% Min., 77% Max.

The entire pigment composition shall consist of either titanium dioxide and/or organic yellow pigment. No extender pigments are permitted. The white pigment upon analysis, shall contain a minimum of 16.5% TiO_2 (100% purity).

Epoxy Content-WPE (Component A) - The epoxy content of the epoxy resin will be tested in accordance with ASTM D1652 and calculated as the weight per epoxy equivalent (WPE) for both white and yellow. The epoxy content will be determined on a pigment free basis. The epoxy content (WPE) shall meet a target value provided by the manufacturer and approved by the Department's Material and Research Section (from now on will be addressed as Department). A $\pm$ 50 tolerance will be applied to the target value to establish the acceptance range.

Amine Value (Component B) - The amine value of the curing agent shall be tested in accordance with ASTM D2074-66 to determine its total amine value. The total amine value shall meet a target value provided by the manufacturer and approved by the Department. A $\pm$50 tolerance will be applied to the target value to establish the acceptance range.

Toxicity - Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property.

Viscosity - Formulations of each component shall be such that the viscosity of both components shall coincide (within 10%) at a recommended spray application.

2. Physical Properties of Mixed Composition:

Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73 ± 5 F. (23 ± 3 C).

a. Color. The white epoxy composition when applied at a minimum wet film thickness of 20$\pm$1 mils (500 µm) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

The yellow epoxy composition when applied at a minimum wet film thickness of 20$\pm$1 mils (500 µm) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

b. Directional Reflectance. The white epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 84% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

The yellow epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 55% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

c. Drying Time (Laboratory). The epoxy composition, when mixed in the proper ratio and applied at a 20$\pm$1 mils (500 µm) minimum wet film thickness, and immediately dressed with large reflective glass spheres (Federal Spec. Type 4)at a rate of 12 lb/gal (1.4 kg/l) of epoxy pavement marking materials, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 lb/gal (1.4 kg/L) of epoxy pavement marking material, shall exhibit a no-track condition in 15 minutes or less (ASTM D711). A Bird Applicator or any other doctor blade shall be used to produce a uniform film thickness.

d. Drying Time (Field). When installed at a minimum wet film thickness of 20±1 mils (500 or 625 um) and reflectorized with glass spheres, the maximum drying times shall correspond to these temperatures:

80 F (27 C)	10 minutes
70 F (21 C)	10 minutes
60 F (16 C)	15 minutes
50 F (10 C)	25 minutes
40 F (4 C)	45 minutes
35 F (2 C)	60 minutes

The composition shall dry to "no-tracking" in approximately 10 minutes, and after thirty (30) minutes shall show no damaging effect from traffic. Dry to no-tracking shall be considered as the condition where no visual deposition of the epoxy marking to the pavement surface is observed when viewed from a distance of 100 feet (30 meters), after a passenger car is passed over the line. Regardless of the temperature at the time of installation, the installation contractor shall be responsible for protection of the markings material until dry to a non-tracking state.

e. Abrasion Resistance. The wear index of the composition shall not exceed 82 when tested in accordance with ASTM C501 using a CS-17 wheel and under a load of 1000 grams for 1000 cycles.

f. Tensile Strength. The tensile strength of the epoxy composition shall not be less than 6000 psi (41 MPa) when tested in accordance with ASTM D638 using a Type IV specimen [0.125" ± 0.010" (3.18 ± 0.25 mm) thick]. Tests shall be conducted at an ambient temperature of 75 ± 5 F (24 ± 3 C). The testing machine shall operate at a speed of 0.20" (5.1 mm) per minute.

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing, shall not be less than 24 hours nor more than 96 hours.

Test specimens for tensile strength determination will be prepared as follows:

A 1/8 inch (3 mm) thick sheet of epoxy material is cast from a reservoir-type mold, fabricated from polyterrafluorethylene (PTFE), 1/8" deep x 10" x 10" (3 mm deep x 250 mm x 250 mm).

Prior to casting, the mold is sprayed with a suitable release agent. A sufficient amount of epoxy composition is mixed in the proper proportions (A:B) and poured level with the top of the mold. Care should be taken so as not to decrease or exceed the 1/8" (3 mm) thickness.

After a period of 1 to 4 hours, the material will have set into a semi-rigid sheet that is flexible enough to die-cut yet rigid enough to retain its shape. While the material is in this "plastic" state, five (5) specimens shall be die-cut and then placed on a flat, smooth, PTFE surface for the completion of the specified conditioning period.

g. Compressive Strength. The compressive strength of the epoxy composition shall not be less than 12,000 psi (83 MPa) when tested in accordance with ASTM D695 except that a compression tool shall not be necessary. The test specimen shall be a right cylinder [0.50 inch diameter by 1.0 inch length (12 mm diameter by 25 mm length)]. Tests shall be conducted at an ambient temperature of 75 ± 5 F (24 ± 3 C).

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing shall not be less than 24 hours nor more than 96 hours.

Test specimens for compressive strength determinations will be prepared as follows:

Five molds will be prepared from 1/2" (12 mm) I.D., 1/16" (1.5 mm) wall thickness acrylic tubing, cut in 1 1/2" (38 mm) lengths. After spraying the inside of the mold with a suitable release agent,[1] the cylindrical tubes are placed in a vertical position on a PTFE sheet base. A sufficient amount of epoxy composition is thoroughly mixed in the proper proportions (A:B) and poured into the mold

to a depth of approximately 1 1/4" (32 mm). After a minimum of 72 hours curing, the specimens are removed from the molds and machined to a length of 1" ± 0.002" (25 mm ± 0.05 mm).

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

B. Reflective Glass Spheres/Beads

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

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

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

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

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

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

M247 AASHTO Type 1 Glass Spheres

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

Type 4 Large Spheres

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

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

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

C. Black Epoxy Contrast Markings

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

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

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

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

D. Black Aggregate

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

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

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

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

E. Packaging and Shipment

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

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

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

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

Epoxy Application Equipment:

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

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

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

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

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

1. The applicator shall provide individual material reservoirs, or space, for the storage of Part A and Part B of the epoxy resin composition; for the storage of water; and for the storage of reflective glass spheres.

2. The applicator shall be equipped with heating equipment of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application and for heating water to a temperature of approximately 140 F (60 C).

3. The glass spheres shall be gravity dropped upon 20 mils (500 um) of epoxy pavement markings to produce a wet-night-reflective pavement marking. The large spheres (Federal Spec. Type 4) shall be applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. This application rate and the following gradation shall conform to FHWA's FP-96: Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (pages 757-761 Type 3 and Type 4 Beads).

4. The applicator shall be equipped with metering devices or pressure gauges, on the proportioning pumps. Metering devices or pressure gauges shall be visible to the Engineer.

5. The applicator shall be equipped with all the necessary spray equipment, mixers, compressors, and other appurtenances to allow for the placement of epoxy reflectorized pavement markings in a simultaneous sequence of operations as described below in Construction Details, D. Applications of Epoxy Reflectorized Pavement Markings of this Special Provisions.

Construction Details.

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

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

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

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

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

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

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

C. Surface Preparations: The Contractor shall clean the pavement or existing durable marking to the satisfaction of the Engineer.

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

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

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

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

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

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

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

Markings operations shall not begin until applicable surface preparation work is completed, and approved by the Engineer. Black epoxy contrast pavement markings shall be applied at a minimum uniform thickness of 20 mils (500 µm) on all Portland cement concrete surfaces followed by a single drop of graded black aggregate.

The width of black epoxy line shall be applied for the following situations:

Center Skip Line - On Portland cement concrete pavements a black contrast skip line shall be 10 feet (3 m) in length of the same width as the white epoxy reflectorized skip. It is to lead the white skip and stop at the beginning of the white skip. The black contrast skip is to have a single application of graded black aggregate.

Edge Lines -White Edge lines on Portland cement concrete pavements shall have a 3 inch black contrast line running parallel to the white edge line. The contrast line shall be to the inside or travel lane side of the edge line. The black contrast marking is to be applied with a single drop of graded black aggregate. Once it has cured sufficiently so as not to track, the reflectorized white line is to be applied along side of the contrast line and the two lines shall adjoin each other.

Dotted Line: All dotted lines on Portland cement concrete pavements shall have a base of black contrast markings which is 4 inches (100 mm) wider than the reflective white marking. The black contrast marking is to be applied first with a single drop of graded black aggregate. Once it has cured sufficiently so as not to track, the reflectorized white line is to be applied on top of it. The reflective line is to be centered along the black contrast line such that a minimum of 2 inches (50 mm) of black contrast marking is visible on either side of the reflective marking.

F. Defective Epoxy Pavement Markings: Epoxy reflectorized pavement markings, which after application and curing are determined by the Engineer to be defective and not in conformance with this specification, shall be repaired. Repair of defective markings shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Engineer as follows:

1. Insufficient film thickness [(less than 20±1 mils (500 µm) as applicable] and line widths; insufficient glass bead coverage or inadequate glass bead retention.

   Repair Method: Prepare the surface of the defective epoxy marking by shot blasting, sand blasting, or water blasting. No other cleaning methods will be allowed. Surface preparation shall be performed to the extent that a substantial amount of the reflective glass spheres are removed and a roughened epoxy marking surface remains.

   Immediately after surface preparation remove loose particles and foreign debris by brooming or blasting with compressed air.

   Repair shall be made by re-striping over the cleaned surface, in accordance with the requirements of this specification and at a full 20±1 mils (500 µm) minimum line thickness as applicable.

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

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

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

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

   The extent of removal shall be the defective area plus any adjacent epoxy pavement marking material extending one foot (300 mm) any direction. After surface preparation work is complete, repair shall be made by re-applying epoxy over the cleaned pavement surface in accordance with the requirements of this specification.

3. Reflectivity for epoxy resin paint.

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

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

   White 450
   Yellow 325

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

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

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

Method of Measurement:

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

Basis of Payment:

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 3", 4", 5", 6", 8", 9", 10", 12", 14", 16" (75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 225 mm, 250 mm, 300 mm, 350 mm, or 400 mm) line and the Contract unit price per square foot (meter) of symbol. The quantity of permanent pavement marking (white, yellow, or black epoxy resin paint) will be paid for at the Contract unit price per linear foot (meter) of line and the Contract unit price per square foot (meter) of symbol. Price and payment shall include striping layout, cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

NOTE:

For information only:

The following manufacturers are known to us which manufacturer Epoxy Resin Paint for Pavement Striping. The Department does not endorse or require the use of any of the manufacturers listed below. However, a bidder wishes to use another manufacturer's product, it shall be submitted for review and approval prior to submitting a bid proposal. Should the product be deemed unacceptable by the Department, the successful bidder will be required to use only an approved product.

1. POLY CARB, Inc.
   33095 Bainbridge Road
   Solon, Ohio 44139
   Tel. 1-800-CALLMIX

2. IPS - Ennis Paint
   P.O. Box 13582
   Research Triangle Park, North Carolina 27709
   Tel. 1-877-477-7623

3. Epoplex
   One Park Avenue
   Maple Shade, NJ 08052
   Tel. 1-800-822-6920

4. Or an approved equal.

8/7/2013

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

748530 - REMOVAL OF PAVEMENT STRIPING

Description:

This work consists of removing pavement markings of all kinds including paint, tape, etc., in accordance with this special provision, notes on Plans and/or as directed by the Engineer. The Contractor shall coordinate with the Engineer for maintaining traffic during the operation, prior to starting the work.

Materials and Construction Methods:

Paint and Epoxy Resins:
Shot/abrasive grit blasting or water blasting equipment shall be used for removal of markings from pavement surfaces.

Alkyd Thermoplastic:
In addition to the removal techniques discussed for paint and epoxy, grinding (erasing machines) equipment may also be used for removal of markings from pavement surfaces.

The removal operation shall be performed in a manner that will not damage the pavement surface.

The Contractor shall collect and dispose of all shot/abrasive grit and pavement marking materials removed from the pavement surface. Washing or sweeping such material to the roadside will not be permitted.

After removal of striping on bituminous concrete asphalt sealer shall be used to cover any exposed aggregate or embedded paint at no additional cost.

Method of Measurement:

The quantity of pavement striping removal will be measured as the number of square feet (meters) of pavement striping removed and accepted. The area of lines will be calculated by multiplying the nominal width of line times the length and the area of symbols will be as specified in Subsection 748.10 of the Standard Specifications.

Basis of Payment:

The quantity of pavement striping removal will be paid for at the Contract unit price per square foot (meter) for "Removal of Pavement Striping". Price and payment shall be full compensation for furnishing all materials, removing the pavement markings, disposing of the removed marking material, covering up the exposed aggregate, and for all labor, equipment, tools and incidentals necessary to complete the work.

Note:

There will be no measurement and payment for removal of pavement markings placed incorrectly by the Contractor.

5/21/2013

748541 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 4”
748542 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 6"
748543 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 8"
748544 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 12”
748545 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, 16"
748546 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, SYMBOL/LEGEND
748553 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, BIKE SYMBOL
748554 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, PEDESTRIAN SYMBOL
748555 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, HANDICAP SYMBOL

Description:

This work consists of furnishing and installing preformed retroreflective thermoplastic pavement marking with a preapplied Federal Specification Type IV glass bead coating throughout its entire cross section on bituminous asphalt pavement at the locations and in accordance with the patterns on the Plans, or as directed by the Engineer.

The preformed retroreflective markings shall conform to the size and dimensions as shown in the Federal “Standard Highway Signs” book found at: http://mutcd.fhwa.dot.gov/SHSe/pavement.pdf as referred to in the Delaware Manual on Uniform Traffic Control Devices, Part 3, Markings.

Materials:

General: Only materials listed on the Department’s Approved Pavement Markings Material List will be used for this item. The preformed retroreflective markings shall be fusible to bituminous asphalt pavement by means of the normal heat of a propane type of torch. Adhesives, primers or sealers are not necessary prior to the preformed retroreflective markings application on bituminous asphalt pavement.

The preformed retroreflective markings shall conform to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics and be capable of fusing to itself and previously applied worn hydrocarbon and/or alkyd thermoplastic pavement markings.

The preformed retroreflective markings shall be capable of application on bituminous asphalt pavement wearing courses during the paving operation in accordance with the manufacturer's instructions. After application the markings shall be immediately ready for traffic. The preformed retroreflective markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations. The preformed retroreflective thermoplastic markings shall not be brittle and must be sufficiently cohesive and flexible at temperatures exceeding 50ºF (10ºC) for one person to carry without the danger of fracturing the material prior to application.

Composition: The retroreflective pliant rosin ester thermoplastic pavement markings shall consist of a homogeneous mixture of high quality polymeric thermoplastic binders, pigments, fillers and glass beads. The thermoplastic material must conform to AASHTO M249-79(86) with the exception of the relevant differences due to the material being preformed, and identified herein.

Intermix Glass Beads: The preformed retroreflective material shall contain a minimum of 30% glass spheres which shall conform to AASHTO M247-81 Type 1. Glass spheres shall have a minimum of 80% true spheres overall.

Top Beads: To provide the required retroreflectivity, the preapplied factory top coating of glass beads shall be a combination of both Federal Spec. Type IV and AASHTO M247-81 Type I beads. Federal Spec. Type IV beads shall be evenly disbursed across the entire surface of the product at a minimum rate of 4 lb. (1.8 kg) per 100 ft^2 (9.3 m^2) and the AASHTO at 3 lb.(1.4 kg) per 100 ft^2 (9.3 m^2). In combination, the total glass bead coverage shall be 7-8 lb. (3.2-3.6 kg) per 100 ft^2 (9.3 m^2). The AASHTO M247-81 Type I beads shall have a minimum of 80% true spheres overall and the Federal Spec. Type IV beads shall be 80% true spheres on the 12 and 14 sieves and shall be no less than 75% true spheres on the remaining sieves.

Retroreflectivity: After satisfactory completion of all striping work and written notification from the contractor, the Department shall test the striping to ensure it has the minimum reflectivity. The testing will be completed within 30 calendar days from notification. Testing will be done using a Delta LTL 2000 Retrometer (30 meter geometry). The required minimum initial reflectivity reading in millicandellas shall be:

White 300
Yellow 200
Blue 200

Skid Resistance: The surface of the preformed retroreflective thermoplastic markings shall provide a pre-appled minimum skid resistance value of 45-51 BPN and a post-applied minimum skid resistance value of 45-55 BPN when tested according to ASTM E303-74.

Thickness: The thickness of the supplied material shall have a minimum average thickness of .090" (90 mils) for all Longitudinal lines and a thickness of .125" (125 mils) for all transverse lines and symbols/legends.

Tensile Strength and Elongation: The preformed retroreflective thermoplastic material shall have a minimum tensile strength of 150 lb. per square inch (1054 kg per square mm) of cross section, at .002" (2.28 mil) thickness, when tested according to ASTM D638-76 except that a sample 6" by 1" (150 mm by 25 mm) shall be tested at a temperature between 70°F and 80°F (21°C and 27°C) using a jaw speed of 10" to 12" (250 mm to 300 mm) per minute. The sample shall have a maximum elongation of 20% at break when tested by this method.

Flexibility: The preformed retroreflective thermoplastic marking material shall have flexibility at 50°F such that when a 1" by 6" (25 mm by 150 mm) sample is bent through an arc of 90 degrees at a uniform rate in 10 seconds (9 degrees per second) over a 1" (25 mm) mandrel, no cracking occurs in the test sample. The sample must be conditioned prior to testing at 50°F±2 degrees (10°C) for a minimum of four hours. At least two specimens tested must meet the flexibility requirements at 50°F (10°C) for a passing result.

Environmental Resistance: The applied markings shall be resistance to deterioration due to exposure to sunlight, water, oil, diesel fuels, gasoline, pavement oil content, salt and adverse weather conditions.

Effective Performance Life: When properly applied, in accordance with manufacturer's instructions, the preformed retroreflective pavement markings shall be neat and durable. The markings shall remain skid resistant and show no lifting, shrinkage, tearing, roll back or other signs of poor adhesion for a period of one winter season.

