

# STATE OF DELAWARE

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## DEPARTMENT OF TRANSPORTATION

### BID PROPOSAL

for

### CONTRACT T200811301.01

FEDERAL AID PROJECT NO. NH-2015 (20)

US 301, MARYLAND STATE LINE TO LEVELS ROAD

NEW CASTLE COUNTY

ADVERTISEMENT DATE: November 10, 2015

COMPLETION TIME: 850 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 **December 22, 2015**

**Contract No.T200811301.01  
Federal Aid Project No. NH-2015 (20)**

**US 301, MARYLAND STATE LINE TO LEVELS ROAD  
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 construction of a divided highway including: clearing and grubbing; excavation, hauling and placing embankment for roadway construction P.C.C. roadway pavement and shoulders; P.C.C./asphalt ramps; asphalt side roads; toll facilities; intelligent transportation systems including CVISN and WIM; drainage improvements; stormwater management facilities; guardrail; fencing; archeology resource protection areas; erosion and sediment controls; signing; lighting; pavement markings; traffic signal work; landscaping; mechanically stabilized earth retaining walls; reinforced concrete bridges with prestressed reinforced concrete girders; furnishing and installing piles; maintenance of traffic; utility relocations; and other incidental construction in accordance with the location, notes and details shown on the plans and as directed by the engineer. This contract includes work within the state of Maryland. This contract is also referred to as Contract 3.

COMPLETION TIME

All work on this contract must be complete within 850 Calendar Days. The Contract Time includes an allowance for 120 Weather Days. It is the Department's intent to issue a Notice to Proceed such that work starts on or about February 18, 2016.

PROSPECTIVE BIDDERS NOTES:

1. **BIDDERS MUST BE REGISTERED** with DelDOT and request an official Bid Proposal that contains plans and specifications in order to submit a bid. Contact DelDOT at [dot-special@state.de.us](mailto:dot-special@state.de.us) or phone 302-760-2031 to request Bid Documents.
2. **QUESTIONS** regarding this project are to be e-mailed to [dot-special@state.de.us](mailto:dot-special@state.de.us) no less than six business days prior to the proposal opening date in order to receive a response. 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 is to be printed and submitted in paper form along with the cd and other required documents prior to the Bid due date and time.
4. **BONDS:** 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. The Bid Bond form submitted must be the form included with this proposal, or the [identical form located here](#). The successful bidder will be required to present a Payment/Performance Bond in the amount of 100% of their bid prior to contract execution.
5. **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](mailto: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](mailto: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](http://www.deldot.gov/information/business/bids/const_proj_bid_info.shtml)

6. **WORK IN THE STATE OF MARYLAND.** Work shall be performed within the State of Maryland and Cecil County, Maryland jurisdictions. The contractor shall be responsible for obtaining and paying all licenses, taxes, fees, wage rates, and any other requirements for performing work within those jurisdictions. The contractor shall be responsible for ensuring that all subcontractors performing work in the State of Maryland and Cecil County have obtained and paid all licenses, taxes, fees, wage rates and any other requirements for performing work within those jurisdictions. Items and quantities for the work within the State of Maryland and Cecil County, Maryland jurisdictions are in Section 0009 of the Bid Proposal Schedule of Items.
  - a. As shown in the Contract Documents, this contract involves work within the State of Maryland. The stormwater management and the erosion and sediment control practices within the State of Maryland are subject to oversight by the Maryland State Highway Administration (MDSHA) as delegated to MDSHA by the Maryland Department of the Environment (MDE). The Contractor shall follow all requirements in the MDE permit and as shown in the Contract documents, including the preparation, submission and tracking of daily work logs. DelDOT shall prepare as-built surveys of the permanent stormwater management facilities constructed in the State of Maryland. Item 900500 Environmental Performance Incentive (Disincentive) shall be based on a review of the entire project limits, including work within the State of Maryland.
  - b. Grading Permit from Cecil County, Maryland is required for the work within Cecil County, Maryland. DelDOT will submit the application for this permit after the T200811301 Contract has been fully executed. The Contractor shall coordinate with DelDOT to supply all required information and signatures. DelDOT shall pay any application fees.

7. **ALTERNATE BID ITEMS.** This contract contains options for Alternate Bid Items. There are two choices for the Pile Alternate group for Bridge 1-486 (Strawberry Lane over US 301) and three choices for the Pile Alternate group for Bridge 1-482 (Levels Road over US 301). Bid only one of the choices in each ALT GROUP. For Bridge 1-486, one Section Choice is titled PILE ALTERNATIVE 1 and the other Section is title PILE ALTERNATIVE 2. Bid only one of these sections and leave the other section blank. For Bridge 1-482, one Section Choice is titled PILE ALTERNATIVE 1, one Section Choice is titled PILE ALTERNATIVE 2, and one Section Choice is titled PILE ALTERNATIVE 3. Bid only one of these sections and leave the other sections blank. (NOTE. In the event of a bidder error mistakenly bidding more than one Alternative, the Alternative that is fully completed and contains the lowest price will be utilized for the bid.)
8. **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 his document.
9. **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.
10. **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 titles "3 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](mailto: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.

11. 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.

DelDOT anticipates that the potential NLEB habitat areas will be cleared under a separate Advance Clearing Contract that will be complete before April 15, 2016. The Advance Clearing Contract will only perform clearing and not grubbing and the cleared materials shall be left within the limits of the project at the locations where they are cleared and the Contractor for Contract T200811301 shall be responsible for removing and properly disposing of the cleared materials with all costs included under Item 201000-Clearing and Grubbing. The Advance Clearing Contractor shall cut trees 3 inches and larger in diameter at breast height (DBH) and leave a stump that is approximately two to four feet above the existing ground. Coordination between the Advance Clearing Contractor and the Contractor for Contract T200811301 shall also include:

- a. The Contractor for Contract T200811301 shall review with the Engineer all Resource Protection Fence (RPF) that has been installed by the Advance Clearing Contract. The Engineer shall identify the limits of the existing RPF that shall become the responsibility of the Contractor for Contract T200811301 to maintain and repair during the construction period in accordance with the requirements of Item 727552. The Contractor for Contract T200811301 shall also remove and

dispose of the existing RPF after it is no longer required as determined by the Engineer and at the time of the removal the existing RPF shall be measured for payment under Item 727552 Resource Protection Fence. All costs to maintain and repair the existing RPF and salvaging and delivering the signs to the DelDOT sign shop shall be included in the unit bid price for Item 727552. There will be approximately four thousand five hundred (4,500) linear feet of existing RPF installed by the Advance Clearing Contract.

The approximate areas bounded within the woods line symbol and the limit of construction symbol on the construction plans that have been identified as potential NLEB habitat and that are anticipated to be cleared by the Advance Clearing Contract include:

- a. US301 Station 104+20 Rt. to US301 Station 110+50 Rt.
  - b. US301 Station 120+85 Rt. to US301 Station 124+40 Rt.
  - c. US301 Station 125+00 Rt. to US301 Station 131+15 Rt.
  - d. US301 Station 133+00 Rt. to US301 Station 134+50 Rt.
  - e. US301 Station 122+50 Lt. to US301 Station 126+40, 120' Lt.
  - f. US301 Station 126+10 Lt. to US301 Station 137+40, 110' Lt.
  - g. Strawberry Lane, US301 Station 135+60, 600' Lt. to US301 Station 135+60, 610' Lt. to US301 Station 136+55, 610' Lt. to US301 Station 136+55, 600' Lt.
  - h. Strawberry Lane, US301 Station 137+40, 110' Lt. to US301 Station 136+70, 600' Lt. to US301 Station 137+40, 575' Lt. to US301 Station 137+95, 155' Lt. to US301 Station 137+40, 110' Lt.
  - i. Strawberry Lane, US301 Station 137+80, 550' Rt. to US301 Station 137+90, 270' Rt., to US301 Station 138+20, 320' Rt., to US301 Station 138+11, 550' Rt.
  - j. Strawberry Lane, US301 Station 140+00, 850' Rt., to US301 Station 139+50, 280' Rt., to US301 Station 141+90, 300' Rt., to US301 Station 142+50, 280' Rt., to US301 Station 139+70, 375' Rt.
  - k. Strawberry Lane, US301 Station 138+80, 120' Lt. to US301 Station 138+17, 990' Lt., to US301 Station 140+05, 165' Lt. US301 Station 143+50, 10' Rt. to US301 Station 143+50, 10' Lt. to US301 Station 152+20, 215' Lt. to US301 Station 154+30, 140' Lt. to US301 Station 160+50, 85' Rt. to US301 Station 160+90, 15' Lt.
  - l. US301 Station 161+50, 65' Rt. to US301 Station 165+40, 40' Rt. to US301 Station 165+40, 115' Rt.
  - m. US301 Station 178+70, 15' Rt. to US301 Station 178+95, 150' Lt. to US301 Station 170+90, 145' Lt. to US301 Station 171+10, 45' Rt.
  - n. US301 Station 144+00, 295' Rt. to US301 Station 144+50, 130' Rt. to US301 Station 138+30, 325' Rt., to US301 Station 152+65, 210' Rt. to US301 Station 158+50, 450' Rt.
  - o. US301 Station 159+25, 220' Rt. to US301 Station 160+20, 470' Rt. to US301 Station 160+50, 200' Rt. to US301 Station 160+85, 440' Rt.
  - p. US301 Ramp E Station 1279+15, to US301 Ramp E Station 1278+50, 280' Rt., to US301 Ramp E Station 1280+25.
  - q. US301 Ramp E Station 1279+15, to US301 Ramp E Station 1280+00, 110' Lt. to US301 Ramp E Station 1280+70, 110' Lt. to US301 Ramp E Station 1283+20, 295' Lt. to US301 Ramp E Station 1280+25.
12. 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.
  13. The Contractor shall submit to the Department legible copies of the Bid Documentation as set forth in Section 103.09 Escrow of Bid Documentation.
  14. 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.
  15. 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.

16. Any unacceptable shifting or movement in MSE wall panels resulting from adjoining pile driving or other Contractor activity shall be corrected to the satisfaction of the Engineer. The Contractor shall submit a plan detailing the repair procedure to the Engineer for approval prior to beginning any required repairs. Costs for preparation and submittal of the plan and for performing the repairs if required are to be incidental to Item 602772 Mechanically Stabilized Earth Walls.
17. Any requirement to utilize Borrow Types A, B, C, D, F, or MSE wall backfill (or materials meeting the requirements of Borrow Types A, B, C, D, F, or MSE wall backfill) 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.
18. 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.
19. Under Item 763501 Construction Engineering, Machine Control Grading, the Contractor shall provide the Engineer a total of three (3) 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.
20. 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.
21. 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.

22. Completion dates and Interim Completion dates identified in the Contract documents shall be identified in the Contractor's CPM schedule as Milestones.
23. 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.
24. 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>
25. Concrete for Items 602013 P.C.C. Masonry, Superstructure Class D, 602017 P.C.C. Masonry, Parapet, Class A and 720626 Concrete Single Face Barrier, Type I shall include a shrinkage reducing/compensating admixture. 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.
26. Delete Standard Specification Section 602.20 (c) and replace with the following:

Texturing. Texture bridge deck, approach slab, and transition slab surfaces by first dragging a fabric over the final screeded concrete and then by sawing longitudinal grooves in the cured concrete. After final screeding of the surface, drag multiple-ply damp fabric over the surface to provide a gritty texture. After the bridge deck or approach slab has been cured and attained at least 75% of the 28-day design compressive strength, saw uniformly pronounced grooves parallel to the centerlines without damaging the concrete deck surface. Complete a longitudinal grooving operation that results in a uniformly grooved deck surface.

Saw grooves approximately  $1/8" + 0"$ ,  $- 1/16"$  wide,  $3/16" \pm 1/16"$  deep, and on  $3/4" \pm 1/16"$  (nominal) centers. Terminate grooves  $18" \pm 1"$  from the face of the parapet or curb line. If metal drainage inlets extend more than 18" from the parapet or curb line, all grooves on the bridge deck surface are to end within 6" of the drainage inlet perimeter. At skewed metal edged expansion joints, end all grooves within 6" of the joint leaving no ungrooved surface adjacent to each side of the joint greater than 6" in width on the deck side of the expansion joints. Produce grooves that are continuous across construction joints or other joints in the concrete deck surface less than  $1/2"$  wide. Do not saw grooves for a width of 10 inches,  $\pm 1$  inch at locations of permanent striping lines in order to provide a smooth surface for placement of permanent roadway striping. Perform continuous removal of all waste materials, including slurry, resulting from the grooving operations in accordance with Standard Specification subsections 106.09 and 110.17, leaving all surfaces in a washed and clean condition.

Delete the last paragraph of Standard Specification Section 602.20 (b) and replace with the following:

After the concrete has cured, test the surfaces of all decks, approach slabs, and transition slabs for smoothness using an Inertial Profiler. Testing and corrective work shall conform to the requirements of Special Provision Section 501.14, Pavement Smoothness Testing. Seal or repair any cracks in the

decks, approach slabs, or transition slabs which occur prior to opening to traffic, in a manner approved by the Engineer at no cost to the Department. Sound the riding surfaces, then remove and replace any delaminated areas in a manner approved by the Engineer at no cost to the Department.