Oil/grease Resistant Test: The preformed retroreflective thermoplastic material shall not dissolve or smear after rubbing a small amount of motor oil on a small piece of the thermoplastic material for two minutes.

Bond Strength: The material shall exhibit a bond strength to Portland Cement Concrete (PCC) equal or exceed 180 psi when tested at room temperature (73.4±3°F) (23°C) in accordance to ASTM Standard Test Method for Bond Strength of thermoplastic marking Material D4796-88. Place a coarse brick in a 400°F (204°C) oven for 5 minutes. Prepare a 4 square inch test specimen. Place the test specimen on the brick and

further heat in the 400ºF (204ºC) oven for 15 minutes. The test specimen is then allowed to cool to room temperature and prepared for testing.

Low Temperature Cracking (Stress) Resistance for Extended Period: The material shall be tested according to AASHTO T250 Section 7 with Section 7.2.3 modified for and extended cold temperature 15 degrees ±3ºF (-9.4±2ºC) exposure period 72 hours. Any cracking shall constitute failure of the material for PCC road surfaces.

Impact Resistance (Gardner Falling Weight): A 2" by 7.5" (50 by 190 mm) specimen shall be applied on a course concrete brick. Using a Gardner Impact Tester, a 2 lb (.91 kg) weight is dropped from a height of 80" (2032 mm). The specimen when tested at room temperature 73.4±3ºF (23ºC) should show no sign of cracking. (Test procedure is in accordance with ASTM D5420-93).

Packaging: The flexible preformed retroreflective thermoplastic marking materials, for use as transverse or longitudinal markings as well as legends, arrows and symbols shall be available in flat form material or in rolls. Flat material shall be supplied in maximum of 4' (1.2 m) lengths up to 2' (.6 m) in width. The material shall be packed in suitable cartons clearly labeled for ease of identifying the contents.

Construction Methods:

The markings shall be applied in strict accordance with the manufacturer's recommendations on clean and dry surfaces. Marking configurations shall be in accordance with the "Delaware Manual on Uniform Traffic Control Devices, Part 3, Markings."

The preformed retroreflective thermoplastic material shall be fusible to the pavement by means of a propane torch recommended by the manufacturer. Preheating the surface to remove any latent moisture will be done just prior to the placement and installation of the Symbol/ Legend.

No markings shall be placed when the ambient temperature is below 40ºF (4ºC). The material shall be kept in a location above 55ºF (13ºC) until just before application.

The supplier shall provide technical services as may be required.

Method of Measurement:

The quantity of pavement striping (748541-748545) will be measured by the number of linear feet (linear meters) of 4”, 6”, 8”, 12”, or 16” pavement striping line placed and accepted. The quantity of symbol/ legend (748546) will be measured by the number of square feet (meters) of symbol/legend placed and accepted. The quantity of bike symbol, pedestrian symbol, and handicap symbol (748551-748553) will be measured as each placed and accepted. The dimensions for the symbol/legends are as follows:

Bike Rider with Helmet shall be 3’ X 5’.
Pedestrian shall be 4’ X 8’.
Handicap Symbol shall be 40” X 40”.

Basis of Payment:

The quantity of pavement striping payment will be paid for at the Contract unit price per linear foot (linear meter) for 4”, 6”, 8”, 12” and 16” (100 mm, 150 mm, 200 mm, 300 mm, and 400 mm) line. The quantity of symbol/legend will be paid for at the Contract unit price per square foot (meter). The quantity of bike symbol, pedestrian symbol, and handicap symbol will be paid for at the Contract unit price per each. Price and payment shall include cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

Warranty:

The Contractor shall warrant to the Department that the installed retroreflective preformed thermoplastic pavement markings are free of defects, as hereafter defined, for a period of one winter season beginning at the initial acceptance of the marking installation by the Department. The initial acceptance of the marking installation will occur upon the satisfactory correction of all deficiencies noted in the marking installation during the Final Inspection of the project. The markings shall be warranted against failure due to blistering, excessive cracking, bleeding, staining, discoloration, oil content of the pavement materials, smearing and spreading under heat, deterioration due to contact with grease deposits, oil, diesel fuel, or gasoline drippings, chipping, spalling, poor adhesion to the pavement materials, vehicular damage, and wear from normal maintenance activities including snow plowing.

The Contractor shall repair all defective areas identified by the Department after initial installation or during the Warranty Period. All repairs shall begin immediately following the notice to the Contractor by the Department unless weather limitations prevent the corrective work. Should the contractor not commence work within the period stated in the notice, weather permitting, and pending severity, the Department reserves the right to remedy the condition and charge the contractor for the work. Any corrective work shall be as recommended by the manufacturer of the marking material and approved by the Department. The Department shall be given notification before the Contractor begins corrective work to allow for inspection of the operation. All costs associated with the repair work shall be the responsibility of the contractor. These costs shall include, but are not limited to, removal, material, maintenance of traffic, etc.

2/28/09

749532 – SUPPLY OF FLAT SHEET ALUMINUM SIGN PANEL TYPE IX RETROREFLECTIVE SHEETING
749534 – SUPPLY OF EXTRUDED ALUMINUM SIGN PANEL TYPE IX RETROREFLECTIVE SHEETING
749579 - SUPPLY OF FLAT SHEET ALUMINUM SIGN PANEL,TYPE XI RETROREFLECTIVE SHEETING
749580 - SUPPLY OF EXTRUDED ALUMINUM SIGN PANEL, TYPE XI RETROREFLECTIVE SHEETING

Description:

This work shall include fabrication and furnishing new sign panels constructed of either flat sheet aluminum panels OR extruded aluminum sign panels as specified in the job order. Supply of sign overlays will be part of flat sheet aluminum panels. The sign panels shall have a reflective sheeting background, and all complete with demountable copy or direct applied or silk screened copy. Included with the sign panel will be connections to supports, and other incidentals shown on the Plans or as described in the special provisions. Installation of flat sheet aluminum panels and extruded aluminum panels are paid for under other items in this contract.

The removing and transporting of the existing sign panels before fabricating and erecting new sign panels, if such requirement is specified shall be paid for under other items in this contract.

Design:

Sign panels and their connections to supports shall be designed for applicable loadings and allowable stresses specified for supports. All panels, stiffeners and subframing shall conform with any pertinent requirements set forth in the 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals" with subsequent revisions. No method of stiffening will be allowed which would require rivets, bolts, screws, or nuts perforating the message face. The Contractor shall submit working drawings showing the details for fabrications of the panels and support connections for prior approval.

Sign panel sections shall be fabricated of standard width, readily available, aluminum sheets not less than 3'-0" wide and not more than 5'-6" wide, except that not more than one sheet of 2'-0" minimum width will be permitted.

Sections 12 feet and under: Sign panel sections including those twelve (12) feet in height shall run from the top edge to the bottom edge of the sign face without horizontal joints in the aluminum sheets.

Sections 12 feet and Over: Sign panel sections over twelve (12) feet in height shall be fabricated of two or more sheets with horizontal joints which butt and fasten securely together and may be disassembled for simplified handling and erection in the field. Each horizontal joint in sign panel sheets shall be located at point of contraflexure in the sign face.

Fasteners and Backing Strips: Sign panel sections shall be provided with suitable fastenings, as shown on the Plans, to permit easy attachment to the supporting frames and these fastenings shall be so designed as to carry the full design load with a factor of safety of 1.6 against the minimum yield stress of the materials.

Sign panel sections shall be provided with backing strips at the joints, held firmly in place to keep the abutting panel sections in proper alignment. All sign panel fastenings and backing strips, accepting the fastening of letters, symbols and border to the sign face, shall be applied without causing visible projections or indentations of the sign face. Each sign panel section shall be designed to engage and hang from two or more horizontal structural members of the supporting frame. The method of fastening to obtain secure close butt joints between panels may vary as recommended by the fabricator. Shop drawings will be required showing proposed method of attachment for approval of the Engineer.

Supporting Frame: The supporting sign frame shall consist of horizontal and vertical stringers as shown on the plans. The horizontal members of the supporting sign frame shall be fabricated of new material in one piece. Where large signs necessitate splicing the stringers, such splices shall be located at points of contraflexure and shall be held to a minimum, but splice must develop full section of member.

Sign Panel Size: Sizes of sign panels having demountable copy shall be based on the manufacturer's spacing charts. All letters shall be placed in accordance with manufacturer's spacing charts. Overall horizontal and vertical dimensions shall be in six-inch increments.

Materials:

Aluminum Flat Sheet Panels: Sign panels shall be of aluminum sheet type conforming to ASTM Designation B209 (alloy 6061-T6 or 5052-H38). The minimum panel sheet thickness shall be 0.125 inches. Stringers or horizontal structural sign supporting members and vertical connections shall be fabricated of 6061-T6 or 6062-T6 ASTM B221 aluminum alloy. All sign panels shall be fully reflectorized unless otherwise indicated on the Plans.

All sign hardware shall be stainless steel or galvanized steel or 2024-T4 aluminum alloy ASTM B211 or ASTM B221. Hardware for attachment to overhead members shall be Type 304 passivated stainless steel, except that stainless steel lock washers shall be Type 302 stainless steel alloy. Connections to the sign support structure shall be of steel conforming to the requirements of ASTM Designation A36 and galvanized to the requirements of ASTM Designation A123.

Extruded Aluminum Sign Panels: Extruded aluminum sign panels and edge strips shall conform to B 221, alloy 6063 T6. (See Extruded Aluminum Detail Sheets)

Hardware: Hardware shall be clear anodized, conforming to one of the following: ASTM B 209, alloy 2024 T4; B 211, alloy 2024 T4, 6262 T9, 6061 T6, 7075 T6 or 2017 T4.

Sheeting: The sheeting shall consist of prismatic lens elements with a distinctive interlocking pattern visible from the face of a smooth surface, unless otherwise specified on the plans. The sheeting shall have a precoated adhesive protected by an easily removable liner.

Retroreflective properties will be measured in:

Minimum Coefficient of Retroreflection Ra
(cd/lux/m^2)

- All measurements shall be made after sign cleaning according to sheeting manufacturer's recommendations.
- The coefficients of retroreflection observation angles shall be 0.2°, 0.5°, 1.0°.
- The coefficients of retroreflection entrance angles shall be -4° and 30°.

Letter of Certification

The contractor shall send a letter of certification stating that the sign sheeting materials meet the required Minimum Coefficient of Retroreflection described in the charts below. The letter shall be sent to:

Delaware Department of Transportation
Signs and Markings Section
Attn: Traffic Operations Manager
P.O. Box 778
Dover, Delaware 19901

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.

Type IX Retro-Reflective Sheeting

White	-4	30
0.2	380	215
0.5	240	135
1	80	45

Blue	-4	30
0.2	17	10
0.5	11	6
1	3.6	2

Yellow	-4	30
0.2	285	162
0.5	180	100
1	60	34

FYG	-4	30
0.2	300	170
0.5	190	110
1	64	36

Red	-4	30
0.2	76	43
0.5	48	27
1	16	9

FY	-4	30
0.2	230	130
0.5	145	81
1	48	27

Green	-4	30
0.2	38	22
0.5	24	14
1	8	4.5

FO	-4	30
0.2	115	65
0.5	72	41
1	24	14

Type XI Retro-Reflective Sheeting

White	-4	30
0.2	570	215
0.5	400	150
1	120	45

Blue	-4	30
0.2	26	10
0.5	18	6.8
1	5	2

Yellow	-4	30
0.2	425	160
0.5	300	11
1	90	34

FYG	-4	30
0.2	455	170
0.5	320	120
1	96	36

Red	-4	30
0.2	87	33
0.5	63	23
1	18	7

FY	-4	30
0.2	340	130
0.5	240	90
1	72	27

Green	-4	30
0.2	57	21
0.5	40	15
1	12	4.5

FO	-4	30
0.2	170	64
0.5	120	45
1	36	14

Sheeting Manufacturer's Replacement Obligation:

Standard Colors 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 period listed below.

80% of the values listed in the tables for 12 years.

Non-reflective black material that is used on the signs will carry the same warranty period and replacement obligation. This material will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that it is visibly cracked or has experienced shrinkage of more than a 1/8" from the edge of the metal it is applied.

For temporary signing, fluorescent orange, where it can be shown that the retroreflective sheeting fails to conform to the performance requirements of this section, the sheeting manufacturer shall cover restoration costs as follows for sheeting shown to be unsatisfactory during the period listed below.

80% of the values listed in the tables for 3 years.

The remedy to any failure will be:

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.

Government Obligation

The agency shall be responsible for requiring the dating of all signs at the time of application. That date constitutes the start of the field performance obligation period.

All measurements shall be made after sign cleaning according to the sheeting manufacturer's recommendations.

Natural causes include effects of exposure to weather. Natural causes exclude (without limitation) damage from exposure to chemicals, abrasion and other mechanical damage (such as from fasteners used to mount the sign, collisions or mishandling), vandalism, or malicious mischief.

Applicable Documents

The following documents, of the issues in effect on the date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

ASTM Standards

D 4956 Standard Specification for Retroreflective Sheeting for Traffic Control

E 810 Standard Test Method for Coefficient of Retroreflection of Retroflective Sheeting

AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals

Construction Methods:

Sign Face Finishing: All reflective sheeting, backgrounds, letters, numerals, symbols, and borders shall be clean-cut and sharp, and the messages on all signs shall be as indicated on the plans. Application of reflective sheeting to aluminum panels shall be in accordance with sheeting manufacturer's recommendations. Reflective sheeting shall be color matched and marked. The height of characters and the alphabet series to be employed for the signs shall conform to the Plans and their references. The alphabet series used on the sign panels shall conform to the Plans and the "Standard Alphabets for 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.

Sheeting applications shall meet ambient temperature requirements as specified by the manufacturer.

Whenever it is necessary to construct the background of a sign face with two or more pieces of reflective sheeting, they must be carefully matched for color prior to application and sign fabrication, to provide uniform appearance and brilliance, day and night. Each full width section of reflective sheeting mounted adjacent to another full width section taken consecutively from the same roll shall be rotated and mounted 180 degrees with respect to that adjacent section. This rule shall also be observed as a guide when partial width sheets of reflective sheeting are used.

Non-conformance may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting which will render signs unacceptable. The entire background of each sign shall be uniform in color, brilliance, texture, and general appearance as seen in the daytime and under typical automobile illumination at night. No more sections of reflective sheeting shall be used for backgrounds than is necessary; remnants, scraps, and odd sized pieces of sheeting shall not be used in the fabrication of any signs manufactured for this contract. Joints between reflective sheeting sections shall either butt or overlap no more than 3/8 of an inch.

Transporting Sign Panel: 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.

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 is to be measured as the square footage of front sign face installed for the type and sheeting grade specified under this item complete 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 working drawings, (verified by field measurements). All sign panels will be considered either square or rectangular in shape, as the case may be, and no area deductions will be made for rounding corners.

Basis of Payment:

The quantity of sign panels will be paid for at the unit price per square foot for the type and sheeting grade specified. Price and payment shall constitute full compensation for furnishing, fabricating, and delivering sign panels complete in place and accepted, with reflective materials, copy, symbols, borders, connections to supports, degreasing, etching, and for all labor, materials, tools, equipment, and incidentals required to complete the item.

12/12/2012

749687 – INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON SINGLE SIGN POST

Description:

This work consists of installing or removing traffic sign(s) on a single post at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in boring holes constructed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than or equal to 48 inches shall be installed on multiple sign posts under Item 749690 – Installation or Removal of Traffic Sign on Multiple Sign Posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the DelDOT MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

Method of Measurement:

The number of single sign installations or removals will be measured as the actual number of sign posts installed or removed and accepted.

Basis of Payment:

The quantity of single sign post installations or removals will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed in accordance with the DelDOT MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

2/2/11

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

Description:

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

Materials:

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

Construction Methods:

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

Method of Measurement:

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

Basis of Payment:

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

Note:

The cost for installing holes and PVC sleeves for sign posts in newly constructed P.C.C. islands, medians, or sidewalks shall be incidental to the P.C.C. item.

3/23/09

749690 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON MULTIPLE SIGN POSTS

Description:

This work consists of installing or removing traffic sign(s) on multiple sign posts at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in holes installed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than 48 inches shall be mounted on two (2) posts. Signs with a length greater than or equal to 78 inches shall be mounted on three (3) sign posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the DelDOT MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

Method of Measurement:

The number of sign installations or removals will be measured as the total square foot of the sign(s) installed or removed and accepted.

Basis of Payment:

The quantity of sign installations or removals will be paid for at the Contract unit price per square foot. Price and Payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed accordance with the DelDOT MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

2/2/11

753515 - INSTALLING SANITARY SEWER FORCE MAIN, 2" PVC

Description:

This work consists of furnishing all materials and constructing a 2" PVC Sanitary Sewer Force Main, partially encased, in accordance with the locations, details, notes shown on the Plans, and/or as directed by the Engineer.

Materials:

2" PVC Schedule 40 pipe with solvent welded joints shall conform to the requirements of ASTM D 1785.

4" Ductile Iron pipe casing shall conform to the requirements of ASTM A 756.

Construction Methods:

The Contractor shall minimize the length of service outage for sanitary facilities at the toll plaza administration building. The work procedure shall be as follows:

- Prior to the outage, the contractor shall coordinate with the Toll Plaza Manager;
- Temporary restroom and hand sanitation facilities shall be provided during the outage;
- The PVC pipe, fittings, and DIP casings shall be placed, just short of the connections.
- The pipe shall be tested in accordance with the procedure outlined in this specification prior to the outage.
- After completion of tests and beginning of outage, the existing pipe shall be emptied by the contractor and waste material property disposed of.
- Connections shall then be made immediately. Sanitary service shall be restored to the Toll Plaza Administration Building as quickly as possible. The constructor shall ensure solvent welded joints will provide adequate restraint before pressurizing the pipeline.