27. 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](http://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.
28. At the Levels Road Borrow Site, this site is also being utilized under the adjacent Contract T200911303. The Contractor for Contract T200811301 shall coordinate access to the areas of the Borrow Site as noted elsewhere in the contract documents. In addition, Contract T200811301 will be responsible for erosion and sediment control measures in Area 2 and Area 3 of the Borrow Site as shown on the plans and shall be responsible for the erosion and sediment control measures for the durations noted unless otherwise approved by the Engineer. The Contractor for Contract T200911303 shall assume responsibility for the erosion and sediment control devices installed by Contract T200811301 when Contract T200911303 moves into an area where Contract T200811301 had been working. This responsibility shall begin at least 14 calendar days prior to the end of the responsibility period for the specific area by Contract T200811301 unless otherwise approved by the engineer. The Contractor for Contract T200911303 shall replace the erosion and sediment control measures with his own material or enter into an agreement to purchase the erosion and sediment control measures from the Contractor for Contract T200811301. The Contractor for Contract T200811301 shall coordinate the replacement with the Contractor for Contract T200911303 so that continuous erosion and sediment control is provided. The Contractor for Contract T200811301 shall remove all erosion and sediment control measures that the Contractor for Contract T200911303 does not agree to purchase. All costs associated with removing the erosion and sediment control measures and coordinating any replacement shall be incidental to Item 900501 Borrow Area Erosion and Sediment Control and Dewatering.
29. At the Levels Road Borrow Site, the Contractor for Contract T200811301 shall only perform work within Area 2 and Area 3 as designated on the plans. In addition:
- a. The Contractor for Contract T200811301 shall have access to Area 2 and responsibility for the erosion and sediment control measures for the first two hundred and eight (208) calendar days from the first chargeable day identified in the Notice to Proceed for Contract T200811301 after which Contract T200911303 shall have exclusive access to Area 2.
  - b. The Contractor for Contract T200811301 shall have access to Area 3 and responsibility for the erosion and sediment control measures for the first three hundred and forty-four (344) calendar days from the first chargeable day identified in the Notice to Proceed for Contract T200811301 after which Contract T200911303 shall have exclusive access to Area 3.
  - c. If the Contractor for Contract T200811301 has not completed the excavations in Area 2 or Area 3



within the timeframes noted to obtain the quantities of materials needed for the project as identified in the contract documents, the Contractor for Contract T200811301 shall provide the materials needed for the project that he was not able to obtain from Area 2 or Area 3 from an approved outside source at the unit price bid for Item 202000-Excavation and Embankment.

30. DelDOT will be advertising a separate contract to construct the toll equipment huts and gantries within the limits of construction for this Contract. The Contractor for T200811301 shall coordinate their Work and cooperate with this Toll Equipment Hut and Gantries Contractor per Section 105.08 Cooperation between Contractors. For informational purposes only, the anticipated work to be performed by the Toll Equipment Hut and Gantries Contractor is included in the Contract Plans.
31. The Completion Date for all of the work in this contract is identified elsewhere in the contract documents. In addition, the following Interim Completion Dates and coordination are associated with the separate Toll Equipment Hut and Gantries Contract:
  - a. An Interim Completion Date of five hundred seventy (570) Calendar Days is established for completion and acceptance by the Engineer of all work required to be complete by the Contractor for Contract T200811301 in order for the Toll Equipment Hut and Gantries Contractor to access and construct the Toll Equipment Hut and Gantries. This will include completing all paving along the entire baseline of the US 301 mainline from Station 201+00 to Station 210+00, completion of the gantry foundations, and the installation of all ITMS underground facilities throughout the entire contract. The contractor for Contract T200811301 shall provide unrestricted access to the Toll Equipment Hut and Gantry work areas on the US 301 mainline for the construction of those improvements for a period of one-hundred sixty (160) calendar days after the work just described is completed or after 570 Calendar Days, whichever is later. If the work just described is not completed within 570 Calendar Days, then for each and every Calendar Day charged beyond the 570 Calendar Days, Liquidated Damages shall be assessed and deducted from monies due the contractor per Section 108.08 in the amount of seventy-five percent (75%) of the value shown in Section 108.09 until such time as the described work is complete and accepted by the Engineer.
  - b. An Interim Completion Date of forty-five (45) Calendar Days is established for completion and acceptance by the Engineer of all work required to be complete by the contractor for Contract T200811301 in order for the Toll Integrator to install and test all toll equipment at the US 301 mainline toll locations, both northbound and southbound. This work shall include: pavement on the US301 mainline from Station 186+00 to Station 246+00; guardrail and end treatment installation; final grading and stabilization; installing conduits and junction wells connecting to the Toll Equipment Hut and Gantries; and installing any electric and communication connections to the Toll Equipment Hut and Gantries. The contractor for Contract T200811303 shall then provide unrestricted access to the US301 mainline for the Toll Integrator to install and test the toll collection facilities for the remaining duration of Contract T200811301 after the work just described is completed. This forty-five Calendar Day period shall begin upon completion and acceptance by the Engineer of the work being constructed under the separate Toll Equipment Hut and Gantries contract. The Engineer shall notify the contractor for Contract T200811301 when the work under the Toll Equipment Hut and Gantries contract has been accepted. If the work just described is not completed within the proscribed 45 Calendar Days, then for each and every Calendar Day charged beyond the 45 Calendar Days, Liquidated Damages shall be assessed and deducted from monies due the contractor per Section 108.08 in the amount of ninety percent (90%) of the value shown in Section 108.09 until such time as the described work is complete and accepted by the Engineer.
  - c. These liquidated damages for Interim Completion Dates are in addition to and do not void or alter any liquidated damages that may be assessed if work for other Interim Completion Dates is not completed and accepted by the Engineer within the identified Interim Completion Date or if all of the work in the contract is not completed and accepted by the Engineer within the identified Completion Date for the entire contract.
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. 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
802516	910001	INFILTRATION STONE, NO.3
802517	910002	INFILTRATION STONE, NO. 8
802518	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 VEGETATIVE 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	<i>In 2A for Levels Site</i>	BEDDING FOR REFORESTATION

34. No retainage will be withheld on this contract.
35. 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.
36. This project incorporates **Appendix A TECHNICAL SPECIFICATIONS**, which is a part of this contract. Appendix A contains additional specifications required for this project.
37. **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*).
38. **PROPOSED TRAINEE PLANS** as required. Number of required programs is listed in the Training Special Provisions within Contract General Notices. The program(s) must be submitted within 10 Calendar Days of notification of apparent low bidder status. Contract Award will not take place until acceptable On-the-Job (OJT) program plans are received by the Civil Rights Group of the Department.  
Failure of the apparent low bidder to present copies of an acceptable OJT Trainee Programs within ten (10) calendar days of notification of apparent low bidder status, shall create a rebuttable presumption that the bid is not responsive.

Contract No.T200811301.01  
CONSTRUCTION ITEMS UNITS OF MEASURE

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

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

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

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

TAX CLEARANCE:

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

LICENSE:

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

SUBCONTRACTOR LICENSE: 29 DEL. C. §6967:

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

DIFFERING SITE CONDITIONS,

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

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

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

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

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

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

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

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

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

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

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

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

- (A) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction or
- (B) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed.

CONFLICT WITH FEDERAL STATUTES OR REGULATIONS:

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

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

FEDERAL LABOR AND EMPLOYMENT REQUIREMENTS

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

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

CONVICIT PRODUCED MATERIALS:

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

TO REPORT BID RIGGING ACTIVITIES:

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

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

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

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

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

Goals for Minority Participation In  
Each Trade

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

Goals for Female Participation In  
Each Trade

6.9% (Entire State)

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

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

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

REV. 11-3-80

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

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



Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

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

- by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
  - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
  - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
  - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
  - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
  - o. Document and maintain a record of all solicitations of offers for subcontractors from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
  - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participating, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
  9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under utilized).
  10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
  11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
  12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Order of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment-related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

\* \* \* \* \*

#### TRAINING SPECIAL PROVISIONS

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

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

The number of trainees to be trained under the special provision will be 2. In the event the contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year apprenticeship or training.

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

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

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

The minimum length and type of training for each classification will be as established in the training program selected by the contractor and approved by the Department of Highways and Transportation and the Federal Highway Administration. The Department of Highways and Transportation and the Federal Highway Administration shall approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the contractor and to qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work the classification covered by the program. It is the intention of these provisions that the training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some off-site training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

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

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

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

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

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

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

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INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT  
& TRANSPORTATION EQUITY ACT

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

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM SPECIFICATION

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

The following definitions apply to this subpart:

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

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

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

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

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

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

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

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

- (i) Black Americans which includes persons having origins in any of the Black racial groups of Africa;
- (ii) Hispanic Americans which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;

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

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

### **Disadvantaged Business Enterprise 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 it has made to obtain the information.
5. Sanctions for Noncompliance: In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration (FHWA), or Federal Transit Authority (FTA) may determine to be appropriate, including, but not limited to:

withholding payments to the contractor under the contract until the contractor complies; and/or cancelling, terminating, or suspending a contract, in whole or in part.

6. Incorporation of Provisions: The contractor will include the provisions of paragraphs one through five in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts and the Regulations . The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration (FHWA), or Federal Transit Authority (FTA) may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

#### **APPENDIX E**

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

Pertinent Non-Discrimination Authorities:

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

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,(42 U.S.C. § 460 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 1964,The AgeDiscrimination Act of 1975and Section 504 of the Rehabilitation Act of 1973,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 :

*8/17/15*

BY:

*[Signature]*  
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.

**Project:**

**US ROUTE 301**

**T200811301 US301, MARYLAND STATE LINE TO LEVELS ROAD**

GENERAL DECISION: DE150011 08/14/2015 DE11

State: DELAWARE

Construction Type: HIGHWAY

COUNTY: New Castle County in Delaware

HIGHWAY CONSTRUCTION PROJECTS

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

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

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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	

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

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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



General Decision Number: MD150019 10/09/2015 MD19

State: Maryland

Construction Type: Highway

Counties: Carroll, Cecil, Harford and Queen Anne's Counties in Maryland.

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

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

Modification Number                      Publication Date  
 0    10/09/2015

SUMD2015-014 09/15/2015

	Rates	Fringes
CARPENTER.....	\$ 26.01	12.55
CEMENT MASON/CONCRETE FINISHER... \$	24.61	9.64
ELECTRICIAN..... \$	37.69	14.65
IRONWORKER, REINFORCING..... \$	27.05	17.31
IRONWORKER, STRUCTURAL..... \$	26.97	15.87
LABORER: Asphalt, Includes Raker, Shovel er, Spreader and Distributor..... \$	18.39	5.87
LABORER: Concrete Surfacer..... \$	20.99	5.87
LABORER: Grade Checker..... \$	19.11	16.35
LABORER: Luteman..... \$	21.75	5.87
LABORER: Mason Tender - Cement/Concrete..... \$	19.11	16.35
LABORER: Pielayer..... \$	20.65	6.06
LABORER: Common or General, Includes Flagger..... \$	17.32	6.08

MD FHWA rates.txt

OPERATOR:		
Backhoe/Excavator/Trackhoe.....	\$ 26.45	12.15
OPERATOR: Bobcat/Skid		
Steer/Skid Loader.....	\$ 23.49	12.15
OPERATOR: Boom.....	\$ 23.49	12.15
OPERATOR: Broom/Sweeper.....	\$ 23.49	12.15
OPERATOR: Bulldozer.....	\$ 26.45	12.15
OPERATOR: Crane.....	\$ 30.30	15.30
OPERATOR: Distributor.....	\$ 23.24	1.88
OPERATOR: Grading.....	\$ 27.45	12.15
OPERATOR: Loader.....	\$ 26.45	12.15
OPERATOR: Milling Machine.....	\$ 26.45	12.15
OPERATOR: Paver (Asphalt,		
Aggregate, and Concrete).....	\$ 25.55	12.15
OPERATOR: Piledriver.....	\$ 26.01	12.55
OPERATOR: Roller.....	\$ 25.55	12.15
OPERATOR: Screed.....	\$ 21.99	3.56
PAINTER: Bridge.....	\$ 33.23	9.40
SCAFFOLD BUILDER.....	\$ 26.01	12.55
TRUCK DRIVER: Dump Truck.....	\$ 22.00	0.00
TRUCK DRIVER: Flatbed Truck.....	\$ 19.10	0.00
TRUCK DRIVER: TackTruck.....	\$ 22.94	7.87
TRUCK DRIVER: Water Truck.....	\$ 25.70	6.96

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

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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  
(29CFR 5.5 (a) (1) (ii)).

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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

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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 the "SU" identifier indicate 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.

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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, DC 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, DC 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, DC 20210

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

=====  
END OF GENERAL DECISION

**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](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 T200811301.01  
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 than 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  $\frac{1}{8}$  inch in 10 feet, and do not vary the vertical face of the form by more than  $\frac{1}{4}$  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  $\frac{1}{2}$  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  $\frac{1}{4}$  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 1/4 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 than 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 3/4 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. DeIDOT Materials and Research Section can provide copies of the chart upon request.

The contractor will submit, for approval, a “Thermal Plan” for protection of concrete pavement to address both hot and cold placement temperatures (as defined by ACI 305 and 306 respectively). The plan must incorporate, as a minimum, the following restrictions:

- 1. Cold Weather –
  - a. Do not place concrete when the ambient air temperature in the shade, and away from artificial heat, is less than 35° F. Resume placement when the ambient air temperature is 35° F and rising.
  - b. Do not place concrete on frozen grade.
  - c. Maintain temperatures of not less than 50° F surrounding the concrete pavement for a curing period of five calendar days following placement of the concrete. Provide all necessary monitoring devices (High-Low thermometers or other tools) and a plan for monitoring the temperature during the five day

period ensuring placed concrete is not damaged by the temperatures. Use of insulating blankets, straw, polyethylene, or other protection subject to the approval of the Engineer must be addressed in the plan.

## 2. Hot Weather

- a. If plastic concrete temperatures reach 80° 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 85° 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  $T/3 + 1/4$ " (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  $T/3 + 1/4$ " 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  $1/4$ " 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  $1/4$ " 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  $1/4$ " 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  $1/4$ " 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:

XXXXXXXXLoc1LEBr3

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 DeIDOT Materials and Research and DeIDOT 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**

<i>Deficiency in Average Pavement Thickness Determined by Cores</i>	<i>Proportional Part of Contract Unit Bid Price (%)</i>
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.

$$\text{IRI Bonus / Penalty} = \text{Surface Area (in Square Yards)} * \text{UP} * (\text{PA}-100)/100$$

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:

$$(\sum \text{IRI Bonus / Penalty for each section}) - \text{Total Deviations} * \$200$$

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](http://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](http://www.deldot.gov/information/business/bids/asphalt_cement_english.shtml).

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

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

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

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

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

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

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

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

**NOTE:**

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

5/05/15

**202505 - SETTLEMENT PLATFORM**  
**202518 - SETTLEMENT MONUMENT**

**Description:**

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

**Submittals:**

1. Qualifying Experience

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

1. Project Name, Location, Project Description, and Completion Date.
  2. Surface and Subsurface Conditions.
  3. Type and number of instruments installed.
  4. Installation equipment and techniques utilized when applicable.
  5. Provide names, current phone numbers, and current business addresses for the owner/designer, geotechnical consultant, and contract manager.
2. Settlement surveying and monitoring plan for review prior to construction. The plan shall identify the detailed location of settlement monitoring points, reference benchmarks, survey schedules and procedures and reporting formats.
3. Description of the surveying equipment to be used.
4. Settlement Plate Layout and Installation Details: Within two days after the installation of each settlement plate, the Contractor shall submit an installation record sheet including appropriate items from the following list.
- i. Project name.
  - ii. Contract name and number.
  - iii. Settlement plate number.
  - iv. Material sizes and compositions.
  - v. Planned location in horizontal position and elevation.
  - vi. Planned orientation.
  - vii. Personnel responsible for installation.
  - viii. Date and time of start and completion.
  - ix. Weather conditions at the time of installation.
  - x. Notes of importance on the installation including problems encountered, delays, unusual features of the installation, and details of any events that may have a bearing on settlement plate behavior.

**Schedule for Settlement Platform Installations and Readings:**

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

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

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

**Protection of Instrumentation and Repair of Damage**

- a. The Contractor shall protect all instruments and appurtenant fixtures, leads, connections, and other components of instrumentation systems from damage due to construction operations.
- b. If an instrument is damaged or made inoperative due to the Contractor's operations or the operation of subcontractors under the direction of the Contractor, the Contractor shall notify the Engineer immediately. The Engineer will be the sole judge of whether repair or replacement is required. For each instrument that is abandoned for these reasons, the Contractor shall replace that instrument at no additional cost to the Department.
- c. Should any instrument become damaged or inoperative through no fault of the Contractor, the damaged or inoperative instrument shall be repaired or replaced at the contract unit prices for that instrument.
- d. The Engineer will advise the Contractor immediately upon discovery of damage to instruments as to the necessary schedule for replacement and the times of required access. Damaged instruments shall be repaired or replaced within 24 hours of initial damage. The Contractor's construction operations in the area of a damaged instrument(s) may be halted during repair or replacement of each damaged instrument at the request of the Department.

**Materials:**

**Settlement Plates**

- a. Settlement plates are sub-surface displacement reference platforms placed on the prepared ground surface prior to embankment fill placement. Risers are extended from the settlement plate as the fill is placed. A casing is placed around the riser for protection. Settlement plates are monitored by optical survey methods to determine vertical displacements occurring during and after embankment construction.
- b. The base plate shall be made from steel conforming to the requirements of ASTM A36. The riser pipe and outer casing shall be steel pipe conforming to the requirements of ASTM A53, Grade B, standard weight. The casing and the risers shall be as shown on the attached detail. The casing pipe shall have a minimum wall thickness of 0.375 inches. The riser pipe shall be galvanized and have a minimum wall thickness of 0.25 inches. Couplings, pipe caps, etc. shall conform to the requirements of ASTM A865. Threaded pipes shall be used for riser and casing pipe extensions.
- c. Sand shall conform to the requirements of ASTM C33.

Settlement Monuments

- a. Materials for the construction of the Settlement Monument shall conform to the applicable sections of Section 812 for the Concrete, Class C of the Standard Specifications.
- b. The Reinforcement Bar shall conform to Section 824 of the Standard Specifications.

**Construction Methods:**

1. Readings on the settlement platforms and settlement monuments shall be performed by the Contractor. The Contractor is fully responsible for establishing benchmarks, submittals, and furnishing, installing and maintaining the settlement platforms.
2. The settlement monuments shall be installed at locations indicated on the plans or as directed by the Department.
3. The settlement plates shall be installed as indicated on the plans after all clearing and grubbing and topsoil removal has been completed. The sand base shall be tamped to provide a firm, level, and unyielding bearing surface for the base plate. The riser pipe shall be marked in 1-foot increments and labeled at 5-foot increments to indicate the distances above the plate extending up through the embankment fill. Settlement plates shall be fabricated as shown on the attached detail.
4. The initial casing and riser pipes shall have a maximum length of 4 feet for each section. Spacers shall be provided between the riser pipe and the casing at a minimum of 4-foot intervals to ensure concentricity. The spacers shall not be directly attached to the riser pipe or otherwise installed that would impede the independent movement of the riser pipe.
5. As the height of fill above the settlement plate changes, the casing and riser pipes shall be increased or decreased in a maximum of 4-foot intervals to maintain the top of the riser pipe and casing above the embankment. As each additional length of pipe is added or removed, the pipe cap on the casing shall be immediately transferred to the top section on the settlement plate so as to prevent fill material from entering the casing. At other times, the cap shall only be removed to check settlement.
6. The casing pipe shall be marked by flags or other approved method to clearly show its location and to warn equipment operators and others of its location. The Contractor shall maintain the flags during the entire length of the Contract and replace those flags that are missing. At no time shall the settlement plate risers and casings extend higher than 5 feet above the ground surface elevation. Sections shall be added or removed as necessary during embankment construction to maintain the tops of the risers and casings at least 1-foot above the surface of the embankment.
7. The Contractor is responsible for maintaining the settlement plates in working order during the length of the Contract. Settlement Plates which are to be abandoned at the completion of the project shall have their riser pipes cut off two feet below roadway subgrade level and capped. If an instrument is damaged, moved, or disturbed due to causes other than settlement, the Contractor shall repair, reset, or replace the damaged instrument at no additional cost to the Department within three days after being damaged. The Engineer will be the sole judge of whether repair, resetting, or replacement is required. No additional fills shall be placed within fifty (50) feet of a damaged settlement platform until the damage has been corrected to the satisfaction of the Engineer. The Engineer may impose a work stoppage in the vicinity of the damaged instrument until it is again operational at no additional cost to the Department. Any repairs or replacements required will be at the Contractor's expense.
8. By the end of the first work day in each week, the Contractor shall submit to the Engineer a description of the work performed during the previous week. This description shall include at a minimum: a plan view location of the placed embankment, the volume of embankment placed, and in-situ density test results in accordance with Standard Specification sections 202 and 209.



9. The use of the settlement platforms for collecting data related to embankment foundation response will extend beyond the time of completion of the Contractor's embankment placement operations. The Contractor shall be responsible for assuring that all platforms are in working order until the time of completion of the Contract.
10. Readings on all settlement monitoring devices shall be taken at a minimum of 3 calendar day intervals.
11. For vertical deformation monitoring, runs shall be performed by a single run beginning and ending on two different benchmarks installed in accordance with NGS standards. Settlement monitoring points shall be used as turning points or as intermediate foresights from two different turning points, allowing elevations to be adjusted and eliminating significant observational errors. The maximum length of line of sight shall be 150 feet, and the imbalance between backsight and foresight shall not exceed 30 feet. Allowable level loop misclosure shall not exceed  $\pm 0.033$  times the square root of M feet (where M is the distance of the level run in miles) for a single run between two benchmarks. A formal initial reading on a settlement monitoring point will consist of the average of three elevations, from three independent level runs, which meet the closure specified herein. Elevations established subsequent to a formal initial reading shall be determined by a single run as specified herein. The least count (without estimation) of the rod and level combination shall read to 0.003 foot or less, such that the accuracy of an elevation measurement shall be  $\pm 0.01$  foot (at 95 percent level of confidence).
12. Data shall be recorded in U.S. survey feet or inches.
13. Instruments used for vertical deformation monitoring shall have a minimum accuracy of plus or minus 0.005 of a foot (standard deviation for 3300 feet of double run leveling) and a minimum setting accuracy of plus or minus 1.0 arc seconds. Leveling rods shall be non-telescopic in design (i.e. "Chicago" style leveling rod). A bull's eye bubble shall be used to plumb the leveling rod. The use of fiberglass rods will need approval of Engineer prior to use.
14. All data recorded by the Contractor shall be of the following form:
  - a. Raw and reduced data shall be on summary tables in printed tabular format on 8-1/2 inch x 11 inch sheets of paper.
  - b. Reduced data for up to six like instruments that are located in the same geographical area shall be plotted on the same graphical plot. Each plot shall be submitted on an 8-1/2 inch x 11 inch sheet or 11 inch by 17 inch sheet.
  - c. Plots of deformation data at Settlement Monitoring Plates shall show absolute vertical deformation versus time with height or elevation of fill placed at time of reading. Plots of settlement monument data shall show absolute vertical deformation versus time and shall show the height or elevation of fill placed at the time of reading. Deformation plots shall also be provided in electronic data file format.
  - d. Survey data reports prepared by the Contractor shall be signed and sealed by either a Professional Engineer or Professional Land Surveyor licensed in the State of Delaware.

**Method of Measurement:**

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

**Basis of Payment:**

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

**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

**202569 – POND ACCESS ROAD, MARYLAND**

**Description:**

This work shall consist of furnishing and constructing an access road with a cellular confinement load support system in accordance with the details and locations shown on the Plans and as directed by the Engineer, for locations in Maryland.

**Materials:**

**Topsoil:** Topsoil shall conform to the requirements of Section 732 and Section 733 of the Standard Specifications.

**Stone:** Shall be in conformance with AASHTO M 43, No. 7 for a 1/4" to 3/4" inch stone.

**Mulch Binder:** Mulch binder shall conform to the requirements of Item 734556 – Permanent Vegetative Stabilization, Maryland. Also see Landscape Plans and Erosion Control Plans.

**Fertilizer:** Fertilizer shall conform to the requirements of Item 734556 – Permanent Vegetative Stabilization, Maryland. Also see Landscape Plans and Erosion Control Plans.

**Seed:** Seed shall conform to the requirements of Item 734556 – Permanent Vegetative Stabilization, Maryland. Also see Landscape Plans and Erosion Control Plans.

**Mulch:** Mulch shall conform to the requirements of Item 734556 – Permanent Vegetative Stabilization, Maryland. Also see Landscape Plans and Erosion Control Plans.

**Geotextile:** Class SE

**Geotextile Requirements.** All geotextiles shall be listed in the National Transportation Product Evaluation Program (NTPEP) for geotextiles. The geotextile shall be manufactured from fibers consisting of long chain synthetic polymers, composed of a minimum 95 percent by weight of polyolefins or polyesters. The fibers shall be formed into a stable network so that the filaments or yarns retain their dimensional stability relative to each other, including selvages. The geotextile shall meet the following:

MARYLAND APPLICATION CLASS		TYPE OF GEOTEXTILE	GRAB STRENGTH	PUNCTURE STRENGTH	PERMITTIVITY	APPARENT OPENING SIZE, max	TRAPEZOID TEAR STRENGTH
			lb	lb	sec <sup>-1</sup>	mm	lb
			D 4632	D 6241	D 4491	D 4751	D 4533
SD	TYPE I	NONWOVEN	160	56	0.50	0.43	55
		WOVEN, MONOFILAMENT	250	90	0.50	0.43	90
	TYPE II	NONWOVEN	160	56	0.20	0.25	55
		WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
PE	TYPE I	NONWOVEN	200	80	0.70	0.43	80
		WOVEN, MONOFILAMENT	250	90	0.70	0.43	90
	TYPE II	NONWOVEN	200	80	0.20	0.25	80
		WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
	TYPE III	NONWOVEN	200	80	0.10	0.22	80
		WOVEN, MONOFILAMENT	250	90	0.10	0.22	90
SE	NONWOVEN	200	80	0.20	0.30	80	
	WOVEN	250	90	0.20	0.30	90	
ST	WOVEN	300*	110	0.05	0.15**	110	
F	WOVEN	100	-	0.05	0.60	-	
E	NONWOVEN	90	30	0.50	0.30	30	

Note 1: All property values are based on minimum average roll values in the weakest principle direction, except for apparent opening size.

Note 2: The ultraviolet stability shall be 50 percent after 500 hours of exposure for all classes, except Class F, which shall be 70 percent (D 4355).

\* Minimum 15 percent elongation.

\*\* This is a MINIMUM apparent opening size, not a maximum.

Only those geotextiles that have been tested by NTPEP will be considered candidates for use. In addition, the geotextiles shall meet the Contract Documents and the Geotextile Acceptance and Quality Assurance Procedure, MSMT 732.

**Cellular Structure:** A cellular structure shall be fabricated using sheet strips of perforated, textured, high-density polyethylene (HDPE) each having a length of 12± ft and a width of 6 in. HDPE used to make strips for cell walls shall have a density of 58.4 to 60.2 lb/ft<sup>3</sup> when tested in conformance with D 1505, and an Environmental Stress Crack Resistance (ESCR) of 3000 hours when tested in conformance with D 1693. Carbon black shall be used for ultraviolet light stabilization. Carbon black content shall be 1.5 to 2 percent by weight and shall be homogeneously distributed throughout the material. HDPE strips shall have a sheet thickness of 50 mils with a tolerance of minus 5 to plus 10 percent when tested in conformance with D 5199. Thickness shall be determined before any surface texturing or other surface disruption. The surface texturing shall be diamond-shape indentations having a surface density of 140 to 200 per in<sup>2</sup>. The thickness of the textured sheet shall be 60 mil ± 10 percent when tested in conformance with D 5199. The perforations shall

consist of horizontal rows of 0.4 in diameter holes on 0.75 in centers. Horizontal rows of perforations shall be staggered and separated by 0.5 inches relative to the hole centers. The dimension from the edge of the strip to the nearest edge of perforation shall be 0.3 in.