All joints, including attachment to the existing pipe, shall be watertight. The subgrade and bedding shall be well compacted and all compaction over the un-encased portion of the pipe shall be hand compaction in accordance with applicable state law. Green metallic tape shall be placed per the contract plans continuously along the pipe. The tape shall be a minimum of 2" wide and shall have the message "Caution - Sewer Line Below". Insulated solid copper (#14 AWG, 600 volt) green pipeline detectable wire of not less than 98% conductivity, conforming to ASTM B.58, shall be installed continuously along the pipe.

The 2" PVC force main shall be subjected to a pressure test and a leakage test.

Pressure Test - After backfilling has been completed, the newly laid pipe, just short of the connections to the existing force main, shall be subject to a hydrostatic pressure test of 150 psi for a duration of two hours with the pressure measured at the highest elevation on the line. The test pressure shall be applied by means of a Contractor provided pump connected to the pipe in a manner satisfactory to the Owner. Before applying the test pressure, all air shall be expelled from the pipe. The Contractor shall install corporation stops at high points so the air can be expelled.

Leakage Test - The leakage test shall be conducted after the pressure test but before connections are made. The Contractor shall furnish all equipment for testing, including gauge, measuring device, pump and pipe connections. Leakage is the water that must be supplied into the pipe to maintain 100 psi, measured at the highest elevation. After the pipe has been filled with water and all air expressed, the allowable leakage shall be not more than 25 gallons per inch diameter of pipe per mile of pipe tested per 24 hours. Leakage test shall be carried out for not less than a four hour duration.

Failure of the line to pass either test shall be cause for the Contractor to perform the necessary repairs and retest the line until it passes both tests. All tests shall be conducted in the presence of the Owner.

Method of Measurement:

The quantity of 2" PVC Sanitary Sewer Force Main shall not be measured but shall be paid as a Lump Sum.

Basis of Payment:

The 2" PVC Sanitary Force Main will be paid for at the Contract lump sum. Price and payment will constitute full compensation for all materials, fittings, and attachments, casing, temporary restroom facilities; excavation, bedding, vacating of existing pipe, and testing, complete in place and accepted, and for all labor, equipment, tools and incidentals necessary to complete the work.

Type C Backfill will be paid for under Item 209003 - Type C Borrow.

11/17/15

763501 - CONSTRUCTION ENGINEERING

1) **Description:**

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

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

The Engineer will only establish the following:

(a) Original and final cross-sections for borrow pits.
(b) Final cross-sections: Top and bottom pay limit elevations for all excavation bid items that are not field measured by Construction inspection personnel. The Contractor shall notify the Engineer when these pay limit elevations are ready and allow for a minimum of two calendar days for the Engineer to obtain the information.
(c) Line and grade for extra work added on to the project plans.

2) Equipment. The Contractor shall use adequate equipment/instruments in a good working order. He/she shall provide written certification that the equipment/instrument has been calibrated and is within manufacturer's tolerance. The certification shall be dated a maximum of 9 months before the start of construction. The Contractor shall renew the certification a minimum of every 9 months. The equipment/instrument shall have a minimum measuring accuracy of [3mm+2ppmxD] and an angle accuracy of up to 2.0 arc seconds or 0.6 milligons. If the Contractor chooses to use GPS technology in construction stakeout, the Contractor shall provide the Engineer with a GPS rover and Automatic Level for the duration of the contract. The GPS rover shall be in good working condition and of similar make and model used by the Contractor. The Contractor shall provide up to 8 hours of formal training on the Contractor's GPS system to a maximum of four Engineer's appointees (DELDOT Construction Inspectors). At the end of the contract, the Engineer will return the GPS rover to the Contractor. If any of the equipment/instruments are found to be out of adjustment or inadequate to perform its function, such instrument or equipment shall be immediately replaced by the Contractor to the satisfaction of the Engineer. Choosing to use GPS technology does not give the contractor authority to use machine control.- Construction Engineering (GPS) Machine Control Grading shall only be used if noted in the General Notes in the plan set outlining the available files that will be provided to the Contractor and "the Release for delivery of documents in electronic form to a contractor" are signed by all parties prior to delivery of any electronic files. Only files designated in the General Notes shall be provided to the contractor. If machine control grading is allowed on the project see the "machine control" section of this specification. GPS technology and machine control technology shall not be used in the construction of bridges.

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

Construction Methods:

4) Performance Requirements:

(a) Construction Engineering shall include establishing the survey points and survey centerlines; finding, referencing, offsetting the project control points; running a horizontal and vertical circuit to verify the precision of given control points. Establishing plan coordinates and elevation marks for culverts, slopes, subbase, subsurface drains, paving, subgrade, retaining walls, and any other stakes required for control lines and grades; and setting vertical control elevations, such as footings, caps, bridge seats and deck screed. The Contractor shall be responsible for the preservation of the Department's project control points and benchmarks. The Contractor shall establish and preserve any temporary control points (traverse points or benchmarks) needed for construction. Any project control points (traverse points) or benchmarks conflicting with construction of the project shall be relocated by the Contractor. The Contractor as directed by the Engineer must replace any or all stakes that are destroyed at any time during the life of the contract. The Contractor shall re-establish centerline points and stationing prior to final cross-sections by the Engineer. The Vertical Control error of closure shall not exceed 0.035 ft times [Square root of number of miles in the level run] (0.01 m times. The Horizontal Control precision ratio shall have a minimum precision of 1:20,000 feet of distance traversed prior to adjustment.

(b) The Contractor shall perform construction centerline layout of all roadways, ramps and connections, etc. from project control points set by the Engineer. The Contractor using the profiles and typical sections provided in the plans shall calculate proposed grades at the edge of pavement or verify information shown on Grades and Geometric sheets.

(c) The Contractor shall advise the Engineer of any horizontal or vertical alignment revisions needed to establish smooth transitions to existing facilities. The Contractor must immediately bring to the attention of the Engineer any potential drainage problem within the project limits. The Engineer must approve any proposed variation in profile, width or cross slope.

(d) The Contractor shall establish the working points, centerlines of bearings on bridge abutments and on piers, mark the location of anchor bolts to be installed, check the elevation of bearing surfaces before and after they are ground and set anchor bolts at their exact elevation and alignment as per Contract Plans. Before completion of the fabrication of beams for bridge superstructures, the Contractor shall verify by accurate field measurements the locations both vertically and horizontally of all bearings and shall assume full responsibility for fabricated beams fitting and bearing as constructed. After beam erection and concurrently with the Department project surveyors or their designated representative, the Contractor shall survey top of beam elevations at a maximum of 10-ft stations and compute screed grades. These shall be submitted to the Engineer for review and approval before the stay in place forms are set. Construction stakes and other reference control marks shall be set at sufficiently frequent intervals to assure that all components of the structure are constructed in accordance with the lines and grades shown on the plans. The Contractor will be responsible for all structure alignment control, grade control and all necessary calculations to establish and set these controls.

(e) The Contractor, using contract plans, shall investigate proposed construction for possible conflicts with existing and proposed utilities. The Contractor shall then report such conflicts to the Engineer for resolution. All stakes for utility relocations, which will be performed by others, after the Notice to Proceed has been given to the Contractor, shall be paid for under item 763597 - Utility Construction Engineering.

(f) The Contractor shall be responsible for the staking of all sidewalk and curb ramp grades in accordance with the plans and the Departments Standard Construction Details. The Contractor shall review the stakeout with the Engineer prior to construction. The Engineer must approve any deviation from plans, Department Standard Construction Details and Specifications in writing. The Contractor shall be responsible for any corrective actions resulting from problems created by adjustments if they fail to obtain such approval.

(g) If wetland areas are involved and specifically defined on the Plans the following shall apply:

i. It is the intent of these provisions to alert the Contractor, that he/she shall not damage or destroy wetland areas, which exist beyond the construction limits. These provisions will be strictly enforced and the Contractor shall advise his/her personnel and those of any Subcontractor of the importance of these provisions.

ii. All clearing operations and delineation of wetlands areas shall be performed in accordance with these Special Provisions. Before any clearing operation commences the Contractor shall demarcate wetlands at the Limits of Construction throughout the entire project as shown on the Plans labeled as Limits of Construction or Wetland Delineation to the satisfaction of the Engineer.

iii. The material to be used for flagging the limits of construction shall be orange vinyl material with the wording "Wetland Boundary" printed thereon. In wooded areas, the flagging shall be tied on the trees, at approximate 20-foot intervals through wetland areas. In open field and yard areas that have been identified as wetlands, 3 foot wooden grade stakes shall be driven into the ground at approximate 20 foot intervals and tied with the flagging.

iv. If the flagging has been destroyed and the Engineer determines that its use is still required, the Contractor shall reflag the area at no cost to the Department. If the Contractor, after notification by the Engineer that replacement flagging is needed, does not replace the destroyed flagging within 48 hours, the Engineer may proceed to have the area reflagged. The cost of the reflagging by the Engineer will be charged to the Contractor and deducted from any monies due under the Contract.

v. At the completion of construction, the Contractor shall remove all stakes and flagging.

vi. The Contractor shall be responsible for any damages to wetlands located beyond the construction limits, which occurs from his/her operations during the life of the Contract. The Contractor shall restore all temporarily disturbed wetland areas to their preconstruction conditions. This includes restoring bank elevations, streambed and wetland surface contours and wetlands vegetation disturbed or destroyed. The expense for this restoration shall be borne solely by the Contractor.

(h) Whenever the Engineer will be recording data for establishment of pay limits, the Contractor will be invited to obtain the data jointly with the Engineer's Survey Crew(s) in order to agree with the information. If the Contractor's representative is not able to obtain the same data, then the information obtained by the Engineer shall be considered the information to be used in computing the quantities in question.

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

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

(a) Proposed method of recording information in field books to ensure clarity and adequacy.

(b) A printout of horizontal control verification, as well as coordinates, differences and error of closure for all reestablished or temporary Control Points.

(c) A printout of vertical control verification, with benchmark location elevation and differences from plan elevation.

(d) Sketch of location of newly referenced horizontal control, with text printout of coordinates, method of reference and field notes associated with referencing control - traverse closure report.

(e) Description of newly established benchmarks with location, elevation and closed loop survey field notes - bench closure report

(f) All updated electronic and manuscript survey records.
(g) Stakeout plan for each structure and culvert.
(h) Computations for buildups over beams, screed grades and overhang form elevations.
(i) A report showing differences between supplied baseline coordinates and field obtained coordinates, including a list of preliminary input data.
(j) Any proposed plan alteration to rectify a construction stakeout error, including design calculations, narrative and sealed drawings.
(k) Baseline for each borrows pit location.
(l) Detailed sketch of proposed overhead ground mounted signs or signals showing obstructions that may interfere with their installation.
(m) Copies of cut sheets.

Machine Control Grading

This Section of the specification shall only be used if machine control is authorized for use on the project.

Description:

This specification contains the requirements for grading operations utilizing Global Positioning Systems (GPS).

Use of this procedure and equipment is intended for grading the subgrade surface; it is not intended for the use in constructing final surface grades.

The Contractor may use any manufacturer's GPS machine control equipment and system that results in achieving the grading requirements outlined in section 202 of the standard specifications. The Contractor shall convert the electronic data provided by the Department into the format required by their system. The Department will only provide the information outlined in this document and no additional electronic data will be provided.

The Contractor shall perform at least one 500 foot test section with the selected GPS system to demonstrate that the Contractor has the capabilities, knowledge, equipment, and experience to properly operate the system and meet acceptable tolerances. The engineer will evaluate and make the determination as to whether additional 500 foot test sections are required. If the Contractor fails to demonstrate this ability to the satisfaction of the Department, the Contractor shall construct the project using conventional surveying and staking methods.

Materials:

All equipment required to perform GPS machine control grading, including equipment needed by DelDOT to verify the work, shall be provided by the Contractor and shall be able to generate end results that are in accordance with the requirements of Division 200 - EARTHWORK of the Standard Specifications.

Construction:

a. DelDOT Responsibilities:

1. The Department will set initial vertical and horizontal control points in the field for the project as indicated in the contract documents, (plans set). If the Contractor needs to establish new control points they shall be traversed from existing control points and verified to be accurate by conventional surveying techniques.

2. The Department will provide the project specific localized coordinate system.

3. The Department will provide data in an electronic format to the Contractor as indicated in the General Notes.

   a. The information provided shall not be considered a representation of actual conditions to be encountered during construction. Furnishing this information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered including, but not limited to site visits, and basing the bid on information obtained from these investigations, and the professional interpretations and judgments of the Contractor. The Contractor shall assume the risk of error if the information is used for any purpose for which the information is not intended.

   b. Any assumption the Contractor makes from this electronic information shall be at their risk. If the Contractor chooses to develop their own digital terrain model the Contractor shall be fully responsible for all cost, liability, accuracy and delays.

   c. The Department will develop and provide electronic data to the Contractor for their use as part of the contract documents in a format as indicated in the General Notes. The Contractor shall independently ensure that the electronic data will function in their machine control grading system.

4. The Files that are provided were originally created with the computer software applications MicroStation (CADD software) and INROADS (civil engineering software). The data files will be provided in the native formats and other software formats described below. The contractor shall perform necessary conversion of the files for their selected grade control equipment. The Department will furnish the Contractor with the following electronic files:

   a. CAD files
      i. Inroads -Existing digital terrain model (.DTM)
      ii. Inroads -Proposed digital terrain model (.DTM)
      iii. Microstation -Proposed surface elements - triangles

   b. Alignment Data Files:
      i. ASCII Format

5. The Engineer shall perform spot checks of the Contractor's machine control grading results, surveying calculations, records, field procedures, and actual staking. If the Engineer determines that the work is not being performed in a manner that will assure accurate results, the Engineer may order the Contractor to redo such work to the requirements of the contract documents, and in addition, may require the Contractor to use conventional surveying and staking, both at no additional cost to the Department.

B. Contractor's Responsibilities

1. The Contractor shall provide the Engineer with a GPS rover and Automatic Level, for use during the duration of the contract. At the end of the contract, the GPS rover and Automatic Level will be returned to the Contractor. The Contractor shall provide a total of 8 hours of formal training on the Contractor's GPS machine control system to the Engineer and up to three additional Department appointees per rover.

2. The Contractor shall review and apply the data provided by the Department to perform GPS machine control grading.

3. The Contractor shall bear all costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to application of GPS machine control grading techniques. Grade elevation errors and associated corrections including quantity adjustments resulting from the contractor's use of GPS machine control shall be at no cost to the Department.

4. The Contractor shall convert the electronic data provided by the Department into a format compatible with their system.

5. The Contractor's manipulation of the electronic data provided by the Department shall be performed at their own risk.

6. The Contractor shall check and if necessary, recalibrate their GPS machine control system at the beginning of each workday in accordance with the manufacturer's recommendations, or more frequently as needed to meet the requirements of the project.

7. The Contractor shall meet the accuracy requirements as detailed in the Standard Specifications.

8. The Contractor shall establish secondary control points at appropriate intervals and at locations along the length of the project. These points shall be outside the project limits and/or where work is performed. These points shall be at intervals not to exceed 1000 feet. The horizontal position of these points shall be determined by conventional survey traverse and adjustments from the original baseline control points. The conventional traverse shall meet or exceed the Department's Standards. The elevation of these control points shall be established using differential leveling from the project benchmarks, forming a closed loop. A copy of all new control point information including closure report shall be provided and approved by the Engineer prior to construction activities. The Contractor shall be responsible for all errors resulting from their efforts and shall correct deficiencies to the satisfaction of the Engineer and at no additional cost to the Department.

9. The Contractor shall provide stakes at all alignment control points, at every 500 foot stationing, and where required for coordination activities involving environmental agencies and utility companies at the Contractor's expense. Work that is done solely for utility companies and that is beyond the work performed under item 763501 - Construction shall follow and be paid for under item 763597 -Utility Construction Engineering.

10. The Contractor shall at a minimum set hubs at the top of finished grade at all hinge points on the cross section at 500 foot intervals on the main line and at least 4 cross sections on side roads and ramps as directed by the engineer or as shown on the plans. Placement of a minimum of 4 control points outside the limits of disturbance for the excavation of borrow pits, Stormwater Management Ponds, wetland mitigation sites etc. These control points shall be established using conventional survey methods for use by the Engineer to check the accuracy of the construction.

11. The Contractor shall preserve all reference points and monuments that are identified and established by the Engineer for the project. If the Contractor fails to preserve these items the Contractor shall reestablish them at no additional cost to the Department.

12. The Contractor shall provide control points and conventional grades stakes at critical points such as, but not limited to, PC's, PT's, superelevation points, and other critical points required for the construction of drainage and roadway structures.

13. No less than 2 weeks before the scheduled preconstruction meeting, the Contractor shall submit to the Engineer for review a written machine control grading work plan which shall include the equipment type, control software manufacturer and version, and proposed location of the local GPS base station used for broadcasting differential correction data to rover units.

14. The Contractor shall follow the guidelines set forth in the "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques" and follow a minimum of Second Order Class 1, (2-I) classification standards.

Automated equipment operations have a high reliance on accurate control networks from which to take measurements, establish positions, and verify locations and features. Therefore, a strong contract control network in the field which is the same or is strongly integrated with the project control used during the design

of the contract is essential to the successful use of this technology with the proposed Digital Terrain Model (DTM). Consistent and well designed site calibration for all machine control operations (as described below under *Contract Control Plan*) are required to ensure the quality of the contract deliverables. The Contract Control Plan is intended to document which horizontal and vertical control will be held for these operations. Continued incorporation of the Base Station(s) as identified in the Contract Control Plan is essential to maintaining the integrity of positional locations and elevations of features. The Contract Control Plan shall be submitted to the Department for review and approval by the Departments Survey Section 3 weeks prior to the start of any machine control work. The Contractor shall operate and maintain all elements of the Machine Grade Control continuously once the operations begin until otherwise approved by the Engineer.

Contract Control Plan:

The Contractor shall develop and submit a Contract Control Plan for all contracts which use Machine Control Grading. Contract control includes all primary and secondary horizontal and vertical control which will be used for the construction contract. Upon the Contractor's completion of the initial survey reconnaissance and control verification, but prior to beginning primary field operations, the Contractor shall submit a Contract Control Plan document (signed and sealed by the Delaware licensed Land Surveyor or Delaware Professional Engineer who oversees its preparation) for acceptance by the Engineer, which shall include the following:

1. A control network diagram of all existing horizontal and vertical control recovered in the field as contract control.

2. Include a summary of the calculated closures of the existing control network, and which control has been determined to have been disturbed or out of tolerance from its original positioning.