The HDPE strips shall be connected in series to form a honey-comb-like cellular structure, using full depth ultrasonic spot welded seams, aligned perpendicular to the longitudinal axis of the strips. Weld spacing shall be 14± in. The ultrasonic weld melt-pool width shall not exceed 1 in. When expanded, the interconnected strips shall form the walls of a flexible, three-dimensional cellular confinement structure into which the No. 7 Aggregate shall be placed. HDPE cell dimensions shall have an expanded length ranging from 8.02 to 9.65 in and an expanded width ranging from 9.20 to 11.07 in. The number of cells in a manufactured section may vary according to site conditions. The minimum expanded section width shall be 9.2 ft and the minimum expanded section length shall be 12 ft.

HDPE cell seam strength shall be uniform over the full depth of the cell. Short-term seam strength shall be tested in conformance with the U.S. Army Corps of Engineers Technical Report GL-86-19, Appendix A. Minimum short-term seam peel strength shall be 480 lb. A long-term seam peel strength test shall be performed for a period of 7 days minimum in a temperature controlled environment that undergoes change on a one hour cycle from room temperature to 130°F. Room temperature shall be as defined in E 41. Test samples shall be made by welding four HDPE strips together to produce a 2-cell structure. Individual welds shall be tested by cutting them from the 2-cell structure such that 4 in of material exist on each side of the weld. Samples shall be cut to a 4 in width and tested by securing one end to a stationary upper clamp and attaching a weight to the free lower end. The test sample shall support a 160 lb load for the test period.

The cellular confinement load support system shall include stake anchors in the form of steel J-pin stakes fabricated in conformance with the Contract Plans and ½ in. staples. Steel for J-pin stakes shall conform to A 36 or A 709, Grade 36.

### **Construction Methods:**

**Subgrade Preparation.** Subgrade soils shall be grubbed and cleared of all trees, brush, debris, and root matter. Cut the area where the geotextile is to be placed to the depth shown or as directed. Bring the area to the specified line, grade, and cross section. Provide a grade that is smooth as practical and free of debris. Minimize construction traffic on the grade. Remove ruts by reshaping, but do not overwork the grade. Have the grade approved prior to placement of the geotextile. Maintain adequate surface drainage by using open bleeder ditches along the subgrade at all times to keep the area thoroughly drained. The Engineer may waive compaction and moisture requirements for the underlying soil. When directed, test the foundation by rolling with a 35 ton pneumatic tired roller, or as approved. Remove and dispose of all soft and unstable material and any other portions of the subgrade that will not properly compact. Replace with suitable material and compact.

**Geotextile Placement.** Place geotextile on the prepared surface for the full width of the area to be treated. In areas where longitudinal underdrain is to be placed, place the geotextile up to the edge of the proposed longitudinal underdrain trench, but not where the trench is to be excavated. Unroll the geotextile parallel to the base line. Do not drag the geotextile across the grade. Remove wrinkles and folds by stretching and pinning. Overlap the geotextile at least 30 in. at roll edges and ends. Overlap the end of the roll in the direction of aggregate placement, with the roll being covered by aggregate on top of the next roll. Pin all roll ends and roll end overlaps a maximum of 5 ft on center. Pin roll edges and roll edge overlaps a maximum of 50 ft on center. For curves, fold or cut the geotextile and overlap in the direction of the turn. Pin folds in the geotextile a maximum of 5 ft on center. Immediately repair or replace damaged geotextile as directed. Overlap geotextile patches at least 3 ft into undamaged geotextile. Do not allow traffic, including construction equipment, on the bare geotextile.

**Cellular Structure Placement.** Sections of HDPE cells shall be placed within three working days of geotextile placement. Sections shall be expanded into position and anchored with steel J-pins prior to placing the No. 7 Aggregate. The number and layout of the J-pins shall be according to the Contract Plans with additional pins as required to hold the shape and specified dimensions of the expanded cell sections. The J-pin diameter and length shall be suitable to hold the expanded cell sections in tension for the subgrade

condition at the site. At manholes or other obstructions, the cell section shall be stretched into position and cut out around the perimeter of the obstruction to allow the cell section to fit around the obstruction and be anchored flat on the prepared surface.

The upper surfaces of adjoining cell sections shall be flush at the joint. Interleaf sides and abut ends of adjoining cell sections. Secure adjoining sections to each other using a pneumatic stapler. Welded edge seams shall be aligned when stapling sides of adjoining sections. Abutting sections shall be stapled at the cell wall contact point and be aligned at longitudinal center lines.

**Placement of Infill.** Place the No. 7 Aggregate into the expanded HDPE cells to a level at least 2 in. above the top of the cell walls. The drop height of infill shall be limited to three feet. A front end loader may be used to place the infill provided that it only traffics over cell sections that have been filled and covered with the minimum 2 in. of additional material. The infill material shall be compacted to a minimum density of 95 percent of the standard proctor dry density or as specified by the Engineer.

**Placement of topsoil, seed, and mulch.** After the aggregate has been graded and approved by the Engineer, 6 in. of topsoil shall be placed over the surface to a depth sufficiently greater than that specified on the plans, so that after natural settlement has taken place the work shall conform to the elevations on the plans. After the topsoil has been graded and approved by the Engineer, seed and mulch shall be placed in conformance with Item 734556, Permanent Vegetative Stabilization, Maryland, and as shown on the Landscape Plans and Erosion Control Plans.

**Method of Measurement:**

Access Road with Cellular Confinement Load Support System will be measured per square yard. Measurements for calculating the number of square yards needed will be made along the surface of the area covered. Overlaps of materials of any kind will not be measured.

**Basis of Payment:**

Payment for Access Road with Cellular Confinement Load Support System as measured above will be at the Contract unit price per square yard. Payment will be full compensation for all excavation, geotextile, HDPE cells, J-pins, staples, fasteners, aggregate, subgrade preparation, hauling, removal, replacement, and disposal of unsuitable material, anchoring, grading, backfilling, test rolling, compacting, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Topsoil, seed, mulch, and fertilizer will be paid separately.

8/13/12

**202572 - BORROW AREA EROSION AND SEDIMENT CONTROL AND DEWATERING**

**Description:**

Prepare and implement plans for erosion and sediment controls (ESC), including dewatering operations, for each proposed phase of construction in compliance with Subsections 107.01 and 107.02.

Furnish and maintain all ESC measures until the final stabilization is accepted by the Engineer.

**Design:**

*Submittal and Review:*

Submit to the Engineer and Stormwater Engineer prior to implementation the proposed erosion and sediment control plans, including dewatering operations for each phase of construction proposed by the contractor. At a minimum, include these phases of construction:

1. Initial clearing, grubbing and removal of topsoil.
2. Operations from original ground to final grade.
3. Final grades until stabilization is achieved and the site is accepted by the Engineer.

The Plans will be used by the Department for informational purposes, not approval.

*Design Specifications:*

In accordance with the following Subsections; 110.01–110.03, 110.07, 110.11, 110.14-110.19. All dewatering operations in accordance with Section 111, except Subsection 111.10.

**General Requirements:**

Provide erosion and sediment control measures such that in the receiving stream at a point directly downstream of any borrow site discharge point(s) the Nephelometric Turbidity Units (NTU) do not increase by more than 10% at any time as compared to a point directly upstream of the furthest upstream borrow site discharge point.

Maintain and protect all discharge outfalls until a point where a clean, stabilized outfall location is established. For any discharge points not draining directly to a stream, the turbidity at the discharge can not exceed 300 NTU.

Maintain dust control during all phases of construction as required in Section 202.09. Failure to maintain adequate dust control measures during borrow pit earth moving operations will result in stoppage of Work until the dust control has been acceptably addressed. All costs associated with dust control are incidental to Item No. 202000.

**Testing:**

Turbidity testing will be performed by DelDOT during DelDOT's normal working hours and at locations determined by the Stormwater Engineer

**Compliance:**

Submit a plan of action to the Stormwater and Construction Engineers to reduce the turbidity of the discharge to acceptable levels within 24 hours of receiving the test results if the turbidity testing exceeds the turbidity standards and/or if an erosive condition exists due to dewatering operations.



Implement the plan of action within 48 hours of receiving the test. Failure to acceptably remedy unsatisfactory conditions within the time frame established will result in the Engineer proceeding with adequate forces and equipment to implement or maintain the necessary erosion and sediment control items to bring the project into compliance. The entire cost of work for correcting unsatisfactory conditions by the Engineer will be deducted from monies due the Contractor on this Contract.

Failure to acceptably remedy unsatisfactory conditions within the time frame established will result in stoppage of Work until the unsatisfactory conditions have been acceptably addressed.

**Method of Measurement:**

The quantity of Borrow Area Erosion and Sediment Control and Dewatering Operations is not measured.

**Basis of Payment:**

Payment will be made at the lump sum price bid for the item Borrow Area Erosion and Sediment Control and Dewatering paid on a monthly basis pro-rated per the total number of months in the Contract. The bid price includes, but is not limited to the following; preparing, submitting and updating erosion sediment control plans, including dewatering operations; installation, maintenance and removal of all erosion and sediment control and dewatering devices; removal and disposal of all sediment; corrections to damages inside or outside of the borrow source due to the Contractor's operations; and all materials, labor, equipment and incidentals required to complete the work.

If the work is acceptably completed by the Engineer prior to the end of the contract time, the remainder of the Lump Sum will be paid.

Permanent topsoiling and seeding on final slopes will be paid in accordance with contract items as indicated in the contract documents.

**NOTE:**

When Item 202572- Borrow Area Erosion and Sediment Control and Dewatering is applicable to more than one location, the Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each location, the sum of which is to equal the lump sum price bid. The required breakdown of the Lump Sum price is shown on a breakout sheet attached to the proposal. The complete breakout sheet shall be attached to the submitted Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the Bid Proposal being declared non-responsive and rejected.

The Department reserves the right to delete from the Contract the application of this item at one or more of the locations. The lump sum to be paid will be adjusted in accordance with the Contractor's cost breakdown as required above. There will be no extra compensation to the Contractor if such deletions are made.

10/23/12

**211521 – ABANDONMENT OF WELLS**

**Description:**

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

**Submittals:**

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

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

**Materials:**

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

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

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

**Construction Methods:**

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

**Method of Measurement:**

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

**Basis of Payment:**

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

7/10/12

**255502 - GABION OUTLET STRUCTURE, MARYLAND**

**Description:**

This work consists of furnishing and placing stone filled wire baskets of the type specified in accordance with the details and locations shown on the Plans and as directed by the Engineer, at locations in Maryland. This work also includes preparing the bedding areas for the placement of stone.

**Materials:**

Stone: Class as specified. Use field or quarry stone of approved quality. Stone may be certified from a source previously approved. Ensure that maximum dimension does not exceed four times the minimum dimension. Ensure that stone for riprap is uniformly graded from the smallest to the largest pieces as specified in the Contract Documents. The stone will be accepted upon visual inspection at the point of usage, as follows:

CLASS OF RIPRAP	SIZE	PERCENT OF TOTAL by weight
0	Heavier than 33 lb Heavier than 10 lb Less than 1 lb	0 50 10 max
I	Heavier than 150 lb Heavier than 40 lb Less than 2 lb	0 50 10 max
II	Heavier than 700 lb Heavier than 200 lb Less than 20 lb	0 50 10 max
III	Heavier than 2000 lb Heavier than 600 lb Less than 40 lb	0 50 10 max

Note: Optimum gradation is 50 percent of the stone being above and 50 percent below the midsize. Reasonable visual tolerances will apply.

QUALITY REQUIREMENTS	
TEST AND METHOD	SPECIFICATION LIMITS
Apparent Specific Gravity T 85, min	2.50
Absorption T 85, %max	3.0
Sodium Sulphate Soundness - 5 cycles, 2-1/2 to 1-1/2 in. Aggregate T 104, % loss max	20

DEPTH OF BASKET in.	SIZE OF INDIVIDUAL PIECES* in.
6	3 - 6
9	4 - 7
12	4 - 7
18	4 - 7
36	4 - 12

**Wires for Gabions:** All wire including tie and connecting wire shall have a tensile strength of at least 60,000 psi when tested per A 370. All wire sizes and mesh spacing shall be as recommended by the manufacturer.

Stainless steel interlocking fasteners meeting A 313 may be substituted for wire ties. When subjected to directional tension along its axis, the fastener shall remain in a closed and locked condition for a minimum force of 900 lb.

Galvanized coating for fabric, ties, and connecting wire shall not be at least 0.8 oz/ft<sup>2</sup> when tested per A 90.

Polyvinyl Chloride (PCV) coating for fabric, ties, and connecting wires shall exhibit no weight loss when tested per MSMT 508. Color shall meet Federal Standard 595, gray color No. 26440 or green color No. 24533, and match throughout the project.

**Geotextile:** Class as specified.

Geotextile Requirements. All geotextiles shall be listed in the National Transportation Product Evaluation Program (NTPEP) for geotextiles. The geotextile shall be manufactured from fibers consisting of long chain synthetic polymers, composed of a minimum 95 percent by weight of polyolefins or polyesters. The fibers shall be formed into a stable network so that the filaments or yarns retain their dimensional stability relative to each other, including selvages. The geotextile shall meet the following:

MARYLAND APPLICATION CLASS		TYPE OF GEOTEXTILE	GRAB STRENGTH lb D 4632	PUNCTURE STRENGTH lb D 6241	PERMITTIVITY sec <sup>-1</sup> D 4491	APPARENT OPENING SIZE, max mm D 4751	TRAPEZOID TEAR STRENGTH lb D 4533
SD	TYPE I	NONWOVEN	160	56	0.50	0.43	55
		WOVEN, MONOFILAMENT	250	90	0.50	0.43	90
	TYPE II	NONWOVEN	160	56	0.20	0.25	55
		WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
PE	TYPE I	NONWOVEN	200	80	0.70	0.43	80
		WOVEN, MONOFILAMENT	250	90	0.70	0.43	90
	TYPE II	NONWOVEN	200	80	0.20	0.25	80
		WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
	TYPE III	NONWOVEN	200	80	0.10	0.22	80
		WOVEN, MONOFILAMENT	250	90	0.10	0.22	90
SE	NONWOVEN	200	80	0.20	0.30	80	
	WOVEN	250	90	0.20	0.30	90	
ST	WOVEN	300*	110	0.05	0.15**	110	
F	WOVEN	100	–	0.05	0.60	–	
E	NONWOVEN	90	30	0.50	0.30	30	

Note 1: All property values are based on minimum average roll values in the weakest principle direction, except for apparent opening size.