3. An explanation of which horizontal and vertical control points will be held for construction purposes. If necessary include all adjustments which may have been made to achieve required closures.

4. An explanation of what horizontal and vertical control (including base stations) was set to accomplish the required stakeout or automated machine operation. Include how the position of these new control points was determined.

5. Describe the proposed method and technique (technology and quality control) for utilizing the control to establish the existing and/or proposed feature location and to verify the completed feature location and/or measured quantity.

6. A listing of the horizontal and vertical datums to be used and the combined factor to be used to account for ellipsoidal reduction factor and grid scale factor.

7. If the Contractor chooses to use machine control as a method of measuring and controlling excavation, fill, material placement or grading operations as a method of measuring and controlling excavation, fill, material placement or grading operations, the Contractor Control Plan shall include the method by which the automated machine guidance system will initially be site calibrated to both the horizontal and vertical contract control, and shall describe the method and frequency of the calibration to ensure consistent positional results.

8. Issues with equipment including inconsistent satellite reception of signals to operate the GPS machine control system will not result in adjustment to the "Basis of Payment" for any construction items or be justification for granting contract time extension.

Method of Measurement:

The quantity of Construction Engineering will not be measured.

Basis of Payment:

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

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

3/27/15

763503 - TRAINEE

Description:

The item shall consist of providing training in the construction crafts in accordance with the requirements stated in the General Notices of this proposal under the Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246).

Basis of Payment:

The payment for the item shall be made at a fixed rate of $.80 per hour toward the hourly rate of the trainee.

5/2/02

763508 - PROJECT CONTROL SYSTEM DEVELOPMENT PLAN
763509 - CPM SCHEDULE UPDATES AND/OR REVISED UPDATES

Description:

The Contractor Shall plan, schedule and construct the Project by using a Critical Path Method Project Schedule (CPM) meeting the requirements of these specifications. Use the CPM for coordinating and monitoring the Work specified in the Contract Documents including all activities of Subcontractors, vendors, suppliers, utilities, railroads, the Department, and all other parties associated with the construction of the Contract. Include all Work in the CPM; including but not limited to submittals, major procurement, delivery, and construction activities. Include all activities, including bid items, quantified in the Contract Documents. Base the CPM upon the entirety of the Contract Documents. Utilize CPM software that generates files compatible with Primavera P6 Project Management Release: 7.0.0.

Scheduling Representative:

Designate a scheduling representative prior to submission of the Original Critical Path Method Project Schedule (OCPM). The scheduling representative is the person primarily responsible for development and maintenance of the CPM schedule; the Contractor's representative in all matters regarding the schedule; and the Contractor's designated attendee for all schedule related meetings. The scheduling representative shall also be knowledgeable of the status of all parts of the Work throughout the duration of the Project. Replacement of the scheduling representative will require written approval from the Engineer.

Submit the qualifications of the scheduling representative to the Engineer for approval. This approval is required before the OCPM will be accepted. The scheduling representative shall have at least three years of verifiable experience for preparing and maintaining CPM project schedules on Contracts of similar size and complexity.

Critical Path, Project Completion Date, and Float:

The critical path is defined as the series of activities in a CPM that has the longest path in time. The submitted activity sequence and durations must generate a CPM with only one critical path. Divide Project wide activities such as Maintenance of Traffic, Construction Engineering, or Temporary Erosion Control that, by their nature, generate long durations and complement other activities into "establish" and "conclude" activities to prevent this type of Work from occupying a significant portion of the critical path.

The project start date, or initial data date, of the original CPM shall be the first chargeable day of Work. Nonproductive Work and administrative activities may begin and/or end prior to the project start date. The Original CPM must use all of the Contract Time and contain a critical path containing exactly zero float. Early completion schedules are not permitted. The schedule ending date of the Original CPM that uses all of the Project Time is the contract completion date.

Total Float is the difference between the schedule's finish date and the contract completion date. Free float is the difference in time between an activity's early finish and late finish. Free float is a shared commodity for the use of the Department and the Contractor and is not for the exclusive use or benefit of either party. Both parties have the full use of free float until depleted.

Submittal of the OCPM; the Start of Work and the Schedule of Record:

Complete and submit the proposed original CPM schedule (OCPM) database and the written narrative (WN) within 30 calendar days after Contract is Awarded. The WN is a description of any elements of the Schedule that deviate from the proposed construction sequence shown in the Contract Documents. Submit the OCPM in CPM format fully compatible with Primavera P6 Project Management Release: 7.0.0 by email or CD ROM as a single compressed database in CPM format.

The Engineer will complete the review of the OCPM within 30 calendar days after submittal. If required, a Joint Review Conference will be convened at which time the Engineer and Contractor may make corrections and adjustments to the proposed OCPM. If a revision is necessary due to the Engineer's review or the Joint Review Conference, submit the proposed revision within seven calendar days after receiving the Engineer's review comments or within seven calendar days after the date of the Joint Review Conference, whichever is the latest. Make revisions in accordance with the requirements for the OCPM. The Engineer will respond to the revised OCPM within seven calendar days after receipt. Clearly identify each submittal and resubmittal for clarity by labeling "2nd Draft", "3rd Draft", etc.

Do not start any Work until the OCPM is accepted. If the Engineer is ready to issue a Notice to Proceed but the OCPM is not yet accepted, the Engineer may issue the NTP and start Contract Time, but forbid Work to begin until the OCPM is accepted. The Engineer may partially accept a OCPM and allow Work to begin if the required corrections to the OCPM are minor, but the Engineer will not accept submittals that do not show the complete schedule. The Engineer will not pay any estimates until the OCPM is partially accepted. Once the OCPM is partially accepted, the Engineer will pay the first estimate. If the Contractor fails to make a good faith effort to address the Engineer's comments before the second estimate is due for payment, the Engineer will not pay the second estimate until a good faith effort is made by the Contractor to comply. The Engineer may not withhold an estimate payment if, within the estimate period in question, the Engineer has failed to provide timely review comments in response to the Contractor's submittal. The Engineer may, however, withhold the payment of subsequent estimates if the Contractor fails to make a good faith effort to address the Engineer's comments. Upon issuance of the Notice to Proceed, the start date utilized in the OCPM will be adjusted to comply with the first chargeable day of Work. Any delay in starting Work caused by the acceptance of the OCPM by the Engineer will not be considered as a basis for any adjustment in the Contract amount or time. For Contracts that have fast-tracked starts, the Engineer and the Contractor may agree to alter the response times and approval dates listed above.
Upon notification that the OCPM has been accepted, the corrected copy will become the CPM of record. The CPM of record shall be the Contractor's work plan for completing the entire Contract as specified in the Contract Documents.

Requirements for the OCPM:

The format of the OCPM database shall be the precedence diagram method with days as the planning unit and shall be based on Calendar Days. Use the Department's partially predetermined coding structure (CS) that is furnished by the Engineer.

Activity Sequencing. Activity sequence must be logical and representative of the Contractor's order of the Work. Successors and predecessors determine the schedule logic or activity sequence. A given activity cannot start until all of the given activity's predecessors have been completed. Use only finish to start dependency relationships (links); do not use lag times without approval from the Engineer. The Engineer may request that the Contractor resequence the activities to reflect realistic job logic. When scheduling using multiple resources, each resource unit shall have a corresponding activity. Durations of activities include all the time necessary to complete the activity including, but not limited to, Contractor's non-work periods (other than those shown on the calendars), reasonably foreseeable inclement weather, weekends and holidays. Base schedule calculations on retained logic, contiguous durations, and total float as finish float.

Activity Resources. Sequence activities to reflect resource apportionment. Logically connect and code each activity to reflect the crew (resource) performing the operation. Submit a summary list of crews, their crew codes, and their operation(s) with each schedule submission, unless unchanged. Identify responsibility for each activity. Identify Subcontractors, DBE's, utilities and Work performed by others that affects the Schedule.

Breakdown and Durations of Activities. An individual activity is required for each construction element or each activity not under the control of the Contractor that affects the sequence or progress of the Work. The Engineer reserves the right to require additional breakdown of the Work activities at any time. Each activity must be identified by a name, symbol and coding, and shall have a duration, sequence, responsibility and resource(s). Choose activity names that are descriptive and identify single construction elements. Activity symbols, or ID's, shall be unique and systematic.

Activity types must be either "task", "start milestone", or "finish milestone". Do not use "hammock" type activities. Date constraints, float and duration constraints, and/or flags for activities are not permitted.

Assign a reasonable duration to each activity representative of its scope. Durations may not exceed 14 calendar days unless approved by the Engineer. Determine the duration of each activity by using productivity rates based on Calendar Days.

Include the preparation and approval of Working Drawings as activities. Include phasing (staging) milestones as activities. Correlate phasing milestones with the sequence of construction provided in the Contract Documents. Use a separate start and finish milestone activity to delineate each phase (stage).

*Utility Work***.** Include all Work performed by utilities on the Project as activities in the OCPM. Include each utility item of Work shown in the Contract's Utility Statement as an activity. Durations for utility activities shall be the same as the durations shown in the Utility statement for each activity unless otherwise approved by the Engineer.

*Calendars***.** Assign a calendar to each activity in the schedule. Use a minimum of 6 calendars, when applicable: (1) Full Schedule; (2) Permit Requirements; (3) Winter Condition; (4) Concrete Work; (5) Asphalt Paving Work; and (6) Nighttime Asphalt Paving Work. Use additional calendars if needed. Calendar non-work periods shall reflect the average Delaware weather history for the jobsite and the restrictions identified in the Contract Documents. The Contractor may choose perform Work during an activity's calendar non-work period at no additional cost to the Department if weather conditions are favorable for such Work and the Work does not violate a set forth in the Contract Documents. The maximum allowable non-work period for each calendar is set forth below. The Contractor may choose to shorten non-work periods at his/her discretion.

CALENDAR	MAXIMUM NON-WORK PERIOD
Full Schedule	None
Winter Condition	December 1 through March 15
Concrete Work	December 1 through March 15
Asphalt Paving	November 15 through March 15
Nighttime Asphalt Paving	October 15 through April 30

Written Narrative (WN). Provide a written narrative (WN) as part of the OCPM explaining the following:

(a) Relationships between activities not obviously identified
(b) Equipment usage and limitations.
(c) Manpower usage and limitations.
(d) Use of additional shifts and overtime.
(e) Activity codes, abbreviations, and activity identification system.
(f) All calendars utilized in the CPM and the basis of determining each non-work period
(g) All abbreviations.
(h) Use of calendars.
(i) Any other conditions that affect the schedule and are not readily discernible in the database.

CPM Updates:

Provide monthly updates to the CPM of record. Meet with the Engineer once a month prior to submitting the update to review the status of the schedule's activities. Prepare an updated list of activities showing all of the actual start and actual finish for each of the schedule's activities so that both parties can agree on the dates. Use the dates that were agreed upon in the meeting to status the CPM of record and submit the updated schedule to the Engineer for approval. Assign a unique file name to each update (Number/version). The data date of the update shall be the next day after the end of the update period. As part of the monthly update, submit a written description that identifies any delays or disruptions to the schedule experienced during the period of an update, any change in manpower or equipment, and any potential delays to the completion date of the schedule.

Do not include any revisions to the CPM without prior approval. Failure to submit complete updates in a timely manner may result in the withholding of estimates by the Engineer. The Engineer agrees to refrain from withholding estimates unless the Contractor is habitually late in providing updates, is more than four weeks late in submitting an update or has failed to submit an update that is part of a resolution to a serious problem that must be addressed immediately.

Revisions to the Schedule of Record:

Revisions are defined as any changes to the database other than status updates, log entries and moving the data date. Discuss any proposed revisions to the CPM verbally with the Engineer. If the revision is minor in nature, the Engineer may allow the revision to be included on the next Update of the CPM. If the Engineer determines that the revision is not minor in nature, submit the proposed revision for review and approval prior to deviating from the approved CPM. When a revision to the CPM is required due to changes in the Contract initiated by the Engineer, immediately contact the Engineer to discuss the changes. The Engineer may allow a deviation from the approved CPM for specific mitigating activities.

The Engineer may direct the Contractor to revise the schedule of record at the Contractor's expense if: the critical path has less than minus ten (-10) Calendar Days of total float due to the Contractor's failure to perform the Work in accordance with the schedule; the Contractor requests to re-sequence the Work; and/or the Contractor has performed a significant amount of Work out of sequence. The Engineer may direct the Contractor to revise the schedule for any other reason; and such a revision will be paid at the unit cost for a CPM Revision.

The Engineer will review and respond to the proposed revision within 7 Calendar Days after receipt. Resubmit, if required, within seven calendar days after receipt of the Engineer's review comments. The Engineer reserves the right to reject any proposed revision that adversely impacts the Department, utilities, or other concerned parties.

Extensions of Contract Time and/or Incentive/Disincentive Dates.

Make requests for extension of Contract time in writing and subject to the notice and timeliness of submission provisions as provided for elsewhere in the Contract. Requests for an extension of Contract time or change in an incentive/disincentive date will be evaluated by the Engineer's analysis of the CPM of record and any proposed revision submitted. Include in the request a written narrative of the events that impacted the schedule and a detailed explanation of why the Contractor cannot meet the requirements of the schedule of record. Only delays to activities that affect the Contract completion date or will be considered for an extension of Contract time. Only delays to activities that affect the completion duration of an incentive/disincentive period will be considered for an extension of an incentive/disincentive completion date. The extension of the specified Contract completion date or incentive/disincentive date will be based upon the number of Calendar Days the Contract completion date or incentive/disincentive date is impacted as determined by the Engineer's analysis. The Engineer and Contractor may agree to defer the analysis of a potential impact to the schedule until the completion of the activities that are affected. Such a deferment does not relieve the Contractor of his/her duty to identify potential impacts to the schedule in the applicable schedule updates.

All requests for extensions of Contract Time must be supported by the most recent CPM Update. If, within a reasonable period of time, the Contractor fails to make a good faith effort to produce an acceptable CPM update and uses an unacceptable CPM update to support a request for a time extension, the Contractor loses the right to receive that time extension; and/or the right to receive compensation for that delay caused in whole or in part by the Engineer.

Final As Built Schedule.

Submit a final CPM Schedule database within 14 Calendar Days of Substantial Completion. Failure to submit a final CPM Schedule may result in the withholding of estimates by the Engineer.

Method of Measurement:

The Project Control System will be measured in two items. The item, "Project Control System Development Plan" will be lump sum. The item "CPM Schedule Updates and/or Revised Updates" will be measured one each per update that is submitted and accepted.

Basis of Payment:

The item, "763508 – Project Control System Development Plan" will be paid at the Contract's lump sum bid price on the next monthly estimate after completion of the requirements of the Project Control System Development Plan, which includes the approval of the Original CPM Schedule. Price and payment will constitute full compensation for preparing the CPM database, acquiring the necessary software, attending all scheduling meetings with the Department, submitting and resubmitting all documents and for all labor, tools, equipment and incidentals necessary to complete the Work.

The item, "763509 – CPM Schedule Updates and/or Revised Updates" will be paid at the Contract unit price per each approved CPM schedule update as described above. Price and payment will constitute full compensation for preparing, submitting and resubmitting all CPM updates, for attendance at all scheduling meetings with the Department, for preparing and reviewing a list of actual start and actual finish dates with the Engineer, and for all labor, tools, Equipment and incidentals necessary to complete the Work.

2/11/2015

763597 - UTILITY CONSTRUCTION ENGINEERING

Description:

Utility Construction Engineering consists of providing construction and right-of-way/easement information to utility companies performing work (as defined in the Utility Statement) within the project limits. This may include but not necessarily be limited to staking right-of-way/easement lines, tops of cuts, bottoms of slopes, clear zones, drainage facilities, fill and cut grades, and other features that will enable utility companies to coordinate their work and correctly locate/relocate their facilities. Engineering/surveying required for utility work bid as part of the Contract is included in item 763501.

It is the intent of this item to cover engineering/surveying work that is done solely for utility companies and that is beyond the work performed under item 763501 - Construction Engineering. Work covered under Utility Construction Engineering will generally fall into two categories:

1. Engineering/surveying work that is not necessary for construction of the project, i.e. staking the clear zone line, providing cut/fill grades at proposed utility pole locations, staking back of drainage structures, and staking right-of-way lines where construction of the project (exclusive of utilities) is obviously well within the right-of-way.

2. Engineering/surveying work that is necessary for construction, but has to be provided for utility companies well in advance of the Contractor's need and will likely need to be redone later. This can essentially be any of the Construction Engineering work that when done early cannot be reasonably expected to remain undisturbed until needed for construction of the project (non-utility).

The Engineer must approve all requests for Utility Construction Engineering before the work begins. To this end, the Contractor should instruct utility companies to submit their requests to the Engineer. The Engineer will decide if the requested work meets the criteria for Utility Construction Engineering or is normal Construction Engineering and pass the requests along with his/her decisions to the Contractor. When the Engineer determines that the requested work qualifies as Utility Construction Engineering, the Department will reimburse the Contractor on a per hourly basis for each and every hour the Contractor's survey crew is in the field actively engaged in performing the Utility Construction Engineering work. The survey crew size shall be adequate to efficiently perform the work required and shall meet the approval of the Engineer. Office work associated with Utility Construction Engineering will be considered as incidental to the item.

The personnel engaged in and the equipment used for Utility Construction Engineering shall meet the requirements as described in item 763501 - Construction Engineering.

Method of Measurement:

The quantity of Utility Construction Engineering will be measured as the actual number of hours the Contractor's survey crew is in the field actively engaged in utility construction engineering work.

Basis of Payment:

The quantity of Utility Construction Engineering will be paid for at the Contract unit price per hour. Price and payment will constitute full compensation for furnishing all labor, equipment, instruments, stakes and other materials necessary to complete the work.