Note 2: The ultraviolet stability shall be 50 percent after 500 hours of exposure for all classes, except Class F, which shall be 70 percent (D 4355).

\* Minimum 15 percent elongation.

\*\* This is a MINIMUM apparent opening size, not a maximum.

Only those geotextiles that have been tested by NTPEP will be considered candidates for use. In addition, the geotextiles shall meet the Contract Documents and the Geotextile Acceptance and Quality Assurance Procedure, MSMT 732.

**Construction:**

Construction requirements shall be in accordance with the detail shown in the contract plans. The area shall be graded and stabilized immediately after removal of the structure.

Excavation. Excavate to the specified lines and grades. Ensure that the subgrade is smooth, firm, and free from protruding objects or voids that would affect the proper placement of the wire baskets or damage the geotextile.

Geotextile. Place geotextile on the prepared subgrade. Overlap adjacent strips at least 2 ft. Replace or repair geotextile damaged during placement of the wire baskets.

Wire Baskets. Set the empty units on the geotextile and bind the vertical ends together with wire ties or interlocking fasteners spaced to permit stretching of the units to remove kinks. Use stretching methods that do not damage the baskets. Use stakes, pins, or other methods approved by the Engineer to ensure proper alignment.

Stone. Carefully fill the basket units with stone placed by hand or machine to ensure good alignment with a minimum of voids between stones. Avoid bulging of the mesh. Do not drop the stone from a height greater than 36 in. Place the stone to provide a minimum of two courses. Place the top layer of stone to a uniform surface. Avoid any bulging of the lid mesh. After a basket unit is filled, bend the lid over until it meets the ends of the unit. Secure the lid to the sides and ends with wire ties or interlocking fasteners. When a complete basket unit cannot be installed because of space limitations, cut the basket unit to fit as directed.

Backfill. Backfill any excavation voids existing along the edges of the completed gabions and compact in an acceptable manner.

**Method of Measurement:**

The quantity of Gabion Outlet Structure, Maryland will be measured as each placed and accepted in Maryland.

**Basis of Payment:**

The quantity of Gabion Outlet Structure, Maryland will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all excavation, geotextile, stone, ties or fasteners, backfill, compaction, disposal of excess material, and for all labor, equipment, tools, and incidentals necessary to complete the work.

3/31/15

**272511 – POND OUTLET STRUCTURE, CONCRETE MARYLAND**

**Description:**

This work consists of furnishing, fabricating, and constructing a pond outlet structure and outlet facilities in accordance with the details and locations shown on the Plans and as directed by the Engineer, at locations in Maryland. Construct cast-in-place concrete weir walls or install them as pre-cast concrete structures. This work shall also consist of applying integral color admixture to the concrete mixture for drainage structures as specified in the contract documents. A sandblast finish shall be applied to the completed, colored drainage structures.

**Materials and Construction Methods:**

Materials and construction methods shall conform to the applicable requirements of Section 602, 603, and 604 of the Standard Specifications, and notes and details on the Plan.

The Contractor shall submit shop drawings showing the fabrication details for prior approval.

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

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

- Minimum Unit Weight of Soil and Soil Surcharge = 110 pounds per cubic foot
- Minimum Unit Weight of Reinforced Concrete = 150 pounds per cubic foot
- Maximum Soil Friction Angle = 30 degrees
- Water is present to the top of the wall
- Lateral soil pressures are Active for non-restrained walls and At-Rest when braced at top of wall
- Design for Strength
- Design for Temperature and Shrinkage
- Design for Shear
- Check Maximum and Minimum Reinforcement Limitations
- Check development of reinforcement.
- Walls are solid
- Full Live Load
- Soil Reaction is uniform

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

**Pipe Connections.** Set or cut low flow pipe flush with the outside face of the weir wall. Extend the pipe a sufficient distance beyond the inside face of the weir wall to provide for making proper connections. Completely and neatly close the joint around the pipe in the structure wall with mortar or other specified materials.

**Integral Concrete Color Pigment Admixture.** The admixture shall be a colored, water reducing, admixture containing no calcium chloride with coloring agents that are lime proof and UV resistant. The admixture shall conform to C979, C494 and M194.

The color shall meet Federal Standard 595B. The manufacturer shall choose from the following colors: 30277, 30145, and 30219. The same color shall be used throughout the project. It may be necessary to use white portland cement to achieve the color. Compromising the color will not be acceptable in order to avoid

using white cement. The pigment admixture shall be added to the concrete as specified by the manufacturer. Care should be taken to ensure uniform coloration throughout the structure.

**Sandblasted Finish.** All colored drainage structures shall be textured with a sandblast finish. Allow concrete to cure to sufficient strength so that it will not be damaged by blasting but not less than seven days. The finish shall be Class 1 (Brush) involving a one pass brush blast which will remove the cement matrix and expose the fine aggregates only. No part of the coarse aggregates shall be exposed.

The contractor shall be responsible for meeting all local air pollution regulations. The contractor shall ensure the safety of the workers, ensuring that each blaster is equipped with an air-fed helmet.

The Sandblast contractor shall be responsible for clean-up of immediately adjacent areas to the sand-blasting operation.

**Sample Panel.** Whenever the contract documents specify that drainage structures be cast with integral concrete color pigment admixture, prior to casting the structures a 2 ft. by 2 ft. by 4 in. sample panel shall be cast, sandblasted and made available to the Engineer at the construction site for color and finish approval. All subsequent structures requiring integral color shall match the sample panel. The sample shall remain at the construction site to be used by the Engineer as a basis for comparison for the structures.

**Method of Measurement:**

Payment for this item will be made on a lump sum basis wherein no measurement will be made.

**Basis of Payment:**

The quantity of Pond Outlet Structure, Concrete, Maryland will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for excavation, dewatering, ground preparation, furnishing and placing all materials including reinforcing steel, concrete, pipes, gaskets, grout, pipe bedding, backfill, and all other materials required for pond outlet structure, concrete, for welding and for all labor, equipment, tools, and incidentals necessary to complete the work.

**NOTE:**

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

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

11/23/11



**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 made 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  $8.3 \text{ lb/ft}^3 \pm .37 \text{ lb/ft}^3$ . 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 rubber-tired 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. Screenshot 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  $\pm 1/2$ " 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. 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 2000<sup>th</sup> ton target lot size is achieved during a production day, the lot size shall extend to the end of that production day. The Contractor may interrupt the production of one JMF in order to produce different material; this type of interruption will not alter the determination of the size or limits of material represented by a lot. The Engineer will evaluate each lot on a subplot basis. The size for each subplot shall be 100 to 500 tons and testing for the sub lots will be completed on a daily basis. For each subplot, the Engineer will evaluate one sample.

The target size of sub-lots within each lot, except for the first sample of the production day, is equal-sized 500 ton sub lots and will be based upon anticipated production, however, more or fewer sublots, with differing sizes, may result due to the production schedule and conditions. If the actual production is less than anticipated, and it's determined a sample will not be obtained (based upon the anticipated tonnage), a new sample location will be determined on a statistically random, unbiased basis based upon the new actual production. If the actual production is going to be 50 tons or greater over the anticipated sub lot production, a new sample location will be determined on a statistically random, unbiased basis based upon the new actual production. The Engineer will combine the evaluation and test results for all of the applicable sublots in order to evaluate each individual lot.

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

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

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

**(b) Pavement Construction - Tests and Evaluations.**

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

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

The exempt areas around manholes will be a maximum of 4 feet transversely on either side from the center of the manhole, and 20 feet longitudinally on either side from the center of the manhole. The exempt areas around driveway entrances shall be the entire width of the driveway, and 3 feet from the edge of the longitudinal joint next to the driveway. Areas of exemption that will be cored for informational purposes only include: areas where the mat thickness is less than three times the nominal maximum aggregate size as

directed by the Engineer, violations of Section 401.08 in the Standard Specifications as directed by the Engineer, and areas shown to contain questionable subgrade properties as proven by substantial yielding under a fully legally loaded truck. Failure to obtain core samples in these areas will result in zero payment for compaction regardless of the exempt status.

The Engineer will evaluate and accept the compaction work on a daily basis. Payment for the compaction will be calculated by using the material production lots as referenced in **.02 Acceptance Plan (a) Material Production - B Tests and Evaluation** and analyzing the compaction results over the individual days covered in the material production lot. The compaction results will be combined with the material results to obtain a payment for this item.

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

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

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

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

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

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

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

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

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

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

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

**.03 Payment and Pay Adjustment Factors.**

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

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

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

**(a) Material Production - Pay Adjustment.**

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

<b>Table 2 - Material Parameter Weight Factors</b>		
<b>Material Parameter</b>	<b>Single Test Tolerance (+/-)</b>	<b>Weight Factor</b>
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):  

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

$$QL = ((\text{mean value}) - (JMF \text{ target}) + (\text{single test tolerance})) / (\text{standard deviation}).$$

4. For each parameter, locate the values for the Upper Payment Limit (PU) and the Lower Payment Limit (PL) from Table 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.

<b>Table 3 - Quality Level Analysis by the Standard Deviation Method</b>							
<b>PU or PL</b>	<b>QU and QL for "n" Samples</b>						
	<b>n = 3</b>	<b>n = 4</b>	<b>n = 5</b>	<b>n = 6</b>	<b>n = 7</b>	<b>n = 8</b>	<b>n = 9</b>
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

<b>Table 3 – Quality Level Analysis by the Standard Deviation Method</b>							
<b>PU or PL</b>	<b>QU and QL for “n” Samples</b>						
	<b>n = 3</b>	<b>n = 4</b>	<b>n = 5</b>	<b>n = 6</b>	<b>n = 7</b>	<b>n = 8</b>	<b>n = 9</b>
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

<b>Table 4 - PWL Pay Adjustment Factors</b>		
<b>PWL</b>	<b>Pay Adjustment Factor (%) Column B</b>	<b>Pay Adjustment Factor (%) Column C</b>
100	+5	0
99	+4	-1
98	+3	-2
97	+2	-3
96	+1	-4
95	0	-5
94	-1	-6
93	-2	-7
92	-3	-8
91	-4	-9
PWL<91	PWL - 100	PWL - 100

**(b) Pavement Construction - Pay Adjustments.**

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

- Degree of compaction of the in-place material

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

1. Calculate the core bulk specific gravity values from the subplot tests values, to the nearest 0.001 unit. Obtain the Theoretical maximum Specific Gravity values from the corresponding laboratory subplot tests.
2. Calculate the Degree of Compaction:  
Degree of Compaction =  
((Core Bulk Specific Gravity) / (Theoretical Maximum Specific Gravity)) x 100% recorded to the nearest 0.1%.
3. The average compaction for the sublots shall be averaged together for the compaction level of the lot. The lots compaction test level shall be averaged and recorded to the nearest whole percent.



4. Locate the value of the Payment Adjustment Factor corresponding to the calculated degree of compaction from Table 5 or Table 5a.

5. Determine the pavement construction price adjustment by using the following formula:

$$\text{Construction Pay adjustment} = (\text{Lot Quantity}) \times (\text{Bid Price}) \times (\text{Pay Adjustment Factor}) \times 30\%.$$

<b>Table 5: Compaction Price Adjustment Highway Locations</b>		
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

<b>Table 5A: Compaction Price Adjustment Other<sup>1</sup> Locations</b>		
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

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

**.04 Dispute Resolution.**

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

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

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

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

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

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

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

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

## **Appendix A - Repairing Core Holes in Bituminous Asphalt Pavement**

### **Description.**

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

### **Materials and Equipment.**

The following material shall be available to complete this work:

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

The following equipment shall be available to complete this work:

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

### **Construction Method.**

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

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

### **Performance Requirements.**

The Engineer will judge the patch on the following basis:

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

### **Basis of Payment.**

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

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

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

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

**Structural Number Calculations**

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

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

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

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

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

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

**Example:**

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

Calculation:

For the Type B lift the calculation would be:

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

For the Type C lift the calculation would be:

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

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](http://www.transtechsys.com)

or

Carlson Paving Products  
18425 50<sup>th</sup> Ave. E  
Tacoma, WA 98446  
1-253-278-9426  
[www.carlsonpavingproducts.com](http://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 <sup>1</sup>, 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 <sup>1</sup>
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 gyrations 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 <sup>1</sup> (% MIN)		FINE AGGREGATE ANGULARITY <sup>2</sup> (% MIN)		CLAY CONTENT <sup>3</sup> (% - MIN)	FLAT AND ELONGATED <sup>4</sup> (% - 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 <sup>5</sup>	60/-	45	40	45	
10 < 30	95/90	80/75	45	40	45	
≥ 30	100/100	100/100	45	45	50	10

<sup>1</sup>Coarse Aggregate Angularity is tested according to ASTM D5821.

<sup>2</sup>Fine Aggregate Angularity is tested according to AASHTO TP-33.

<sup>3</sup>Clay Content is tested according to AASHTO T176.

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

<sup>5</sup> 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
<b>Toughness, AASHTO T96</b> Percent Loss, Maximum	40
<b>Soundness, AASHTO T104</b> Percent Loss, Maximum for five cycles	20
<b>Deleterious Materials, AASHTO T112</b> Percent, Maximum	10
<b>Moisture Sensitivity, AASHTO T283</b> 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 A Laboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces. @ RAP shall be assigned a value of 5.0. The Contractor shall supply all polish values to the Engineer upon request.

e) **Mineral Filler:**

Conform to AASHTO M17.

f) **Warm Mix Additives:**

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

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

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

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

g) **Anti-stripping additives**

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

**.03 Bituminous Concrete Production – Quality Control**

**(a) Process Control - Material Production Quality Control.**

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

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

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

- Production Plant - make, type, capacity, and location.
- Production Plant Calibration - components and schedule; address documentation.
- Personnel - include name and telephone number for the following individuals:
  - Person responsible for quality control.
  - Qualified technician(s) responsible for performing the inspection, sampling, and testing.
  - Person who has the authority to make corrective actions on behalf of the Contractor.
- Testing Laboratory - state the frequency of accuracy checks and calibrations of the equipment used for testing; address documentation.
- Load number of QC samples (1-10 if QA sample is not within trucks 1-10)
- Locations where samples will be obtained and the sampling techniques for each test
- Tests to be performed and their normal frequency; the following, at a minimum, shall be conducted:

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

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

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

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

The following steps will be taken for violations listed above:

1. First offence: Written notice of violation to the Contractor
2. Second offence: Written notice of violation and forfeiture of any bonus (material production or pavement construction) payment eligibility under 401699 section .03 for that production shift.