02/28/09

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 from the 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 applicable U.S. Department of Energy diesel fuel price is posted on the first Monday of the month.

The Base Price Index, FB, is the index price posted by the Department, determined as specified above, on the project advertisement date.

BASE PRICE INDEX (FB) FOR DIESEL FUEL

PER GALLON (PER LITER) = $ ~CEMENT_PRICE_72~

The price index for adjustment, 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 the month that contains the first day of every 90 calendar days period 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 (See above chart in section 1.2 for usage factors.)
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 change order, either up or down, at Notice to Proceed and every 90 Calendar Days thereafter.

The affected items will be calculated using the Diesel Fuel Price Index posted for the month in which the first day of the 90 day period falls. The Diesel Fuel Price Index will be used for all the affected items performed during the 90 day period.

Every 90 days, the newly posted Diesel Fuel Price Index will be used to calculate the adjustment for the items performed the next 90 days.

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.

10/8/15

Appendix---Item 763626 Diesel Fuel Cost Adjustment

Contract: **T201011302.01; US 13 and Port Penn Road Intersection Improvements**

		Item No./s
Category A:	**Earthwork** Excavation & Embankment, Borrow (total qty must exceed 5000 CY)	202000, 207000, 208000, 209001, 209002, 209004 210000
Category B:	**Subbase and Agg.** GABC, PTB, Soil Cement Base (total qty must exceed 500 T)	302007
Category C:	**Flexible Bases and Pavements** Warm Mix Asphalts (total qty must exceed 500 T)	401813, 401819, 401824, 401830, 402000
Category D:	**Rigid Bases and Pavements** Concrete, P.C.C. Patching (total qty must exceed 5000 CY)	501006, 503001
	Structures	602001, 602002,602522, 604000
Category E:		
	Bridges, Large P.C.C. Structures	

763655 - STEEL COST PRICE ADJUSTMENT

.01 Description: The Department will adjust monthly progress payments up or down as appropriate for cost changes in steel used on specific items of work identified in the contract in accordance with this provision.

The following steel items will be eligible for consideration under this provision:

1. structural steel (rolled beams, plate girders, diaphragms, plate bearings, etc.);
2. reinforcing steel (plain & epoxy coated);
3. overhead sign structures;
4. guardrail, posts;
5. standard sign or lighting supports;
6. railing;
7. steel encasement pipe;
8 steel piles (end bearing or friction);
9. steel strand (used for pre-tensioned or post-tensioned finished elements); and
10. sheet piles.

Inventoried materials from the listing of eligible items and fasteners of any kind are specifically excluded for consideration. Fasteners include but are not limited to, bolt, nuts, washers, rivets, and welding rods.

The requirements of this provision shall apply only to material cost changes that occur between the date of bid opening and the date the material is shipped to the fabricator. To be eligible for this price adjustment, the Contractor is required to place purchase order(s) for eligible steel items for price adjustment identified in the contract within 30 days after final execution of the contract by the Department. All items eligible must be submitted and used on the project for any item to be eligible for adjustment.

For steel items to be eligible for adjustment, once shipped to the fabricator, the items shall be specifically stored, labeled, or tagged, recognizable by color marking, and identifiable by project for inspection and audit verification.

This provision allows for price adjustment for embedded steel used for pre-tensioned or post-tensioned precast components where furnishing steel is included in the unit price of the finished bid item. Steel used for post-tensioned or pre-tensioned elements shall be evaluated for price adjustment in the same manner as other steel material eligible under the requirements of this provision except that adjustment shall only apply to the tonnage or poundage of steel strand used in the pre-tensioned or post-tensioned element.

This provision shall only apply to material cost changes of steel that occur between the date of bid opening and the date the material is shipped to the Contractor, subcontractor or supplier/fabricator placing the steel into the finished component.

Submit material price quotes, bid papers, or other documentation satisfactory to the Department within 15 days after the date of the Award letter for the bid items the Contractor is requesting a steel price adjustment. This documentation shall support the completion of the form establishing the average price per pound for the eligible steel bid item. The Contractor must use the format as shown with this provision; no other format for presenting this information will be permitted. Certification is required that all items of documentation are original and were used in the computation of the amount bid for the represented eligible pay items for the month bids were opened. The documentation will be used to support the base line material price ("Base Price") of the steel item only. No adjustment will be made for changes in other components of the contract unit bid price, including, but not limited to, fabrication, shipping, storage, handling, and erection.

Failure to submit specifically required information such as purchase order, price data, bill of lading, material information or other requested information as noted herein will result in the Contractor not being eligible for price adjustment of steel items.

Price adjustment of each qualifying item under consideration will be subject to the following condition:

There must be an increase or decrease in the cost of eligible steel materials in excess of 10% up to a maximum of 60% from the Base Price when compared with the latest published price index ("Price Index") in effect at the time material is shipped to the fabricator.

The Price Index the Department is using is based on The U.S. Department of Labor, Bureau of Labor Statistics, Producers Price Index (PPI) which measures the average price change over time of the specific steel eligible item from the perspective of the seller of goods. The specific PPI to be used to adjust the price for the eligible steel items is shown in the table below. **Please note**: The PPI is subject to revision four months after original publication, therefore, price adjustments and payments will not be made until the index numbers are finalized.

The following table indicates the PPI steel category index items and the corresponding I.D. numbers to which the steel items will be compared:

Steel Item	**Bureau of Labor Statistics PPI Series I. D. Number WPU#**
Reinforcing steel (plain & epoxy coated) Steel Strand (Pre-tensioning & Post-tensioning)	WPU101704 (http://data.bls.gov/pdq/SurveyOutputServlet?years_option=all_years&output_view=data&periods_option=all_periods&output_format=text&reformat=true&request_action=get_data&initial_request=false&data_tool=surveymost&output_type=column&series_id=WPU101704)
Plate girders & rolled beams (Standard & High strength, diaphragms, plate bearings, etc.) Steel piling (H-pile, pipe piles & sheet piles)	Average of WPU1017 & WPU101 (http://data.bls.gov/pdq/SurveyOutputServlet?series_id=WPU1017&data_tool=XGtable & http://data.bls.gov/pdq/SurveyOutputServlet?series_id=WPU101&data_tool=XGtable)
Steel encasement pipe Overhead sign structures, posts, poles, guardrail, sign or lighting supports, & railing	WPU101706 (http://data.bls.gov/pdq/SurveyOutputServlet?years_option=all_years&output_view=data&periods_option=all_periods&output_format=text&reformat=true&request_action=get_data&initial_request=false&data_tool=surveymost&output_type=column&series_id=WPU101706)
Guardrail	Average of WPU1017 & WPU101707 (http://data.bls.gov/pdq/SurveyOutputServlet?series_id=WPU1017&data_tool=XGtable & http://data.bls.gov/pdq/SurveyOutputServlet?years_option=all_years&output_view=data&periods_option=all_periods&output_format=text&reformat=true&request_action=get_data&initial_request=false&data_tool=surveymost&output_type=column&series_id=WPU101707)

The price adjustment will be determined by computing the percentage of change in index value beyond 10% above or below the index on the bid date to the index value on the date the steel material is shipped to the fabricator (Please see included sample examples). Weights and date of shipment must be documented by a bill of lading provided to the Department. The final price adjustment dollar value will be determined by multiplying this percent increase or decrease in the index (after 10%) by the represented quantity of steel shipped by the Base Price per pound subject to the limitations herein.

A = B x P x Q	
Where:	
A =	Steel price adjustment in lump sum dollars
B =	Average weighted price of steel submitted with bid on project in $/lb
P =	Adjusted percentage change in PPI average from shipping date to bid date minus 10% (0.10) threshold
Q =	Total quantity of steel in pounds shipped to fabricator for the specific project

Delays to the work caused by steel shortages may be justification for a contract time extension but will not constitute grounds for claims for standby equipment, extended office overhead, or other costs associated with such delays.

The need for application of the adjustments herein to extra work will be determined by the Engineer on an individual basis and, if appropriate, will be specified on the Change Order.

This price adjustment is capped at 60%. This means the maximum "P" value for increase or decrease that can be used in the above equation is 50% (60%-10% threshold).

Calculations for price adjustment will be shown separate from the monthly progress estimate and will not be included in the total cost of work for determination of progress or for extension of contract time.

Any apparent attempt to unbalance bids in favor of items subject to price adjustment may result in rejection of the bid proposal.

.02 Method of Measurement:

Price increase/decrease will be computed as follows:

Sample Calculation of a Price Adjustment (increase)			
Project bid on	Tuesday, April 28, 2009		
Project has structural steel in the amount of:		**450,000**	Lbs
Orders placed in timely manner and according to contract.			
Contractor's F.O.B. supplier price for the structural steel in bid:		**$ 0.28**	/lb
Adjusted** BLS Producers Price Index most recently published average at time of bid:			**157.0**
** final change after 4 months			
All steel shipped to fabricator in same month, October 2009.	October-09		
Adjusted BLS Producers Price Index (PPI) most recently published average for month of October:			173.7
Adjustment formula is A = B X P X Q			

Where:	A =	Steel price adjustment in lump sum dollars
	B = $ 0.28	Average weighted price of steel submitted with bid on project in $/lb = $0.28
	P = 0.0064	Adjusted percentage change in PPI average from shipping date to bid date minus 10% threshold = (173.7-157.0)/157.0 – 0.10 = 0.0064
	Q = 450,000	Total quantity of steel shipped to fabricator in October 2004 for this project in lb = 450,000 lb
	A = $ 802.55	0.28 x 0.0064 x 450,000
	A = $ 802.55	Lump Sum adjustment paid to Contractor

Sample Calculation of a Price Adjustment (decrease)			
Project bid on April 27, 2009.			
Project has structural steel.		**450,000**	Lbs
Orders placed in timely manner and according to contract.			
Contractor's F.O.B. supplier price for the structural steel in bid:		**$ 0.28**	/lb
Adjusted** BLS Producers Price Index most recently published average at time of bid:			**173.7**
** final change after 4 months			
All steel shipped to fabricator in same month, October 2009.	October-09		
Adjusted BLS Producers Price Index (PPI) most recently published average for month of October:			**157.0**
Adjustment formula is A = B X P X Q			

Where:	A =	Steel price adjustment in lump sum dollars
	B = $ 0.28	Average weighted price of steel submitted with bid on project in $/lb = $0.28
	P = -0.0039	Adjusted percentage change in PPI average from shipping date to bid date minus 10% threshold = (173.7- 157.0)/157.0 – 0.10 = -0.0039
	Q = 450,000	Total quantity of steel shipped to fabricator in October 2009 for this project in lb = 450,000 lb
	A = $ (486.01)	0.28 x 0.0039 x 450,000
	A = $ (486.01)	Lump Sum credit from Contractor

.03 Basis of Payment: The price adjustments will be made as a lump sum payment for eligible steel products placed and accepted.

2/1/11

763659 - DUMPSTER ENCLOSURE

Description:

This work consists of furnishing and installing a Dumpster Enclosure with double-leaf louvered metal gates in accordance with the Standard Specifications and the Plans. Dumpster Enclosures shall be installed at the locations shown on the Plans or as directed by the Engineer.

Materials:

1. Concrete:

The concrete pad for the Dumpster Enclosure shall conform to Section 812, Class A. The minimum 28 day strength for the cast in place concrete shall be 4,500 psi. 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).

The concrete for the footing beneath the concrete masonry units (CMU) foundation wall shall conform to Section 812. The minimum 28 day strength for the cast in place concrete shall be 3,000 psi. 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).

2. Masonry and Brick:

General:

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed work.
B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
C. Quality control shall be established, for each type of concrete masonry unit furnished, per ASTM C 140.

The CMU bond beams and the CMU foundation wall shall conform to ASTM C 90. Provide units with minimum average net-area compressive strength of 1900 psi. The density classification of the CMUs shall be lightweight unless otherwise indicated. The CMUs shall be of a manufacturer's nominal dimensions 16 inches wide by 8 inches high by 4 inches thick.

The brick veneer shall conform to ASTM C 55. Provide units with minimum average net-area compressive strength of 2500 psi. The density classification shall be light weight. The actual dimensions of the brick veneer units shall be 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.

The cast stone coping shall be stone material in accordance with Section 610 of the Standard Specifications.

Mortar and grout for the CMU cores with reinforcement shall meet the following requirements:

A. Mortar for Unit Masonry: Comply with ASTM C 270, Specification. Provide the following types of mortar for applications stated unless another type is indicated.
   - For masonry below grade or in contact with earth, use Type S.

- For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

B. Grout for Unit Masonry: Comply with ASTM C 476.
- Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
- Proportion grout in accordance with ASTM C 476, Table 1.
- Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

C. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

D. Hydrated Lime: ASTM C 207, Type S.

E. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

F. Masonry Cement: ASTM C 91. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- Lafarge North America, Inc.; Lafarge Masonry Cement
- Lehigh Cement Company; Lehigh Masonry Cement
- National Cement Company, Inc.; Coosa Masonry Cement

G. Aggregate for Mortar: ASTM C 144. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone. For joints less than ¼" thick, use aggregate graded with 100 percent passing the No. 16 sieve.

H. Aggregate for Grout: ASTM C 404.

I. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C494/C 494M, Type c, and recommended by manufacturer for use in masonry mortar of composition indicated.

J. Water: Potable.

Mortar and grout mixes shall not contain admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless indicated otherwise. Calcium chloride shall not be used in mortar or grout. Add cold-weather admixture (if used) at the same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

3. Reinforcement:

Bar reinforcement shall meet the requirements of AASHTO M 31, Grade 60; and shall be protected with fusion bonded epoxy meeting the requirements of AASHTO M 284.

Masonry joint reinforcement shall be hot-dip galvanized carbon steel and shall meet the requirements of ASTM A 951. Side rods and cross rods shall be 0.148-inch diameter and shall not be spaced at more than 16 inches on center. The rod lengths shall not be less than 10 feet.

Welded wire fabric reinforcement shall meet the requirements of AASHTO M 55, Grade 60, and shall be protected with fusion bonded epoxy meeting the requirements of AASHTO M 284.

4. Ties and Anchors:

Ties and anchors shall be hot-dip galvanized carbon-steel wire conforming to the requirements of ASTM A 82 with a coating conforming to ASTM A 153, Class B-2.

Wire Ties shall extend at least halfway through veneer but with at least 5/8" cover on the outside face.

Galvanized steel sheets shall conform to ASTM A 653, Commercial Steel, with a G60 zinc coating.

5. Flexible flashing shall be one of the following:

A. Copper-Laminated Flashing weighing 5-oz./sq. ft. shall consist of a copper sheet bonded between two (2) layers of glass-fiber cloth. This shall be used only where flashing is fully concealed in masonry. Subject to compliance with requirements, one of the following shall be provided:
- Hohmann & Barnard, Inc.; H&B C-Fab Flashing
- Sandell Manufacturing Co., Inc.; Copper Fabric Flashing
- York Manufacturing, Inc.; Multi-Flash 500

B. Asphalt-Coated Copper Flashing weight 5-oz./sq. ft. shall consist of a copper sheet coated with flexible asphalt. This shall be used where flashing is fully concealed in masonry. Subject to compliance with requirements, one of the following shall be used:
- Advanced Building Products Inc.; Cop-R-Cote
- Hohmann & Barnard, Inc.; H&B C-Coat Flashing
- Sandell Manufacturing Co., Inc.; Coated Copper Flashing

6. Anti-graffiti coating shall be one of the following products.

A. Primer (if required): FX-441 (one component)
Intermediate Coat: FX-441 (two components)
Top Coat: FX-441 (two components)
As manufactured by Fox Industries
(Telephone [no toll free number]: 1-410-243-8856);

OR

B. Primer (if required): EUCOPOXY TUFCOTEVOX or DURALTEX
Intermediate Coat: EUCOTHANE
Top Coat: EUCOTHANE
As manufactured by Euclid Chemical
(Telephone: 1-800-321-7628; 1-216-531-9222);

OR

C. Intermediate Coat: PROFESSIONAL WATER SEALANT & ANTI-GRAFFITIANT (Super Strength)
Top Coat: PROFESSIONAL WATER SEALANT & ANTI-GRAFFITIANT (Super or Extra Strength)
As manufactured by Professional Products of Kansas, Inc.
(Telephone 1-800-676-1899; 1-316-522-9300);

OR

D. Approved Equal.

All materials shall be brought to the job site in original sealed and labeled containers of the manufacturer, and subject to inspection by the Engineer. Top coat color of anti-graffiti coating shall be a clear, flat finish.

7. The interior faces Dumpster Enclosure shall be coated with block filler. Block filler shall be acrylic and shall conform to MPI # 04.

8. Additional Materials:

The expansion joint material between the CMU wall and the concrete pad shall meet the requirements of Section 808.04(d) of the Standard Specifications.

The coarse aggregate shall conform to Borrow Type "C" as specified in Section 209 of the Standard Specifications.

Adjustable Masonry-Veneer Anchors shall allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs. The anchors shall be capable of withstanding a 100-pound load in both tension and compression without deforming or developing play in excess of 0.05 inches. Anchors shall be screw-attached units consisting of a wire tie and a metal anchor. The wire tie shall be triangular-, rectangular- or T-shaped wires ties, fabricated from a 0.25 inch diameter, hot-dip galvanized steel wire in conformance with ASTM A82 with a coating conforming to ASTM A 153, Class B-2.

9. Metal Louvered Gates:

Provide gates of type and size indicated on Drawings. Equip gates with manufacturer's standard hardware as required for complete and functional operation.

Gate provided shall be a hinged swinging double gate. The welded frame of each of the two gates shall have a nominal size 7' in height by 10' in width as shown on the construction plans. Gate leaf widths shall be adjusted as needed such that the gate closes in a secure manner with no angle between the two gate leafs, accounting for hardware spacing, including hinges and lock mechanisms, within the opening provided on the construction plans.

Gate panels shall consist of ornamental steel fencing system composed of modular open grille fencing panels fabricated by welding flat steel bars and rods. Gate panels shall be fabricated from galvanized steel rods, flat bars, and louvers welded to form an open grille pattern with 100% direct vision screening. Louvers shall be placed in the horizontal direction. Multiple panels may be provided on each gate leaf as required by the manufacturer to meet the required gate leaf dimensions.

Hinge sizes and types shall be as determined by the manufacturer. Two (2) hinges shall be provided for each gate leaf. Hinges shall be of the pivot type, heavy duty, with large bearing surfaces. Hinges shall not twist or turn under the action of gates. Hinges shall be configured such that closed gates cannot be lifted off their hinges. Vehicular gates shall be capable of being operated easily by one person and shall be able to swing open 180 degrees.

A latch shall be provided consisting of a ¾ inch minimum diameter slide bolt which will accommodate a padlock.

A 5/8 inch minimum diameter center cane bolt assembly and strike shall be provided. Cane bolt assembly shall accommodate a padlock.

Gates shall be manufactured from Steel Bar Stock conforming to ASTM A36 and steel tubing conforming to ASTM A500 (Grade B.)

Gate panels shall be hot-dip galvanized to 1.25 ounces per square foot minimum zinc coating in accordance with ASTM A123. Gate panels shall be coated with 2-part polyurethane coating of 1.0 mil dry film thickness of coating of steel test panel cured 30 minutes at 180 degree F and aged 14 days.

Gate finish color shall match existing gates on the property. If no other gates are present, color shall be dark (brick) red.

10. Fabrication of materials furnished under this Section shall conform to the sizes, shapes, dimensions, and other factors shown on the Plans and shall show careful, finished workmanship in all respects. Each product or item furnished shall be subject to inspection at the factory and the fabricating plant, in laboratories of the Department's choosing, and at all other points of delivery.

Construction Methods:

Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- Verify that foundations are within tolerances specified.
- Verify that reinforcing dowels are properly placed.

Proceed with installation only after unsatisfactory conditions have been corrected.

The concrete pad shall conform to the dimensions and details as indicated on the Plans.

Excavation for the Dumpster Enclosure 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 and tamped on all sides in layers not to exceed 6 inches (150 mm).

Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

Select and arrange units for exposed units to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

Select and arrange units for exposed brick veneer to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

Mortar Bedding and Jointing:

A. Lay hollow CMUs as follows:
   - With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
   - With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
   - With webs fully bedded in mortar in grouted masonry, including starting course on footings.
   - With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

When placing CMUs, use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

To install flashing, prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

Construct formwork and shores as needed to support reinforced masonry elements during construction. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for placing reinforcement.

Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height. Limit height of vertical grout pours to not more than 60 inches.

Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints. After mortar is thoroughly set and cured, clean exposed masonry as follows:

- Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
- Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
- Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
- Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
- Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

Tolerances for CMUs:

A. Dimensions and Locations of Elements:
- For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
- For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
- For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
- For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
- For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
- For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
- For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
- For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
- For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
- For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.

Where a Dumpster Enclosure 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 rectangular 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 concrete slab shall be edged as appropriate and have a broom finish.

Following the construction of the walls and slab for the Dumpster Enclosure, install fencing in accordance with manufacturer's installation instructions and approved shop drawings.

Do not install bent, bowed, or otherwise damaged gate leaves. Remove damaged components from site and replace.

Install gates and adjust hardware to permit smooth operation. Test gate after installation. Open and close a minimum of ten times. Adjust installation as needed.

Touch-up any damaged finish with manufacturer-supplied paint to match original coating.

Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

Anti-graffiti coating shall be applied to surfaces free of dust, dirt, oil, grease and any other foreign materials. Application of anti-graffiti coating shall include temperature/humidity restrictions, mixing, thinning, curing and clean-up, etc., and shall be in accordance with the recommendation of the manufacturer and as directed by the Engineer.

Method of Measurement:

The quantity of Dumpster Enclosures will be measured as the number of individual locations of enclosures constructed, complete in place, and accepted. Excavation and backfilling around the slab and walls for the enclosure are included in this item.

Basis of Payment:

The quantity of Dumpster Enclosures will be paid for at the contract unit price per each. Price and payment will constitute full compensation for furnishing and constructing all materials, gates, anchors, reinforcing steel, welded wire fabric, concrete, concrete masonry units, brick veneers, graffiti coating, finishes, coarse aggregate, excavating, backfilling, removal of excavated material, compacting around the enclosure, repairs to damaged existing pavement, removal or replacement of pavement; and for all labor, equipment, tools, and incidentals necessary to complete the work.

1/5/16

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 ***$452,000.00 .*** 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 **$452,000.00** 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

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

907504 - PERIMETER DIKE / SWALE, TYPE A-1
907505 - PERIMETER DIKE / SWALE, TYPE A-2

Description:

Construct, maintain, and remove various types of perimeter dikes / 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, swale bottom, and all earth dike exposed surfaces 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 dike / 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 swale at locations shown on the plans (1 foot minimum depth) and place excavated material adjacent the swale to form an earth dike. Material may be placed uncompacted to form a 24 inch minimum dike measured from bottom of the swale to top of dike. Top of earth dike must also be a minimum 36 inches measured from bottom of swale at temporary slope drain locations for a minimum distance of 24 inches on either side of the temporary slope drain. Construct side slopes of swale and dike at 1:1 maximum. Provide a 2 foot flat bottom on swale. 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 swale at locations shown on the plans (1 foot minimum depth) and place excavated material adjacent the swale to form an earth dike. Material may be placed uncompacted to form

a 24 inch minimum dike measured from bottom of the swale to top of dike. Top of earth dike must also be a minimum 36 inches measured from bottom of swale at temporary slope drain locations for a minimum distance of 24 inches on either side of the temporary slope drain. Construct side slopes of swale and dike at 1:1 maximum. Provide a 2 foot flat bottom on swale. Stabilize using size R-4 riprap over 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 item 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.

1/14/15

908502 - WET GROUND EROSION CONTROL GRASS SEEDING - FLATS

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:

Wet Ground Erosion Control Grass Seeding – Flats:

Species Name Common / *(Latin)*	Max. % Weed Seeds	Min % Purity	Min % Germination	Seeding Rate lb/Ac
Redtop *(Agrostis alba/Agrostis gigantea)*	0.75	95	90	40
			Total Seed Quantity (lb/Ac)	**40**

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.

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 Wet Ground Erosion Control Grass Seeding - Flats shall only occur between the following dates:

March 1st to May 15 and August 15 to October 31st.

Low-pressure tires or equipment shall be used on all seeding equipment.

No Lime or Fertilizer shall be added to the mix.

All topsoil placement and grading where specified shall be completed before seeding. No other seedbed preparation is required for Wet Ground Erosion Control Grass Seeding – Flats.

Straw mulch shall be applied at the rate of 4000 lb/ac. Small grain straw shall be uniformly and evenly applied immediately after seeding has been completed. 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.

Placed straw shall not be crimped, tracked or disked into the soil unless shown on the Plans.

Acceptance of 908502 – Wetland Erosion Seeding Control – Flats 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 – Soil Stabilization Practices.

Basis of Payment:

As per Section 908 – Soil Stabilization Practices.

11/12/2014

UTILITY STATEMENT
January 15, 2016
State Contract No. T201011302
US 13 & Port Penn Road Intersection
New Castle County

The following utility companies maintain facilities within the project limits:

Artesian Water Company
Delmarva Power Distribution
Verizon Delaware, LLC
Eastern Shore Natural Gas
Delmarva Gas
Atlantic Broadband
Comcast
Fibertech

The following is a breakdown of the utilities involved, adjustments and/or relocations as required.

ARTESIAN WATER COMPANY

Artesian Water maintains the following facilities within the project limits:

1. One (1) 8" Ductile Iron Pipe water main along the west side of US 13 at approximate Station 129+15 Lt., which extends west to SR 1. From this location near US 13, DelDOT owns a water service line north to Sta. 134+90 Lt. for service to the Biddles Toll Plaza Administration Building.
2. Artesian has recently extended the water main under US 13 at approximately Station 129+02 Lt. in a 20 inch diameter steel casing.
3. Artesian has recently installed one (1) 12" Ductile Iron Pipe water main which is located through PP 241 – Gentlemen Farmer's Restaurant, Inc. by way of a private easement. The water main terminates just South of Port Penn Road at approximately Station 4002+90, Rt.

Artesian Water proposes the following adjustments and/or relocations to its existing facilities:

1. The existing facilities will remain in place. The State's Contractor will be responsible for maintaining and relocating the water service to the Biddles Toll Plaza Administration Building as shown in the Contract documents.
2. &3. The existing facilities will remain in place.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

DELMARVA POWER ELECTRIC DISTRIBUTION

Delmarva Power Electric Distribution maintains the following facilities within the project limits:

1. Delmarva Power Electric Distribution maintains Aerial 3 phase, 25 kV facilities on US 13.
2. Delmarva Power Electric Distribution has recently installed poles along the west side of US13 beginning at US 13 Station 109+60 Lt. to a pole at US 13 Station 131+06 Lt. Delmarva Power Electric Distribution's recent installation includes poles that extend along the east side of US 13 from Station 131+06 Rt. to Station 148+75 Rt.
3. New poles have also been installed along the north side of Port Penn Road from US 13 to Sta. 4009+96. Installation of Delmarva Power aerial lines on the new poles has been completed, including an aerial crossing to a private pole right of Sta. 4003+50±.
4. An aerial crossing of Port Penn Road at Sta. 4004+90± to Verizon Pole #109 and then aerial facilities continuing eastward on the south side of Port Penn Road to a pole right of Sta. 4007+90± where it then continues with an aerial crossing to the north side of Port Penn Road. Another aerial crossing is at Sta. 4010+00±.

Delmarva Power proposes the following adjustments and/or relocations to its existing facilities:

1. Existing poles from which facilities have been relocated, within the limits described above, will be removed by the last utility company to vacate their facilities from the poles.
2. An existing pole along US 13 at Station 136+00 Lt. has been installed by Delmarva Power Electric Distribution to replace the existing pole at Station 136+73 Lt. which provides service to the Biddles Toll Plaza; DelDOT's contractor will construct new conduit to connect to the transformer to the new pole location and pull new cable as described in the Contract documents, and Delmarva Power will make the new connection to the DP&L facilities and disconnect the existing service. DelDOT's contractor will remove the existing pole and remaining facilities at Station 136+73 Lt. once the new service installation is complete and operating. Interruptions to the service to the toll plaza will not be allowed. DP&L requires a minimum 30 calendar day notice that the work by DelDOT's contractor has been complete and then a minimum of 14 calendar days to complete the work.
3. These facilities have been installed to avoid conflict with the proposed construction. The existing private pole along Port Penn Road at Station 4003+50 Rt. provides service to PP 241 – Gentlemen Farmer's Restaurant, Inc. The property owner will retain an electrical contractor to install a new private pole at Station 4004+08 Rt. and will coordinate with Delmarva Power to make the new service connections. This work is expected to be complete by May 30, 2016. DelDOT's contractor will remove the existing pole and any remaining facilities at Station 4003+50 Rt. once all utilities have vacated the pole.
4. There are no anticipated conflicts with these facilities.

Outages on the 25kv circuit will only be permitted as load, weather and other system conditions permit. Delmarva Power Distribution will require DelDOT to provide access to all proposed and existing facilities.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

VERIZON DELAWARE LLC

Verizon Delaware maintains the following facilities within the project limits:

1. Facilities attached to Delmarva Power Electric Distribution owned poles described above.

2. Aerial facilities long the north side of Port Penn Road on DP&L poles through the project limits. Cables in conduit crossing Port Penn Road at Sta. 4004+95± to Verizon Pole #109. These cables then continue eastward aerially along the south side of Port Penn Road to Sta. 4007+90± . FromPole #109, these cables extended aerially along the south side of Port Penn Road westward to a private pole right of 4003+50± that serves the Ches-Del restaurant.
3. Underground cables along the north side of Port Penn Road through the project limits.

Verizon proposes the following adjustments and/or relocations to its existing facilities:

1. The facilities located along US 13 have been relocated to the recent Delmarva Power pole relocations. Removal of the existing facilities on the existing poles is expected to be complete by May 30, 2016.
2. The underground conduit crossing Port Penn Road and cables have been extended to the north to the new DP&L pole line. The aerial facilities have been relocated to the new DP&L Pole line and a new aerial service installed crossing Port Penn Road at Sta. 4001+10+. The aerial cables east of Pole #109 are not in conflict and will remain in place. The aerial cable serving the Chesdel Restaurantwill be relocated to the new pole that the property owner is having installed at 4004+08 Rt. and this work is expected to be complete by May 30, 2016.
3. These cables have been abandoned.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

EASTERN SHORE NATURAL GAS

Eastern Shore Natural Gas maintains the following facilities within the project limits:

1. Two (2) steel high pressure natural gas transmission pipelines within the limits of construction along the entirety of the project length. Both lines are located on the west side of US 13, east of SR 1. The specifications of each line are as follows: 16" O.D. x 0.312 W.T. API-5L-X60 with X-tec coating or powercrete coating (16" pipeline) and 10.75" O.D. x 0.219 W.T. API-5L-X42 with cold tar coating (10" pipeline).

Eastern Shore Natural Gas proposes the following adjustments and/or relocations to its existing facilities:

1. Beginning at US 13 Station 110+00 Lt, install new 16" and 10" pipelines generally as shown on the plans along the west side of US 13 and continuing north to US 13 Station 133+20 Lt, where ESNG will install a new crossing under US 13. The pipelines will then turn and run along the east side of US13 to a point north of the project limits. The two existing pipelines will be purged and abandoned in place after the new lines are in service.
2. At Station 103+90 LT, adjust existing facilities to permit construction of drainage pipe P-529.

The Eastern Shore Natural Gas facilities are present north of Contract T201011302, within the limits of Contract T200911302, US 301 & SR 1 Interchange. The relocation of the ESNG facilities for these two contracts must occur concurrently and be complete prior to ESNG abandoning the existing facilities. The existing facilities must remain in service until the new relocations are complete. Shut downs of the existing lines will only be allowed for when ESNG needs to make the tie-ins between the existing and new facilities. These shut downs can only occur outside of ESNG's heating season. The dates available for shut downs is approximately April 1

to October 30, depending on weather conditions. The Contractor for T201011302 shall complete all work to allow the ESNG relocations to begin on or before June 15, 2016.

ESNG requires **one-hundred twenty (120) calendar days** to complete this work within the limits of the two contracts following **twenty-eight (28) calendar days** advance notice that the necessary working area has been readied by the State's road contractors, including but not limited to completion of clearing and grubbing, cuts and fills made to within 1 foot of final grade, staking of rights-of-way and back of curbs, the installation of drainage and completion of the Utility Pre-Construction Meeting for this contract scheduled by DelDOT North District Construction Department and the procurement of any easements / P.E. by DelDOT. The road contractor will be responsible for providing traffic control for the ESNG work within the DelDOT right of way and for maintaining traffic in the Biddles Toll Plaza parking lot, which must remain active at all times. ESNG and the Contractor must work together to stage work in a fashion that provides for ESNG's work and also allows access to the parking lot for all necessary vehicles, and sufficient parking for DelDOT employees and visitors. This work must also be coordinated with the proposed relocations by Delmarva Power Gas. Eastern Shore Natural Gas requires 2,887 CY of Borrow, Type C material to complete this work.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

DELMARVA GAS

Delmarva Gas maintains the following facilities within the project limits:

1. One (1) PCC natural gas distribution pipeline within the limits of construction along the entirety of the project length. The utility is located on the west side of US 13, east of SR 1 until just north of Port Penn Road, at which point the pipeline turns and crosses under US 13 and then runs eastward along the north side of Port Penn Road to beyond the project limits.

Delmarva Gas (DPG) proposes the following adjustments and/or relocations to its existing facilities:

1. Beginning at US 13 Station 103+70 Lt, install a new pipeline generally as shown on the plans construction along the west side of US 13 and continuing north to Station 133+00 Lt, where DPG will install a new crossing under US 13 and run on the north side of Port Penn Road from Station 4000+00 Lt to Station 4010+80 Lt. The existing facilities will be purged and abandoned in place after the new lines are in service.

DPG requires **one-hundred twenty (120) calendar days** to complete this work within the limits of the contract following **twenty-eight (28) calendar days** advance notice that the necessary working area has been readied by the roadway contractors, including but not limited to completion of clearing and grubbing, cuts and fills made to within 1 foot of final grade, staking of rights-of-way and back of curbs, the installation of drainage and completion of the Utility Pre-Construction Meeting for this contract scheduled by DelDOT North District Construction Department and the procurement of any easements / P.E. by DelDOT. The road contractor will be responsible for providing traffic control for the DPG work within the DelDOT right of way and for maintaining traffic in the Biddles Toll Plaza parking lot, which must remain active at all times. DPG and the Contractor must work together to stage work in a fashion that provides for DPG's work and also allows access to the parking lot for all necessary vehicles, and sufficient parking for DelDOT employees and visitors. This work must also be coordinated with the proposed relocations by Eastern Shore Natural Gas. Delmarva Gas requires 1,120 CY or Type C material to complete this work.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

ATLANTIC BROADBAND

Atlantic Broadband maintains the following facilities within the project limits:

1. Facilities attached to Delmarva Power Electric Distribution owned poles described above.
2. Underground facilities along the south side of Port Penn Road through the project limits.

Atlantic Broadband proposes the following adjustments and/or relocations to its existing facilities:

1. The facilities located along US 13 have been relocated to the recent Delmarva Power pole relocations and activated. The removal of the existing facilities from the old pole line is expected to be complete by March 1, 2016.
2. The facilities along the south side of Port Penn Road west of the Ches-Del driveway that are in conflict with the proposed construction have been abandoned. The facilities along the south side of Port Penn Road east of the Ches-Del driveway are not in conflict with the proposed construction.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

COMCAST

Comcast owns the following facilities within the project limits:

1. Facilities attached to Delmarva Power Electric Distribution owned poles described above.

Comcast proposes the following adjustments and/or relocations to its existing facilities:

1. The facilities located along US 13 have been relocated to the recent Delmarva Power pole relocations but not activated. The activation and subsequent removal of the existing facilities from the old pole line is expected to be complete by March 1, 2016.