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

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

**(b) Material Production Test Equipment.**

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

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

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

Maintain minimum calibration records for the referenced equipment:

- SUPERPAVE<sup>R</sup> Gyratory Compactor: once every year; verified once every month by the Engineer.
- Ovens: once every three months, verified once every month.
- Vacuum Container and Gauge (Rice Bowls): once every three months, verified once every month.
- Balances and Scales: once every year, verified once every month.
- Thermometers: once a year; verified once every month.
- Gyratory Compactor molds and base plates: once every year
- Mechanical Shakers: once every year
- Sieve Verifications: once every year

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

**(c) Material Production Test Methods**

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

**.04 Job Mix Formula (JMF)**

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

a) Development of JMF

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

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

**Superpave Gyratory Compactive (SGC) Effort:**

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

**Superpave 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 <sup>1</sup>



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

<b>Nominal Maximum Aggregates Size Control Points, Percent Passing</b>										
<b>SIEVE SIZE</b>	<b>25.0 MM</b>		<b>19.0 MM</b>		<b>12.5 MM</b>		<b>9.5 MM</b>		<b>4.75 MM</b>	
	<b>MIN</b>	<b>MAX</b>	<b>MIN</b>	<b>MAX</b>	<b>MIN</b>	<b>MAX</b>	<b>MIN</b>	<b>MAX</b>	<b>MIN</b>	<b>MAX</b>
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.

<b>PCS CONTROL POINT FOR MIXTURE NOMINAL MAXIMUM AGGREGATES SIZE (% PASSING)</b>					
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:**

<b>Volumeric Property</b>	<b>Superpave Criteria</b>
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

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

**The proposed JMF shall include the following:**

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

1. Job mix formula (JMF) design of the component materials and target characteristic values for each mixture proposed for use. The component materials design shall include designating the source and the expected proportion (within 1 percent for the aggregate components and within 0.1 percent for the other components) of each component to be used in order to produce workable bituminous concrete meeting the specified properties. Recycled Asphalt Pavement (RAP) is one individual aggregate component regardless of fractionation size. Recycled Asphalt Shingles (RAS) is a separate component from RAP.
2. The JMF target characteristic values include the mixing temperature range, core temperature range for gyration, the percentage of the asphalt cement component (both total and virgin), and the percentages of the aggregate amounts retained on the sieves to be addressed by the JMF as shown in Table 1.
3. Plot of the design aggregate structure on the FHWA Superpave 0.45 power chart showing the maximum density line and Superpave control points.
4. Plot of the three trial asphalt binder contents at +/- 0.5% gyratory compaction curves where the percent of maximum specific gravity (% of  $G_{mm}$ ) is plotted against the log base ten of the number of gyrations ( $\log(N)$ ) showing the applicable criteria for  $N_i$ ,  $N_d$ , and  $N_m$ .
5. Plot of the percent asphalt binder by total weight of the mix ( $P_b$ ) versus the following:  
 % of  $G_{mm}$  at  $N_d$ , VMA at  $N_d$ , VFA at  $N_d$ , Fines to effective asphalt binder ( $P_{be}$ ) ratio, and unit weight ( $\text{kg/m}^2$ ) at both  $N_d$  and  $N_m$ .
6. Summary of the consensus property standards test results for the design aggregate structure, summary of the source property standards test results for the individual aggregates in the design aggregate structure, target value of the asphalt binder content, and a table of  $G_{mm}$  of the asphalt mixture for the four trial asphalt binder contents determined according to AASHTO T209.
7. Test data with each JMF and tests performed by a Qualified Laboratory on representative materials, verifying the adequacy of the design. Refer to the specifications for each mix type in order to determine the design requirements. The JMF sieve percentage values shall conform to the ranges shown in Table 1.

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

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

**.05 Approval of JMF**

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

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

a) **Design Evaluation:**

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

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

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

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

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

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

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

**.06 Construction.**

**(a) Pavement Construction Test Equipment.**

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

**Weather Limitations.**

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

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

	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

**602772 - MECHANICALLY STABILIZED EARTH WALLS**

**Description:**

This work shall consist of the design, furnishing all materials, fabrication and construction of mechanically stabilized earth (MSE) retaining walls in accordance with the AASHTO definitions of mechanically stabilized earth walls employing tensile reinforcements in the soil mass. The MSE retaining wall shall be constructed in conformance with these specifications and to the lines, grades, and dimensions shown on the Plans or as established by the Engineer. Acceptance of a proprietary MSE wall system will be based on review and approval of design and specifications submitted by the Contractor for his chosen system. Deviations from these specifications must be approved by the Engineer.

**Design Requirements:**

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

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

- a. All retaining wall components shall be designed for a minimum service life of 100 years.
- b. Completed walls shall have a concrete facing with a finish or aesthetic treatment as described herein or noted on the plans.

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

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

- (a) Existing ground elevations that have been verified by the Contractor for each location involving construction wholly or partially in original ground.
- (b) Layout of wall that will effectively retain the earth but not less in height or length than that shown for the wall system in the Plans.
- (c) Complete design calculations substantiating that the proposed design satisfies the design parameters in the Plans and in the special provisions.
- (d) Complete details of all elements required for the proper construction of the system, including complete material specifications.
- (e) Complete plans, details and a description of the means and methods to repair or replace MSE wall elements that are damaged during construction, that are damaged after acceptance of the work and to address loss of backfill behind the walls. These plans, details and descriptions should define how to determine if a damaged MSE wall element can be repaired or when the element would need to be replaced and assume that traffic is to continue operating on any adjacent and supported facilities.

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

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

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

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

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

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

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

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

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

Loss of Galvanizing (first 2 years):	0.58 mil./year
Loss of Galvanizing (2 years - depletion):	0.16 mil./year
Carbon steel (after zinc depletion):	0.47 mil./year

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

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

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

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

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

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

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

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

### Architectural Treatment

All walls within the contract shall have the same shape and sized panels except as necessary to maintain grade and length. All panels shall be equal in planar dimensions recommended at 5 feet vertical by 10 feet horizontal. The final dimensions need to be coordinated with the Manufacturer and the site-specific geometric constraints (if any). The color and final finish of the concrete panels shall match the adjacent concrete structures and in accordance with the applicable aesthetic guidelines for this project. Panels shall be in a stacked bond pattern with horizontal joints staggered one-half the height of the panel.

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

- The width of the pilasters shall be 4 feet.

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

### Materials:

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

*Steel Reinforcing Mesh.* Reinforcing mesh shall be shop fabricated of cold drawn steel wire conforming to the minimum requirements of ASTM A 82 and shall be welded into the finished mesh fabric in accordance

with ASTM A 185. Galvanization shall be applied after the mesh is fabricated and conform to the minimum requirements of ASTM A 123.

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

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

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

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

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

*Filter Fabric (Separation/Retention Fabric).* Where required by design, filter fabric shall be placed behind the facing units. Filter fabric shall be woven polypropylene fabric, meeting the requirements of M 288 for a Class I geotextile having an Ultraviolet Stability of 70% strength retention after 500 hours as tested by ASTM D 4355. Slit film geotextile shall not be allowed.

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

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

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

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

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

*Backfill.* Multiple types of backfill may be required for the construction of the MSE walls. All backfill material used in the structure volume shall be free draining, reasonably free from organic or otherwise



deleterious materials and shall be as specified on the plans. Metallurgical slag and stone dust are not acceptable backfill materials. Placement limits are shown on the plans. The material requirements for each backfill type are as follows:

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

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

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

- a) Plasticity Index: The Plasticity Index (P.I.), as determined by AASHTO T- 90 (ASTM D-4318), shall not exceed 6.
- b) The material shall be substantially free of shale or other soft, poor durability particles. Testing in accordance with AASHTO T-104 shall be performed to verify a magnesium sulfate soundness loss of less than 30% after four (4) cycles.

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

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

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

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

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

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

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

**Construction:**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Method of Measurement:**

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

**Basis of Payment:**

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

Excavation of unsuitable material, below the bottom of the leveling pad, will be measured and paid for as described under Standard Specification 207.07, Table 207-A and backfilling with Borrow Type B will be measured and paid for under Item 209002. The concrete and reinforcement for the moment slab and barrier will be measured separately and will be paid for as a separate item(s) as indicated in the plans.

**NOTE:**

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

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

7/21/15

**605755 - OVERHEAD SIGN SUPPORT AND FOUNDATIONS**

**Description:**

This work consists of furnishing all materials, fabricating and installing four-chord truss type overhead sign support structures including foundations as specified in the Contract Documents, in accordance with the locations and details shown on the Plans and as directed by the Engineer.

**General**

The main support and truss members of the sign support structures shall be fabricated from tubular steel whose diameters, wall thicknesses and lengths shall conform with the requirements and details shown on the Contract Plans, or as shown on approved alternate design drawings.

Alternate designs utilizing structural shapes for the main support and truss members, which form a structure of sufficient strength as required by AASHTO standard and Plans will also be considered for approval when submitted in accordance with the provisions of these specifications. All submissions for approval including material specifications and alternate designs must be signed by a registered Professional Engineer registered in the State of Delaware. Any alternate designs may be rejected by the Engineer for any reason, including reasons not related to structural equivalency. Additionally, the following conditions and requirements must be met:

- VMS shall not be permitted on cantilever structures;
- The use of aluminum in these structures shall not be permitted; and
- Square members shall not be used in main supports or trusses.

The Contractor is informed that consideration will be given to aesthetics for all of the sign supports including, but not limited to, the general appearance, methods of fabrication and assembly, material selection, arrangement, end finishes of the proposed structural shapes, welding, and surface finishes as required. The span type structure shall be 4-chord structure.

If the bidder elects to furnish sign supports alternate to those shown in the Contract Plans, the alternate design shall meet the requirements of the approved drawings and any other requirements specified on the Plans and these specifications.

If the bidder elects to furnish sign supports alternate to those shown in the Contract Plans, it is a requirement that as an end result, the alternate will satisfy the requirements of the proposal.

Sign panels are not included under this item.

**Materials:**

**Structural**

Main Tubes: ASTM A 53, Grade B, Type E or S or API 5L, PSL2, Grade B  
Minimum Yield Stress = 35,000 psi

Other Tubes: ASTM A 501  
Minimum Yield Stress = 36,000 psi

Structural Shapes, Plates and Bars: ASTM A 709, Grade 36  
Minimum Yield Stress = 36,000 psi

**Fasteners**

Anchor Bolts:	ASTM F 1554, Grade 55
Anchor Nuts:	ASTM A 563, Grade DH or ASTM A 194, Grade 2H
Anchor Washers:	ASTM F 436
Connection Bolts:	ASTM A 325
Heavy Hex Nuts: Washers:	ASTM A 563, Grade DH or ASTM A 194, Grade 2H ASTM F 436

**Finish**

Structural:	Galvanized finish ASTM A 123
Fasteners and anchor bolts:	Galvanized finish ASTM A 153

Galvanizing shall comply with ASTM A 143 and A 385

**Foundations**

Undercut Excavation:	Section 212.
Borrow, Types B & F:	Section 209.04.
Geotextile:	Sections 713 and 827.06.
Reinforcement:	Section 603.
Concrete:	Class B per Sections 602 and 812.

**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.

The Contractor may at his/her option elect to prepare alternate design plans and specifications for the box truss type overhead sign support structures in place of the Plan construction. Detail plans, design computations, and specifications for the proposed structures shall be submitted to the Engineer for approval; and no work shall begin until the alternate design plans have been reviewed and approved, in principle, by the Engineer. No additional time will be added to the contract duration for the approval process of the alternate design.

The requirements for the preparation of shop drawings for an approved alternate design (or designs), shall be similar to those specified for the Plan construction.

Prior to any fabrication, the Contractor shall stake out the proposed sign structure locations at the centerline of the proposed foundation. The stake out information shall contain, but not be limited to, the existing and finished ground elevation at the centerline of the foundation and highest point of the traveled roadway and the shoulder elevation for the finished condition directly under the overhead portion of the proposed sign structure. This information, along with the proposed top of concrete pedestal elevation, shall be shown on the shop drawings.

## **Fabrication**

Loading, transporting, unloading and erection of structural materials shall be done so that the metal will be kept clean and free from injury in handling.

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

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

When sign support structures are subcontracted, the subcontract shall be in accordance with Subsection 108.01 of the Standard Specifications except that the value of the subcontract will be based on the value of the work for fabrication.

## **Cutting, Punching, Drilling and Finishing**

Material  $\frac{1}{2}$ " (12 mm) thick or less may be sheared, sawed or cut with a router, unless noted otherwise on the Plans. Material more than  $\frac{1}{2}$ " (12 mm) thick shall be sawed or routed.

Cut edges shall be true and smooth and free from excessive burrs or ragged breaks.

Edges of plates carrying calculated stresses shall be planed to a depth of  $\frac{1}{4}$ " (6 mm) except in the case of sawed or routed edges of a quality equivalent to a planed edge.

Re-entrant cuts shall be avoided wherever possible. If used, they shall be filleted by drilling prior to cutting.

Structural material shall not be heated except to facilitate bending; then the structural material may be heated to a temperature not exceeding 400° F (204° C) for a period not exceeding 30 minutes. Such heating shall be done only when temperature and time requirements are observed.

Bolt holes in main members shall be subpunched or subdrilled and reamed to finished size after the parts are firmly bolted together. The amount by which the diameter of subpunched holes is less than that of the finished hole shall be at least  $\frac{1}{4}$  the thickness of the piece and in no case less than  $\frac{1}{32}$ " (0.8 mm). If the metal thickness is greater than the diameter of the hole, punching shall not be used.

Bolt holes in secondary material not carrying calculated stress may be punched or drilled to finished size before assembly.

All holes shall be cylindrical and perpendicular to the principal surface. Holes shall not be drilled in such a manner as to distort the metal. All chips lodged between contacting surfaces shall be removed before assembly.

All assemblies and tubular members shall be detailed to permit hot dip galvanizing. All cutting, punching, drilling, finishing, and welding shall be complete prior to hot dip galvanizing.

## **End Post Assemblies**

End post assemblies shall be of galvanized steel. After fabrication the steel end post assemblies shall be hot-dip galvanized in accordance with AASHTO M111. The average thickness of coating (each side) shall be at least 5 mils (125  $\mu$ m), but in no case less than 4 mils (100  $\mu$ m) thickness at any location. Inspection of coating will be by magnetic thickness gauge measurements as specified in AASHTO M111 paragraph 9.3, except that 25 percent of the horizontal and diagonal struts will be measured, and the posts will be measured at the fifth points of the length at three locations around the circumference. The average thickness will be arrived at by the fifth points of the length at three locations around the circumference. The average thickness will be arrived at by the summation of all readings.

## **Truss Spans**

Truss spans shall be galvanized steel. Galvanizing shall be as specified above for end post assemblies. Galvanizing of each truss unit shall be by a single dip process. Magnetic thickness gauge measurements shall be made on each chord of each truss unit at approximately the third points of the chord length at three locations around the circumferences. Prior to shipping, the completed and accepted truss units shall be assembled in the shop and the truss span checked for dimensions, straightness, alignment and camber.

## **Welding**

Welding shall be done in the shop before galvanizing. All welding work shall be done in accordance with the requirements of AASHTO/AWS D1.5M/D1.5:2008 Bridge Welding Code, and shall be inspected at Contractor's expense. Welding not covered in the above shall conform to AWS D1.1:2008 Structural Welding Code. The inspection results shall be submitted to the Engineer for approval.

## **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.

All threading and dimensional requirements shall be in accordance with the "Fastener Standards"; published by the Industrial Fasteners Institute. All threads shall be UNC-2 and, where hot-dip galvanized, internal threads shall be oversized as specified in AASHTO M 291 to provide for proper assembly.

## **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.

End posts shall be erected in position to engage the leveling nuts on the anchor bolts above the top of the concrete pedestal or barrier. During the erection of the sign structure, adjustments for plumbness, grades and alignment shall be made by manipulation of the leveling nuts on the anchor bolts.

The installation and tightening of the anchor bolts shall be performed in strict conformance with the sequence outlined in Appendix A, Part 1 and 2, Section 5.2 of the National Cooperative Highway Research Program (NCHRP) Report 469 – Fatigue Resistance Design of Cantilevered Signal, Sign and Light Supports.

Before final acceptance, all metal surfaces shall be cleaned free of oil, grease, soil or other discoloration. Cleaning shall be done with suitable solvents or by other approved means, and shall be to the satisfaction of the Engineer. If cleaning is necessary after erection over roadways in use, approved suitable means shall be provided for the protection of traffic during cleaning operation.

## **Foundations**

### General

Prior to excavation for the overhead sign structures foundations, the contractor shall obtain the Engineer's approval regarding their location. End posts shall not be erected upon the completed footing until authorized, but the minimum time allowed for the hardening of the concrete before any load is placed thereon shall be 7 calendar days. The truss span and sign panels shall not be erected upon the end posts until the concrete for the foundation and pedestal has achieved the minimum concrete strength specified. 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.



The top surface of the concrete pedestal shall be leveled off at a distance below the bottom of the base plate so as to provide room for the lower leveling nuts and washers as shown on the Plans. The distance between the bottom of the leveling nuts and the top of the concrete pedestal shall not exceed one bolt diameter. The top surface of the concrete pedestal shall be edged and have a broom finish.

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

1. The top elevation of the concrete pedestal shall be within 1-inch of the top of pedestal elevation shown on the Plans.
2. The reinforcing steel shall be placed so that the outer edges of the reinforcing cage are located so as to provide the clear dimension shown on the Plans.

#### Shop Drawings

Shop drawings shall be submitted in accordance with subsection 105.04 of the Standard Specifications. Shop drawings shall be submitted for the formwork and the reinforcement steel associated with the concrete foundations.

The shop drawings shall show the proposed top of pedestal elevation for each sign structure, taking into consideration the stake out survey information required for the fabrication of the sign structure.

#### Formwork

All formwork shall conform to the requirements of Section 602 of the Standard Specifications.

### **Spread Footing Foundations**

#### Excavation & Backfill

Excavation: Section 202.03.

Undercut Excavation: Section 212.

Backfill: Backfilling around and over structures shall be performed with material conforming to the requirements of Section 209.04, Borrow Type F. Backfill in accordance with Section 207.05.

Borrow: Section 209.05.

Geotextile: Sections 713 and 827.06.

#### Concrete Placement, Curing, and Protection

All concrete placement, consolidation and curing activities shall conform to the recommendations of Section 602 and 812, of the Standard Specifications, except as otherwise specified herein.

#### Reinforcing Steel Placement

All reinforcing steel shall be placed in conformance with the requirements of Section 603 of the Standard Specifications.

#### **Basis of Payment:**

The quantity of four-chord truss sign supports and foundations will be paid for at the Contract lump sum price. Price and payment will constitute full compensation for furnishing all materials, fabricating and erecting the structure(s) at designated location(s), including excavation in accordance with Section 207,

geotextile, concrete and reinforcing bars, construction spread footing foundations, backfilling and compaction, grading, for all labor, equipment, tools, and all incidentals necessary to complete the work.

**NOTE:**

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

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

11/23/11

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

**Description:**

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

**Materials and Construction Methods:**

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

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

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

**Method of Measurement:**

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

**Basis of Payment:**

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

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

11/4/15

- 612520 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 15"
- 612522 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 12"
- 612523 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 18"
- 612524 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 24"
- 612525 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 30"
- 612526 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 36"
- 612530 - CORRUGATED POLYETHYLENE PIPE, TYPE S OR D, 42"
- 612531 - CORRUGATED POLYETHYLENE PIPE, TYPE S OR D, 48"
- 612534 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 8"
- 612544 - CORRUGATED POLYETHYLENE PIPE, TYPE S, 60"

**Description:**

This work consists of furnishing and installing corrugated polyethylene pipe with a smooth interior in a reasonably close conformity with lines and grades indicated on the Plans, and as directed by the Engineer.

**Materials:**

Pipes, couplings and fittings shall be made of polyethylene compounds, and shall meet all applicable requirements of AASHTO M294 current edition Type S or Type D for pipe sizes 12" and larger. Polyethylene pipes, couplings and fittings less than 12" in diameter shall meet the requirements of AASHTO M252 current edition. The pipes and fittings shall be free of foreign inclusions and visible defects and pipe shall be cut squarely and cleanly so as to not adversely affect joining or connecting. Visible defects such as cracks, creases, unpigmented or nonuniformly pigmented pipe are not permissible in the pipe as furnished.

Joints for all pipe and fittings shall use gasketed watertight bell/spigot or bell/bell couplers. The gaskets shall meet the requirements of ASTM F477 and the joint system shall be certified to meet a 10.8 psi laboratory test per ASTM D3212. In addition, the joint system shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joint.

The Contractor shall provide a manufacturer's certificate signed by the manufacturer's representative stating the product was manufactured, tested and supplied in accordance with all the applicable requirements of AASHTO M-294 (or ASSHTO M252 as applicable), ASTM F477 and ASTM D3212. The manufacturer shall verify compliance with AASHTO M294 through the National Transportation Product Evaluation Program.

**Construction Methods:**

**General.** The pipe shall be installed per the notes and details shown on the plans and in accordance with the requirements of ASTM D2321 or the manufactures published guidelines whichever is more stringent. The manufactures representative must be present at the beginning of the installation unless the engineer is confident in the contractors work. Having a representative on the site or not does not dismiss the contractor's liability.

**Excavation.** The trench in which the pipe is laid shall be excavated in accordance with Section 208 and The Standard Construction Details to the required depth. The width of the trench shall provide a minimum clearance of 18" between the trench wall and the O.D. of the pipe. If flowable fill is used, trench width shall provide 6" between the trench wall and O.D. of the pipe. Floating of pipe must be controlled. When multiple pipes are place side by side, a minimum of 18" shall be allowed between pipes or 6" if flowable fill is used. Minimum cover for pipe under pavement, including local roads, subdivision roads and non-residential driveways, shall be 1' measured from the top of pipe to bottom of pavement. The minimum cover for pipe under the travel way of roads with higher classifications shall be 2' measured from the top of pipe to the bottom of pavement. Otherwise, the cover shall be 1' measured from the top of pipe to top of grade unless otherwise recommended by the manufacturer to prevent pipe flotation.

**Bedding of Pipe.** Unless noted otherwise, all pipes shall be placed on Class C bedding as shown on The Standard Construction Details. The outside thirds of the bedding material shall be compacted. The areas around the joints shall be hand excavated to accommodate the bell when the outside diameter if the bell is greater than the pipe.

**Joints.** The spigot of the pipe shall be fully inserted into the bell to ensure a tight joint.

**Laying Pipe.** All pipe shall be laid in an upgrade direction unless otherwise directed. The pipe shall be laid with the lowest point of the inside diameter conforming to the flow line shown on the Plans. All pipe shall be carefully laid with the bell ends upgrade, with the spigot ends fully entered into the adjoining bell, and true to the lines and grades shown on the Plans, or as directed. Any pipe which is not in true alignment, or which shows any settlement after laying, shall be taken up and re-laid. Unsuitable material encountered below the flow line of the pipe shall be removed to a depth and replaced, as directed.

**Backfill.** Placement of backfill shall conform to Section 208 except as follows:

The initial backfill lift shall not exceed 12" of loose material or be higher than the spring line of the pipe. The material shall be sliced into the haunches of the pipe using a shovel. A maximum of 8" of loose material shall be placed for each remaining lift. Caution shall be taken not to hit the pipe with any mechanical compaction equipment. Caution shall also be taken not to disturb the pipes alignment. Where heavy construction equipment is expected to travel over the shallow buried pipe the pipe shall be protected by temporarily placing a cover of material as recommended by the manufacturer.

**Video Inspection:**

Video inspection will be performed by DelDOT. If deflection in the pipe is clearly visible it will be assumed to be more than 5% and will have to be corrected. If the contractor wishes to challenge this decision they may do so either by direct internal measurement or by the use of a go-no-go mandrel with a minimum of nine points.

**Method of Measurement:**

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

**Basis of Payment:**

The quantity of polyethylene pipe will be paid for at the Contract unit price per linear foot for each type of pipe. Price and payment will constitute full compensation for furnishing, hauling, and installing pipe; for excavation and backfill, for furnishing and placing Type C Borrow, (#57 stone may be substituted under roadway), for all cribbing or foundation treatment (Class C bedding) necessary to prevent settlement; for all shoring and sheeting; for the replacement of any pipe which is not true in alignment or which shows any settlement after laying; for verifying and correcting deflection, for protection of shallow buried pipe and for all material, labor, equipment, tools, and incidentals required to complete the work. Payment for excavation and replacement of unsuitable material encountered below the Class C bedding will be provided for under Section 208.

For round pipe under 24" nominal inside diameter, the excavation (excluding rock), backfill, and backfilling will be included in the price for this work. For pipe of nominal inside diameter or horizontal dimension of 24" and over, payment for excavation and backfill will be in accordance with Section 208. Furnishing of Borrow Type C for pipe of nominal inside diameter or horizontal dimension of 24" and over, will be paid for under Section 210. Payment for excavation and replacement of unsuitable material encountered below the flow line of pipe will be provided for under Section 208.

**612535 - CLEANING DRAINAGE PIPE, 15" - 24" DIA.**  
**612536 - CLEANING DRAINAGE PIPE, GREATER THAN 24" DIA.**

**Description:**

This work consists of cleaning existing drainage pipe. It is the intent that equipment and cleaning methods used to perform this work conform to Specification Guidelines prepared by the National Association of Sewer Service Companies (NASSCO) hereinafter referred to as the NASSCO Specifications.

**Materials and Construction Methods:**

Water used for cleaning shall be safe for all downstream environments. The source for the cleaning water shall be approved by the Engineer.

Equipment and construction methods shall be in accordance with the requirements under Sewer Line Cleaning, High-Velocity Jet (Hydrocleaning) found in the NASSCO Specifications. Equipment shall be operated in accordance with the manufacturer's instructions. The cleaning operation shall consist of up to three passes of the hydrocleaning equipment. If three passes do not adequately clean the pipe, the Engineer may direct the Contractor to use other procedures covered by other item(s) of work.

Material removed during the pipe cleaning operation shall be disposed by the Contractor at a site approved by the Engineer.

**Method of Measurement:**

The quantity of drainage pipe cleaned will be measured as the actual number of linear feet of pipe cleaned and accepted measured from end to end.

**Basis of Payment:**

The quantity of pipe cleaned will be paid for at the Contract unit price per linear foot. Price and payment will constitute full compensation for furnishing equipment and water, disposing of removed material and for all labor, equipment, tools and incidentals to complete the work.

11/4/15

**617519 – CONCRETE END SECTION, 24", MARYLAND**  
**617520 – CONCRETE END SECTION, 19" X 30", MARYLAND**  
**617521 – CONCRETE END SECTION, 22" x 34", MARYLAND**

**Description:**

This work consists of furnishing, fabricating, and constructing concrete end sections of the type specified in accordance with the details and locations shown on the Plans and as directed by the Engineer, at locations in Maryland. This work shall also consist of applying integral color admixture to the concrete mixture for drainage structures as specified in the contract documents. A sandblast finish shall be applied to the completed, colored drainage structures.