The existing Comcast facilities extend north of Contract T201011302, within the limits of Contract T200911302, US 301 & SR 1 Interchange. The relocation of the Comcast facilities for these two contracts must occur concurrently and be complete prior to Comcast removing the existing facilities.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

FIBERTECH

Fibertech maintains the following facilities within the project limits:

1. Facilities attached to Delmarva Power Electric Distribution owned poles described above.

Fibertech proposes the following adjustments and/or relocations to its existing facilities:

1. The facilities located along US 13 have been relocated to the recent Delmarva Power pole relocations.

Should any additional conflicts be encountered during construction requiring adjustment and/or relocation to the aforementioned utility's existing facilities, the necessary relocation work shall be accomplished by the respective company's forces, as directed by the Engineer. If an adjustment or relocation is found to be required, the length of time required for the work will vary depending on the nature of the adjustment or relocation.

Any existing facilities that are comprised of hazardous materials will be removed by the company. Any existing facilities containing hazardous materials will be purged by the company.

GENERAL NOTES

1. If utility work is being performed in advance of the project, all bidders are to determine the extent of completion of the advanced utility work, and predicate their bid prices on the extent of utility work completed and anticipated to be completed prior to the start of construction.

2. The Utility Company's forces will perform any additional relocations/adjustments that may be necessary during construction of the project. The time to complete any additional relocations/adjustments will depend upon the nature of the work, the required advance notice to the Utility Company, the need for the State's Contractor to stake out the right of way or proposed work, and any work that needs to be done by the State's Contractor in advance of the utility relocation/adjustment.

3. The contractor's attention is directed to Section 105.09 Utilities, Delaware Standard Specifications, August 2001. The Contractor shall contact Miss Utility (1-800-282-8555) two working days prior to any excavation. The Contractor is responsible for the support and protection of all utilities when excavating. The Contractor is responsible for ensuring proper clearances, including safety clearances, from overhead utilities for construction equipment. The contractor is advised to check the site for access purposes for his equipment and, if necessary, make arrangements directly with utility companies for field adjustments for adequate clearances.

4. It is understood and agreed that the contractor has considered in his bid all permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans or described in the utility statement and/or are readily discernible and that no additional compensation will be allowed for any delays, inconvenience, or damage sustained by

him/her to any interference from the utility facilities and appurtenances or the operation of moving the, except that the contractor may be granted an equitable extension of time.

5. The State's Contractor is responsible for rough grading as required by the roadway construction prior to the utility companies placing their proposed facilities unless indicated on the plans and/or outlined elsewhere in these specifications.

6. The Contractor shall follow all requirements of the Delaware Code, Title 26, Chapter 8. Underground Utility Damage Prevention And Safety. Chapter 8 includes, among other requirements, Section 806. Duties of Excavators which contains the requirement for the Contractor to excavate prudently and carefully and to take all reasonable steps necessary to properly protect, support and backfill underground utility lines. This protection shall include, but may not be limited to, hand digging within the limits of the planned excavation or demolition, starting 2 feet of either side of the extremities of the underground utility line for other than parallel type excavations and at reasonable distances along the line of excavation for parallel type excavations.

7. The Contractor shall note that the Delaware Code, Chapter 74B, Section 7405B requires notification to and mutually agreeable measures from the public utility for any person intending to carry on any function, activity work or operation within dangerous proximity of any high voltage overhead lines.

8. Coordination and cooperation among the Utility Companies and the State's Contractor are of prime importance. Therefore, the Contractor is directed to contact the following Utility Company representatives with any questions regarding this work prior to submitting bids and work schedules. Proposed work schedules should reflect the Utility Companies' proposed relocations. The Utility Companies do not work on weekends or legal holidays.

9. As outlined in Chapter 3 of the DelDOT Utilities Manual, individual utility companies are responsible for obtaining all required permits from municipal, State and federal government agencies and railroads. This includes but is not limited to water quality permits/DNREC Water Quality Certification, DNREC Subaqueous Lands/Wetlands permits, DNREC Coastal Zone Consistency Certification, County Floodplain permits (New Castle County only), U.S. Coast Guard permits, US Army Corps 404 permits, sediment and erosion permits, and railroad crossing permits.

10. Individual utility companies are required to restore any areas disturbed in conjunction with their relocation work. If an area is disturbed by a utility company and is not properly restored, the Department may have the highway contractor perform the necessary restoration. Any additional costs incurred as a result will be forwarded to the utility company.

NOTE: Coordination and cooperation among the utilities and the State's Contractor are of prime importance, therefore, the Contractor is directed to contact the following Utility Representatives with any questions in regard to this work prior to submitting bids and work schedules. Proposed work schedules should reflect the Utility Companies' proposed relocations

January 15, 2016

NAME	COMPANY	PHONE
Mr. Carmen Hunter	Artesian Water Company	(302) 453-7153
Mr. Angel Collazo	Delmarva Power (Electric Distribution)	(302) 454-4370
Mr. George Zang	Verizon Delaware LLC	(302) 422-1238
Mr. Richard Welsh	Eastern Shore Natural Gas Company	(302) 734-6710 x6785
Mr. Ted Waugh	Delmarva Gas	(302) 429-3706
Mr. Wesley Page	Atlantic Broadband	(410) 827-6441
Mr. Jim Spicer	Comcast	(302) 672-5975
Mr. Mike Foster	Fibertech	(585) 313-2066

PREPARED AND RECOMMENDED BY:

Whitman, Requardt & Associates, LLP
Consulting Engineers

1/15/2016
Date

APPROVED AS TO FORM BY:

US301 GEC

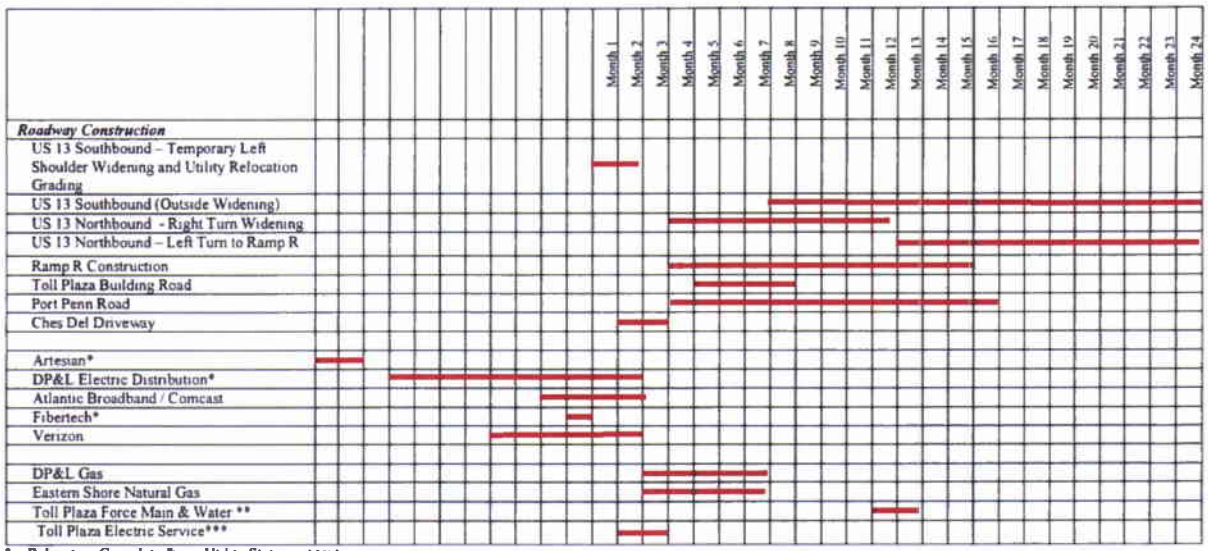
1/20/16
Date

APPROVED AS TO FORM BY:

Delaware Department of Transportation
Utilities Section

1/20/16
Date

Utility Construction Bar Chart
State Contract No. T201011302
US 13 & Port Penn Road Intersection



* Relocation Complete & see Utility Statement text

** The State's Contractor will be responsible for maintaining and relocating the force main and water service to the Biddles Toll Plaza Administration Building as shown in the Contract documents

*** The State's Contractor will be responsible for installing the new service lines and coordinating with DP&L for the new service as shown in the Contract Documents

Note: The information shown in the Contract Documents, including the Utility Statement and the Utility Schedule contained herein, concerning the location, type and size of existing and proposed utilities, their locations, and construction timing has been compiled by the preparer based on information furnished by each of the involved Utility Companies. It shall be the responsibility of the State's Contractor to verify all information and coordinate with the Utility Companies prior to and during construction, as specified in Section 105.09 of the Standard Specifications

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
PO BOX 778
DOVER, DELAWARE 19903

CERTIFICATE OF RIGHT-OF-WAY STATUS

STATE PROJECT NO. T201011302

F.A.P. NO. NH-2015(26)

US 13 AND PORT PENN ROAD INTERSECTION

NEW CASTLE COUNTY

Certificate of Right-of-Way Status – 100%

Status - LEVEL 1

As required by 23 CFR, Part 635, and other pertinent Federal and State regulations or laws, the following certifications are hereby made in reference to this highway project:

All necessary real property interests have been acquired in accordance with current FHWA/State directives covering the acquisition of real property; and,

All necessary rights-of-way, including control of access rights when pertinent, have been acquired including legal and physical possession; and,

All project rights of way are currently available in accordance with the project right-of-way plans; and,

Any residential displaced individuals or families have been relocated to decent, safe and sanitary housing, or adequate replacement housing has been made available in accordance with the provisions of the current Federal Highway Administration (FHWA) directive(s) covering the administration of the Highway Relocation Assistance Program; and,

All occupants have vacated the lands and improvements; and,

The State has physical possession and the right to remove, salvage, or demolish any improvements acquired as part of this project, and enter on all land.

RIGHT OF WAY SECTION

Robert Cunningham
Chief of Right of Way

January 20, 2016

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

JENNIFER COHAN
SECRETARY

September 11, 2015

ENVIRONMENTAL REQUIREMENTS

for

U.S. 13 & Port Penn Road Intersection (Contract #1D)
State Contract No.: T201011302
Federal Aid Project Number: NH-2015(26)

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 11-08-2012**, SP 145/12, Expiration 11-08-2017

- DNREC – 401 Water Quality Certification – **Approved 11-08-2012,** WQ-147/12, Expiration 11-08-2017

- DNREC - Coastal Zone Consistency – **Approved 09-14-2007, modification of condition 3 on 04-04-2011**, No expiration

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. For protection of the threatened Northern Long-Eared Bat (NLEB), there shall be no clearing of trees between 12:01 AM on April 15 and 11:59 PM on August 31 within the limits of the 'woods line' symbol within areas of the project that have been identified as potential NLEB habitat.

10. **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.

11. **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 **[USACE 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. 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.

8. 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]**

9. 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.

10. 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.

11. 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.

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.: T201011302

Federal Aid No.: NH-2015(26)

Project Title: US 13 and Port Penn Rd Intersection

The following railroad companies maintain facilities within the contract limits:

- ☐ Amtrak
- ☐ CSX
- ☐ Delaware Coast Line
- ☐ East Penn
- ☐ Maryland & Delaware
- ☐ Norfolk Southern
- ☐ Wilmington & Western
- ☑ None

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

BID PROPOSAL FORMS

CONTRACT T201011302.01

FEDERAL AID PROJECT T201011302

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

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 ROADWAY						
0010	201000 CLEARING AND GRUBBING	LUMP	LUMP			
0020	202000 EXCAVATION AND EMBANKMENT	73680.000 CY				
0030	202515 COMPACTING INSITU MATERIAL	20130.000 SY				
0040	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	75.000 CY				
0050	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	1425.000 CY				
0060	208001 FLOWABLE FILL	20.000 CY				
0070	209001 BORROW, TYPE A	11816.000 CY				
0080	209002 BORROW, TYPE B	500.000 CY				
0090	209004 BORROW, TYPE D	929.000 CY				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

All figures must be typewritten.

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	CTS	BID AMOUNT DOLLARS	CTS
0100	210000 FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH, AND STRUCTURE BACKFILL	6244.000	CY				
0110	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP		LUMP			
0120	302007 GRADED AGGREGATE BASE COURSE, TYPE B	6749.000	CY				
0130	302011 DELAWARE NO. 3 STONE	10.000	TON				
0140	302012 DELAWARE NO. 57 STONE	512.000	TON				
0150	304501 PERMEABLE TREATED BASE, 4"	4676.000	SY				
0160	304502 SOIL CEMENT BASE COURSE, 6"	4676.000	SY				
0170	304506 PORTLAND CEMENT	100.000	TON				
0180	401813 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 70-22	8096.000	TON				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

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
0190	401819 BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22	8187.000 TON				
0200	401824 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22, WEDGE	174.000 TON				
0210	401830 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 70-22 (NON-CARBONATE STONE)	8325.000 TON				
0220	402000 BITUMINOUS CONCRETE AND/OR COLD-LAID BITUMINOUS CONCRETE (TRM)	500.000 TON				
0230	501006 PORTLAND CEMENT CONCRETE PAVEMENT, 12"	4676.000 SY				
0240	503001 PATCHING P.C.C. PAVEMENT, 6' TO 15', TYPE A	85.000 SY				
0250	601506 MAINTENANCE OF STREAM FLOW	LUMP	LUMP			
0260	602001 PORTLAND CEMENT CONCRETE MASONRY, CLASS A	62.000 CY				
0270	602002 PORTLAND CEMENT CONCRETE MASONRY, CLASS B	100.000 CY				

CANNOT BE USED FOR BIDDING

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0280	602522 PRECAST CONCRETE CULVERT	243.000 LF				
0290	602742 DRILLING FOR CONCRETE SHAFT (IN SOIL), 48" DIAMETER	25.000 LF				
0300	602747 DRILLING FOR CONCRETE SHAFT (IN ROCK), 48" DIAMETER	10.000 LF				
0310	604000 BAR REINFORCEMENT, EPOXY COATED	10800.000 LB				
0320	605501 GROUND MOUNT BREAKAWAY TYPE SIGN SUPPORTS AND FOUNDATION	LUMP	LUMP			
0330	605730 PREFABRICATED EXPANSION JOINT SYSTEM, 1"	55.000 LF				
0340	612021 REINFORCED CONCRETE PIPE, 15", CLASS IV	525.000 LF				
0350	612022 REINFORCED CONCRETE PIPE, 18", CLASS IV	3565.000 LF				
0360	612023 REINFORCED CONCRETE PIPE, 24", CLASS IV	797.000 LF				
0370	612034 REINFORCED CONCRETE PIPE, 36", CLASS IV	86.000 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
0380	612205 REINFORCED CONCRETE ELLIPTICAL PIPE, 19"X30", CLASS IV	141.000 LF				
0390	612216 REINFORCED CONCRETE ELLIPTICAL PIPE, 14"X23", CLASS IV	86.000 LF				
0400	614508 WATERMAIN AND ACCESSORIES	LUMP	LUMP			
0410	617002 REINFORCED CONCRETE FLARED END SECTION, 15"	4.000 EACH				
0420	617003 REINFORCED CONCRETE FLARED END SECTION, 18"	10.000 EACH				
0430	617005 REINFORCED CONCRETE FLARED END SECTION, 24"	3.000 EACH				
0440	617009 REINFORCED CONCRETE FLARED END SECTION, 36"	2.000 EACH				
0450	617165 REINFORCED CONCRETE FLARED END SECTION, 14" X 23"	2.000 EACH				
0460	617515 HEADWALL	2.000 EACH				
0470	701010 PORTLAND CEMENT CONCRETE CURB, TYPE 1-8	748.000 LF				

CANNOT BE USED FOR BIDDING

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0480	701011 PORTLAND CEMENT CONCRETE CURB, TYPE 2	6730.000 LF				
0490	701016 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 1-4	3524.000 LF				
0500	705001 P.C.C. SIDEWALK, 4"	183.000 SF				
0510	705002 P.C.C. SIDEWALK, 6"	55.000 SF				
0520	707005 UNDERDRAIN OUTLET	8.000 EACH				
0530	708050 DRAINAGE INLET, 34" X 18"	18.000 EACH				
0540	708051 DRAINAGE INLET, 34" X 24"	16.000 EACH				
0550	708052 DRAINAGE INLET, 48" X 30"	15.000 EACH				
0560	708053 DRAINAGE INLET, 48" X 48"	8.000 EACH				
0570	708111 MANHOLE, 48" X 30"	2.000 EACH				

CANNOT BE USED FOR BIDDING

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	CTS	BID AMOUNT DOLLARS	CTS
0580	708112 MANHOLE, 48" X 48"	4.000	EACH				
0590	708583 PERSONNEL GRATE FOR PIPE INLET	2.000	EACH				
0600	708585 JUNCTION BOX, 48" X 30"	1.000	EACH				
0610	712005 RIPRAP, R-4	298.000	SY				
0620	712006 RIPRAP, R-5	386.000	SY				
0630	713002 GEOTEXTILES, SEPARATION	721.000	SY				
0640	713003 GEOTEXTILES, RIPRAP	1555.000	SY				
0650	715001 PERFORATED PIPE UNDERDRAINS, 6"	11235.000	LF				
0660	715500 UNDERDRAIN OUTLET PIPE, 6"	289.000	LF				
0670	716000 CONVERTING EXISTING DRAINAGE INLET TO JUNCTION BOX	8.000	EACH				

CANNOT BE USED FOR BIDDING

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	CTS	BID AMOUNT DOLLARS	CTS
0680	720050 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	1536.000	LF				
0690	720051 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 2-31	100.000	LF				
0700	720052 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 3-31	3754.000	LF				
0710	720055 CURVED GUARDRAIL SECTION	56.000	LF				
0720	720057 GUARDRAIL OVER CULVERTS, TYPE 3-31	75.000	EACH				
0730	720544 REFLECTORS, WHITE, CONCRETE	14.000	EACH				
0740	720545 REFLECTORS, YELLOW, CONCRETE	9.000	EACH				
0750	720559 POST MOUNTED DELINEATORS	135.000	EACH				
0760	720586 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2-31	4.000	EACH				
0770	720588 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3-31	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
0780	720629 BIFURCATED CONCRETE MEDIAN BARRIER	1050.000 LF				
0790	720633 CONCRETE MEDIAN BARRIER MOUNTED SIGN SUPPORT	3.000 EACH				
0800	725001 GUARDRAIL TO BARRIER CONNECTION (EXIT TYPE 31)	3.000 EACH				
0810	725002 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31	2.000 EACH				
0820	726001 END ANCHORAGE 31	3.000 EACH				
0830	726004 ENTRANCE SPECIAL END ANCHORAGE	1.000 EACH				
0840	727000 RIGHT-OF-WAY FENCE	1297.000 LF				
0850	727552 RESOURCE PROTECTION FENCE	1040.000 LF				
0860	743000 MAINTENANCE OF TRAFFIC	LUMP	LUMP			
0870	743003 ARROWPANELS, TYPE C	325.000 EADY				

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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
0880	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	400.000 EADY				
0890	743005 FURNISH AND MAINTAIN PORTABLE LIGHT ASSEMBLY	125.000 EADY				
0900	743006 PLASTIC DRUMS	82000.000 EADY				
0910	743007 TRAFFIC OFFICERS	2750.000 HOUR	75.00000		206250.00	
0920	743008 REFLECTOR PANELS	350.000 EACH				
0930	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	245.000 EADY				
0940	743015 FURNISH AND MAINTAIN PORTABLE PCC SAFETY BARRIER	12400.000 LF				
0950	743016 RELOCATION PORATBLE SAFETY BARRIER	10400.000 LF				
0960	743023 TEMPORARY BARRICADES, TYPE III	75000.000 LFDY				
0970	743024 TEMPORARY WARNING SIGNS AND PLAQUES	13250.000 EADY				

CANNOT BE USED FOR BIDDING

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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
0980	743025 INSTALL TEMPORARY IMPACT ATTENUATOR	15.000 EACH				
0990	743029 FURNISH TEMPORARY IMPACT ATTENUATOR - NON-GATING, REDIRECTIVE, TEST LEVEL 3	15.000 EACH				
1000	743030 RELOCATE TEMPORARY IMPACT ATTENUATOR	16.000 EACH				
1010	743031 ATSSA CERTIFIED TRAFFIC CONTROL SUPERVISOR	1600.000 HOUR				
1020	743056 FLAGGER, NEW CASTLE COUNTY, FEDERAL	875.000 HOUR				
1030	743065 FLAGGER, NEW CASTLE COUNTY, FEDERAL, OVERTIME	225.000 HOUR				
1040	744506 CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE	3.000 EACH				
1050	744530 CONDUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/ POLYMER LID-FRAME	22.000 EACH				
1060	744531 CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/ POLYMER LID-FRAME	10.000 EACH				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

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
1070	744544 ADJUST OR REPAIR EXISTING CONDUIT JUNCTION WELL	5.000 EACH				
1080	745602 FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)	2375.000 LF				
1090	745603 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (OPEN CUT)	550.000 LF				
1100	745604 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)	9300.000 LF				
1110	745606 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (TRENCH)	300.000 LF				
1120	746518 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 35' POLE	20.000 EACH				
1130	746537 RELOCATING EXISTING LIGHT STANDARDS	1.000 EACH				
1140	746569 ELECTRIC SERVICE RELOCATION	LUMP	LUMP			
1150	746590 FURNISH & INSTALL GROUND ROD	24.000 EACH				
1160	746653 ELECTRICAL TESTING	LUMP	LUMP			

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

All figures must be typewritten.

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	CTS	BID AMOUNT DOLLARS	CTS
1170	746847 POLE BASE, TYPE 3	4.000	EACH				
1180	746852 POLE BASE, TYPE 6	1.000	EACH				
1190	746872 LIGHTING CONTROL AND DISTRIBUTION ENCLOSURE	1.000	EACH				
1200	746898 REMOVE AND RESET EXISTING LIGHT POLE		LUMP	LUMP			
1210	746899 LIGHTING STANDARD POLE BASE	20.000	EACH				
1220	746907 FURNISH & INSTALL 1-CONDUCTOR #2 AWG STRANDED COPPER	8875.000	LF				
1230	746908 FURNISH & INSTALL 1-CONDUCTOR #4 AWG STRANDED COPPER	4225.000	LF				
1240	746909 FURNISH & INSTALL 1-CONDUCTOR #6 AWG STRANDED COPPER	8650.000	LF				
1250	746910 FURNISH & INSTALL 1-CONDUCTOR #8 AWG STRANDED COPPER	1100.000	LF				
1260	746911 FURNISH & INSTALL 1-CONDUCTOR #10 AWG STRANDED COPPER	950.000	LF				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

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
1270	746926 FURNISH & INSTALL ELECTRICAL UTILITY SERVICE EQUIPMENT 120/240	1.000 EACH				
1280	746941 TRAFFIC CONTROL DEVICE EQUIPMENT TURN ON, PICK UP, REMOVAL & MAINTENANCE, TYPE III	1.000 EACH				
1290	747515 CABINET BASE, TYPE M	1.000 EACH				
1300	747516 CABINET BASE, TYPE P	1.000 EACH				
1310	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	700.000 SF				
1320	748019 TEMPORARY MARKINGS, PAINT, 4"	52000.000 LF				
1330	748026 TEMPORARY MARKINGS, PAINT SYMBOL/LEGEND	400.000 SF				
1340	748027 PERMANENT PAVEMENT STRIPING, ALKYD-THERMOPLASTIC, 12"	100.000 LF				
1350	748502 RAISED/RECESSED PAVEMENT MARKER	250.000 EACH				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

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
1360	748505 TEMPORARY RAISED PAVEMENT MARKERS	450.000 EACH				
1370	748530 REMOVAL OF PAVEMENT STRIPING	25000.000 SF				
1380	748548 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"	44600.000 LF				
1390	748549 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"	1000.000 LF				
1400	748553 PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, BIKE SYMBOL	8.000 EACH				
1410	748557 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"	1650.000 LF				
1420	748564 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 5"	3325.000 LF				
1430	749532 SUPPLY OF FLAT SHEET ALUMINUM SIGN PANEL, TYPE IX RETROREFLECTIVE SHEETING	60.000 SF				
1440	749534 SUPPLY OF EXTRUDED ALUMINUM SIGN PANEL, TYPE IX RETROREFLECTIVE SHEETING	500.000 SF				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

All figures must be typewritten.

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	CTS	BID AMOUNT DOLLARS	CTS
1450	749687 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	78.000	EACH				
1460	749689 INSTALLATION OF 4" DIAMETER HOLE, GREATER THAN 6" DEPTH	2.000	EACH				
1470	749690 INSTALLATION OR REMOVAL OF TRAFFIC SIGNS ON MULTIPLE SIGN POSTS	1115.000	SF				
1480	753515 INSTALLING SANITARY SEWER (FORCE MAIN), PVC, 2"	1.000	LF				
1490	758000 REMOVAL OF EXISTING PORTLAND CEMENTCONCRETE PAVEMENT, CURB, SIDEWALK, ETC.	181.000	SY				
1500	760003 PAVEMENT - MILLING, HOT-MIX, VARIABLE DEPTH	1856.000	SY				
1510	760006 PAVEMENT - MILLING, HOT-MIX, 2" DEPTH	81993.000	SY				
1520	760016 RUMBLE STRIPS, HOT-MIX	10055.000	LF				
1530	760017 RUMBLE STRIPS, CONCRETE	3129.000	LF				
1540	762001 SAW CUTTING, BITUMINOUS CONCRETE	15764.000	LF				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

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
1550	762002 SAW CUTTING, CONCRETE, FULL DEPTH	155.000 LF				
1560	763000 INITIAL EXPENSE	LUMP	LUMP			
1570	763501 CONSTRUCTION ENGINEERING	LUMP	LUMP			
1580	763503 TRAINEE	1000.000 HOUR	0.80000		800.00	
1590	763508 PROJECT CONTROL SYSTEM DEVELOPMENT PLAN	LUMP	LUMP			
1600	763509 CPM SCHEDULE UPDATES AND/OR REVISED UPDATES	24.000 EAMO				
1610	763597 UTILITY CONSTRUCTION ENGINEERING	250.000 HOUR				
1620	763659 DUMPSTER ENCLOSURE	LUMP	LUMP			
1630	900500 ENVIRONMENTAL PERFORMANCE INCENTIVE (DISINCENTIVE)	LUMP	LUMP		452000.00	
1640	905001 SILT FENCE	1555.000 LF				
1650	905003 SEDIMENT TRAP	2800.000 CY				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

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
1660	905004 INLET SEDIMENT CONTROL, DRAINAGE INLET	90.000 EACH				
1670	906002 DEWATERING BAG	5.000 EACH				
1680	906003 SUMP PIT	15.000 EACH				
1690	906004 SKIMMER DEWATERING DEVICE	3.000 EACH				
1700	907011 STONE CHECK DAM	225.000 TON				
1710	907015 TEMPORARY SLOPE DRAIN, 24'	50.000 LF				
1720	907500 TEMPORARY SWALE, TYPE A-1	50.000 LF				
1730	907504 PERIMETER DIKE/SWALE, TYPE A-1	170.000 LF				
1740	907506 EARTH DIKE, TYPE A-1	1400.000 LF				
1750	908010 TOPSOILING, 6" DEPTH	103639.000 SY				

CANNOT BE USED FOR BIDDING

CONTRACT ID: T201011302.01 PROJECT(S): NH-2015(26)

All figures must be typewritten.

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	CTS	BID AMOUNT DOLLARS	CTS
1760	908014 PERMANENT GRASS SEEDING, DRY GROUND	109065.000	SY				
1770	908015 PERMANENT GRASS SEEDING, WET GROUND	5128.000	SY				
1780	908017 TEMPORARY GRASS SEEDING	103000.000	SY				
1790	908020 EROSION CONTROL BLANKET MULCH	16000.000	SY				
1800	908023 STABILIZED CONSTRUCTION ENTRANCE	600.000	TON				
1810	908502 WET GROUND EROSION CONTROL GRASS SEEDING, FLATS	44.000	SY				
1820	909001 SANDBAG DIKE	20.000	CF				
1830	910007 OUTLET STRUCTURE		LUMP	LUMP			
	SECTION 0001 TOTAL						
	TOTAL BID						

CANNOT BE USED FOR BIDDING

Contract No. T201011302.01

Diesel Fuel Cost Price AdjustmentOption

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

CANNOT BE USED FOR BIDDING

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: **T201011302.01** Breakout Sheet

OR MAILED TO: DELDOT
CONTRACT ADMINISTRATION
PO BOX 778, DOVER, DE 19903

'BREAKOUT SHEET' AND THE PROJECT NUMBER
MUST APPEAR ON THE ENVELOPE.

BREAKOUT SHEET - 1 **CONTRACT NO. T201011302.01**

ITEM 605501 - Ground Mount Breakaway Type Sign Supports and Foundations

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	LS	GM-1	$	$
2	1	LS	GM-2	$_____	$_____
3	1	LS	GM-10	$_____	$_____

Total Item No. 605501 - Ground Mount Breakaway Type Sign Supports and Foundations $_____

(LUMP SUM BID PRICE FOR ITEM 605501)

CANNOT BE USED FOR BIDDING

BREAKOUT SHEET - 2 **CONTRACT NO. T201011302.01**

ITEM 614508 - WATER MAIN AND ACCESSORIES

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	379	L.F.	Ductile Iron Pipe, Class 50, 8" (restrained), including excavation, bedding, backfill, and borrow material	$	$
2	3	EA	M.J. Bends 45 Degrees, 8"	$_____	$_____
3	2	EA	M.J. Bends 22.5 Degrees, 8"	$_____	$_____
4	1	EA	M.J. Bends 90 Degrees, 8"	$	$
5	1	EA	M.J. Tee 8"x6"	$	$
6	2	EA	D.I. Gate Valve w/Cast Iron Box and Cover, 8"	$	$
7	1	EA	Fire Hydrant, Ductile Iron Pipe Class 50, 6" (restrained) & D.I. gate Valve w/cast Iron Box and Cover, 6"	$	$
8	45	L.F.	18" Steel Casing Pipe with Ductile Iron Pipe Class 50, 8" (restrained) inside	$	$
9	8	CY	Class B Concrete (3,000 psi) for pipe encasement	$	$
10	1	EA	Prefabricated Reinforced P.C.C. Water Meter Vault 16'x6'x7' (including all Class 53 Ductile Iron Pipe, fittings, ladder, and incidentals)	$_____	$_____

Total Item No. 614508 - WATER MAIN AND ACCESSORIES $_____

(LUMP SUM BID PRICE FOR ITEM 614508)

CANNOT BE USED FOR BIDDING

BREAKOUT SHEET - 3
ITEM 910007 - OUTLET STRUCTURE

CONTRACT NO. T201011302.01

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Pond Outlet Structure, Concrete No. 756	$	$
2	1	EA	Pond Outlet Structure, Concrete No. 757	$_____	$_____
3	1	EA	Pond Outlet Structure, Concrete No. 758	$_____	$_____

Total Item No. 910007 - OUTLET STRUCTURE $_____
(LUMP SUM BID PRICE FOR ITEM 910007)

CANNOT BE USED FOR BIDDING

"ATTENTION"

TO BIDDERS

BREAKOUT SHEET(S) MUST BE SUBMITTED EITHER WITH YOUR BID DOCUMENTS; OR WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE BID DUE DATE BY THE LOWEST APPARENT BIDDER.

BREAKOUT SHEETS ARE TO BE SUBMITTED TO DELDOT'S CONTRACT ADMINISTRATION AS SHOWN BELOW. BREAKOUT SHEETS CANNOT BE CHANGED AFTER AWARD. THE DEPARTMENT WILL REVIEW THE FIGURES SUBMITTED ON THE BREAKOUT SHEET(S) TO ENSURE THEY MATCH THE RESPECTIVE LUMP SUM BID AMOUNT(S). MATHEMATICALLY INCORRECT BREAKOUT SHEETS WILL BE RETURNED FOR IMMEDIATE CORRECTION.

BREAKOUT SHEETS MAY BE SUBMITTED;

VIA E-MAIL TO: DOT-ASK@STATE.DE.US
SUBJECT: **T201011302.01** 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.

Prequalification for US 301 Contracts

I certify that _____ ,
Contractor/Subcontractor Company

Check One:

☐ **Either independently or through agreement with other organizations, is providing craft training for journeyman and apprentice levels through a bona fide program approved by and registered with the State of Delaware and/or United States Department of Labor, to comply with 29 Del C. 6962(c)(11). Enclosed is a copy of the certification of this program.**

☐ **Does not have a Craft Training Program because we do not have any apprenticeable trades, as defined in the Rules and Regulations Relating to Delaware Apprenticeship and Training Law Sections 5 and 6. Enclosed is documentation from the State of Delaware and/or United States Department of Labor confirming this determination.**

Name:_____

Title: _____

Date:_____

The completed Form and supporting documentation must be submitted no later than 10 a.m. local time on the day of the bid opening for Prequalification.

Contract No.T201011302.01
US 13 AND PORT PENN ROAD INTERSECTION IMPROVEMENTS

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____ day of _____ 20____.

My Commission expires _____. NOTARY PUBLIC _____.

<u>THIS PAGE MUST BE SIGNED AND NOTARIZED</u>

CERTIFICATION

Contract No. T201011302.01
Federal Aid Project No. T201011302

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)

CANNOT BE USED FOR BIDDING

The foregoing quantities are considered to be approximate only and are given as the basis for comparison of bids. The Department of Transportation may increase or decrease the amount of any item or portion of the work as may be deemed necessary or expedient. Any such increase or decrease in the quantity for any item will not be regarded as a sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work, except as provided in the contract.

Accompanying this proposal is a surety bond or a security of the bidder assigned to the Department of Transportation, for at least ten (10) percentum of total amount of the proposal, which deposit is to be forfeited as liquidated damages in case this proposal is accepted, and the undersigned shall fail to execute a contract with necessary bond, when required, for the performance of said contract with the Department of Transportation, under the conditions of this proposal, within twenty (20) days after date of official notice of the award of the contract as provided in the requirement and specifications hereto attached; otherwise said deposit is to be returned to the undersigned.

I/We are licensed, or have initiated the license application as required by Section 2502, Chapter 25, Title 30, of the Delaware Code.

By submission of this proposal, each person signing on behalf of the bidder, certifies as to its own organization, under penalty of perjury, that to the best of each signer's knowledge and belief:

1. The prices in this proposal have been arrived at independently without collusion, consultation, communication, or Agreement with any other bidder or with any competitor for the purpose of restricting competition.
2. Unless required by law, the prices which have been quoted in this proposal have not been knowingly disclosed and will not knowingly be disclosed by the bidder, directly or indirectly, to any other bidder or competitor prior to the opening of proposals.
3. No attempt has been made or will be made by the bidder to induce any other person, partnership, or corporation to submit or not to submit a proposal for the purpose of restricting competition.

==========

I/We acknowledge receipt and incorporation of addenda to this proposal as follows:

No.	Date	No.	Date	No.	Date	No.	Date	No.	Date

BIDDERS MUST ACKNOWLEDGE RECEIPT OF ALL ADDENDA

MUST INSERT DATE OF FINAL QUESTIONS AND ANSWERS ON WEBSITE: _____

==========

Sealed and dated this _____ day of _____ in the year of our Lord two thousand _____ (20___).

_____
Name of Bidder (Organization)

Corporate Seal

By: _____
Authorized Signature

Attest _____

_____
Title

SWORN TO AND SUBSCRIBED BEFORE ME this ____ day of _____, 20____.

Notary Seal

_____
Notary

CANNOT BE USED FOR BIDDING

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. T201011302.01___, 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

CANNOT BE USED FOR BIDDING