**Materials and Construction Methods:**

Materials and construction methods shall conform to the applicable requirements of Section 617 of the Standard Specifications, and notes and details on the Plan.

**Integral Concrete Color Pigment Admixture.** The admixture shall be a colored, water reducing, admixture containing no calcium chloride with coloring agents that are lime proof and UV resistant. The admixture shall conform to C979, C494 and M194.

The color shall meet Federal Standard 595B. The manufacturer shall choose from the following colors: 30277, 30145, and 30219. The same color shall be used throughout the project. It may be necessary to use white portland cement to achieve the color. Compromising the color will not be acceptable in order to avoid using white cement. The pigment admixture shall be added to the concrete as specified by the manufacturer. Care should be taken to ensure uniform coloration throughout the structure.

**Sandblasted Finish.** All colored drainage structures shall be textured with a sandblast finish. Allow concrete to cure to sufficient strength so that it will not be damaged by blasting but not less than seven days. The finish shall be Class 1 (Brush) involving a one pass brush blast which will remove the cement matrix and expose the fine aggregates only. No part of the coarse aggregates shall be exposed.

The Contractor shall be responsible for meeting all local air pollution regulations. The contractor shall ensure the safety of the workers, ensuring that each blaster is equipped with an air-fed helmet.

The Sandblast contractor shall be responsible for clean-up of immediately adjacent areas to the sandblasting operation.

**Sample Panel.** Whenever the contract documents specify that drainage structures be cast with integral concrete color pigment admixture, prior to casting the structures a 2 ft. by 2 ft. by 4 in. sample panel shall be cast, sandblasted and made available to the Engineer at the construction site for color and finish approval. All subsequent structures requiring integral color shall match the sample panel. The sample shall remain at the construction site to be used by the Engineer as a basis for comparison for the structures.

**Method of Measurement:**

The quantity of concrete end sections will be measured as the number of concrete end sections furnished of each type, installed and accepted in Maryland, in accordance with the Plans.

Integral colored concrete will not be measured but will be incidental to the contract item Concrete End Section, Maryland. Integral colored concrete will include pigment admixture, sandblast finish, clean-up and all material, labor, equipment, tools and incidentals necessary to complete the work.

**Basis of Payment:**

The quantity of concrete end sections will be paid for at the contract unit price for each concrete end section furnished, installed and accepted in Maryland. Price and payment will constitute full compensation for furnishing, hauling, and installing materials, including bar reinforcement; for excavating, backfilling, and compacting; for cribbing, shoring, sheeting, coating, and paving; and for all labor, equipment, tools, and incidentals required to complete the work.

11/23/11



**618552 – FURNISH PIPE PILE, SCHEDULE 40, OPEN END, 14”**  
**618557 – FURNISH TEST PIPE PILE, SCHEDULE 40, OPEN END, 14”**

**Description:**

This work consists of furnishing steel pipe piles and test piles.

**Materials:**

In accordance with Sections 618.15 and 618.21 of the Standard Specifications and as follows.

**Steel Pipe Piles and Splice Back-up Plate:** ASTM A 252, Grade 2

The pipe piles shall have a minimum wall thickness of 0.5 inch.

**Concrete:** Portland Cement Concrete shall be 4500 psi minimum and shall conform to the material requirements of Class A, Section 812, Portland Cement Concrete of the Standard Specifications.

**Bar Reinforcements:** Bar reinforcements shall be epoxy coated and meet the requirements of ASTM A 615, Grade 60 and conform to Subsection 604.02 of the Standard Specifications.

**Construction Methods:**

Installation of piles shall conform to the requirements of Install Pipe Pile, Schedule 40, Open End, 14”, Item 619540.

**Method of Measurement:**

In accordance with Sections 618.22 of the Standard Specifications.

**Basis of Payment:**

In accordance with Sections 618.23 of the Standard Specifications.

11/23/11

**619501 - PRODUCTION PILE RESTRIKE**  
**619502 - TEST PILE RESTRIKE**

**Description:**

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

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

**Procedure:**

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

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

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

All restrikes shall be performed using the same pile hammer, helmet, and cushion material used to install the piles during initial driving. The pile hammer shall be fully warmed up and operated at full stroke, or as otherwise specified by the Engineer, during the pile restrike. The warm-up procedure shall consist of a minimum of 25 blows of the hammer at full stroke at locations other than the piles to be restruck.

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

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

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

If for any reason, the pile hammer malfunctions, the helmet fails, the cushioning materials fail, or any other component of the pile driving system does not function properly during the pile restrike, the Contractor shall wait up to two (2) calendar days and perform additional restrikes at no additional cost to the Engineer or The Department until the pile driving system operates properly through a complete continuous restrike procedure.

**Method of Measurement/Basis of Payment:**

**Production Pile Restrike:**

This item shall be measured and paid for on a per each basis and payment will constitute full compensation for performing restrikes of selected production piles. The Engineer will work jointly with the Contractor to establish a sequencing of production pile restrikes to minimize impact to the Contractor's driving schedule. Any perceived mobilization costs, set-up costs, delay costs, etc. anticipated by the Contractor shall be incidental to the price for this item.

Payment for "Production Pile Restrikes" shall be made at the fixed price of \$500.00 Each if it is requested by the Department within five (5) working days of the completion of the initial driving of the pile to be restruck. Payment for "Production Pile Restrikes" with requested restrike wait time exceeding five (5) working days will be made at the fixed price of \$500.00 Each for each working day exceeded, starting on the

sixth day, in addition to the fixed price of \$500.00 Each. An example of this case would be, if the Engineer directs a production pile restrike to be performed six (6) working days following the completion of the initial driving, two (2) unit will be paid. Similarly, if the restrike is ordered to be performed eight (8) working days following the completion of the initial driving, four (4) units will be paid. No payment will be made for additional days if the Contractor elects to wait longer to perform the restrike than the time frame as directed by the Engineer. Any overlapping days due to multiple production piles will be paid for only one day.

**Test Pile Restrike:**

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

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

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

11/23/11

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

**Description:**

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

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

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

**Submittals:**

The Contractor shall engage the services of a specialty subcontractor, the Dynamic Testing Consultant (DTC), experienced in high-strain dynamic monitoring of driven piles to perform dynamic testing and signal matching analysis and to evaluate and report results to the Department. The Dynamic Testing Consultant shall have at least five (5) years of documented experience in the performance and interpretation of dynamic pile testing, including dynamic pile testing on open ended pipe piles. The Dynamic Testing Consultant's field engineer or technician, who will be operating the instrumentation and collecting the data, shall have documented experience on at least ten (10) prior projects with similar pile requirements, including pipe piles. All projects submitted as evidence of experience shall include the client and owner, points of contact, and a description of the pile type. The field engineer or technician responsible for operating the instrumentation shall be fully capable of understanding and interpreting the data being collected during driving. The Dynamic Testing Consultant shall be selected by the Contractor and submitted at the pre-construction meeting for approval by the Department.

a. Qualifying Experience

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

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

b. Wave Equation Analysis

The Contractor shall submit the completed Pile and Driving Equipment data form to the Department 30 to 45-days before mobilization to the site. The wave equation analysis of the proposed driving system shall be submitted to the Department at least 10-days prior to driving of the piles. The results of the wave equation analysis using the GRLWEAP program or other software approved by the Department shall be

submitted in a bound report for review and approval. The wave equation analysis shall be performed at each test pile location and for each test pile type and driving equipment. Approval of the proposed driving system by the Department will be based on DelDOT Standard Specifications for Road and Bridge Construction, 2001, Section 619.09, Bearing Values.

c. Reports

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

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

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

Within three (3) working days of the completion of each dynamic test, the Contractor's specialty subcontractor shall submit to the Department a report meeting the requirements of this Special Provision that is signed and sealed by a Professional Engineer licensed in the State of Delaware. In addition to the raw data and ASTM D4945 requirements, the report shall include detailed results of the signal matching analyses including, but not limited to, pile driving log, all extrema tables; pile profile and pile model tables; simulated load test curves for the tip and top of the pile; the soil parameters used in the analysis by matching the measured and computed values of forces, velocities, and displacements; and static resistance distribution along the length of the pile, in a format approved by the Department. The Contractor is to develop the driving criteria for the production piles based on the results of the high strain dynamic testing with signal matching analysis. The Contractor shall submit the driving criteria for review and approval of the Engineer prior to installation of production piles. The driving criteria shall be summarized in the format provided by the Engineer after award of the contract.

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

**Materials and Construction Methods:**

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

The Contractor shall maintain a stock of at least four working accelerometers and strain transducers at the job site whenever high-strain testing is being performed. All repair or replacement costs shall be performed at no additional cost to the Engineer or The Department. The Contractor shall provide the Engineer and The Department reasonable inspection access along the full length and circumference of all piles prepared for instrumentation attachment prior to the piles being lifted and located in the leads.

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

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

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

All dynamically tested piles shall be driven in accordance with the Plans. Should the field data indicate the hammer system is not transferring to the pile the full energy anticipated at the end of initial drive, the Contractor shall increase the hammer stroke and/or driving resistance until the minimum initial drive capacity is displayed on the dynamic testing apparatus. However, in no case shall the permissible stress limits be exceeded.

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

Restriking of all test piles as indicated on the plans or directed by the Department shall be dynamically tested by the Contractor. Dynamic testing of production piles shall be at the request of the Department based on actual field conditions.

**Method of Measurement:**

High-Strain Dynamic Pile Testing by Contractor authorized and found acceptable by the Department will be measured on an Each basis upon receipt and acceptance of the associated dynamic testing report(s). Each initial drive and each restrike dynamically monitored by the Contractor shall be measured as separate units.

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

**Basis of Payment:**

Payment for High-Strain Dynamic Pile Testing by Contractor authorized and found acceptable by the Department will be made at the Contract unit price per Each for Item 619519. Payment for Signal Matching Analysis by Contractor and found acceptable by the Engineer will be made at the Contract unit price per Each for Item 619539. The payment will also be full compensation for preparing the preconstruction wave equation analyses, and preparation of reports. Price and Payment will constitute full compensation for furnishing tools, labor, specialty subcontractor, materials, equipment, analyses, reports, and incidental work required to perform high-strain dynamic pile testing during initial driving and restrikes including providing inspection access to the Engineer and the Department.

**619540 – INSTALL PIPE PILE, SCHEDULE 40, OPEN END, 14”**  
**619558 – INSTALL TEST PIPE PILE, SCHEDULE 40, OPEN END, 14”**

**Description:**

This work consists of installing steel pipe production and test piles. This work also consists of extracting, removing, and disposing of any test pile where required.

**Materials:**

In accordance with Section 619.02 except revise the first sentence as follows: Pile materials shall conform to the requirements of Item 618552 - Furnish Pipe Pile, Schedule 40, Open End, 14”, and Item 618557 - Furnish Test Pipe Pile, Schedule 40, Open End, 14”.

**Construction Methods:**

Equipment: In accordance with Sections 619.03, 619.04, 619.05, 619.06, and 619.07 of the Standard Specifications.

Construction Methods: In accordance with Sections 619.08, 619.09, 619.10, 619.11, 619.12, 619.14, 619.16, 619.17, and 619.18 of the Standard Specifications.

**Method of Measurement:**

In accordance with Section 619.19 of the Standard Specifications.

**Basis of Payment:**

In accordance with Section 619.20 of the Standard Specifications.

8/15/12

**708583 - PERSONAL GRATE FOR PIPE INLET**

**Description:**

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

**Materials:**

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

Working drawings shall be submitted in accordance with Subsection 105.04.

**Construction Methods:**

Personnel grates for pipe inlets shall be constructed based on the details shown in the Plans 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 personal 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.

9/26/07



**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

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

**Description:**

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

**Materials and Construction Methods:**

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

The Contractor shall submit shop drawings showing the details for fabrication of the structure for prior approval.

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

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

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

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

**Basis of Payment:**

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

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

**NOTE:**

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

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

11/23/11

**708660 – DRAINAGE INLET, TYPE K, SINGLE, MARYLAND**

**Description:**

This work consists of furnishing, fabricating, and constructing drainage inlets of the type specified in accordance with the details and locations shown on the Plans and as directed by the Engineer, at locations in Maryland. Construct cast-in-place inlets or install them as pre-cast concrete structures. This work shall also consist of applying integral color admixture to the concrete mixture for drainage structures as specified in the contract documents. A sandblast finish shall be applied to the completed, colored drainage structures.

**Materials and Construction:**

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

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

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

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

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

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

**Pipe Connections.** Set or cut inlet and outlet pipes flush with the inside face of the structure. Extend them a sufficient distance beyond the outside face of these walls to provide for making proper connections. Completely and neatly close the joint around the pipe in the structure wall with mortar or other specified materials.

Integral Concrete Color Pigment Admixture. The admixture shall be a colored, water reducing, admixture containing no calcium chloride with coloring agents that are lime proof and UV resistant. The admixture shall conform to C979, C494 and M194.

The color shall meet Federal Standard 595B. The manufacturer shall choose from the following colors: 30277, 30145, and 30219. The same color shall be used throughout the project. It may be necessary to use white portland cement to achieve the color. Compromising the color will not be acceptable in order to avoid using white cement. The pigment admixture shall be added to the concrete as specified by the manufacturer. Care should be taken to ensure uniform coloration throughout the structure.

**Sandblasted Finish.** All colored drainage structures shall be textured with a sandblast finish. Allow concrete to cure to sufficient strength so that it will not be damaged by blasting but not less than seven days. The finish shall be Class 1 (Brush) involving a one pass brush blast which will remove the cement matrix and expose the fine aggregates only. No part of the coarse aggregates shall be exposed.

The Contractor shall be responsible for meeting all local air pollution regulations. The contractor shall ensure the safety of the workers, ensuring that each blaster is equipped with an air-fed helmet. The Sandblast contractor shall be responsible for clean-up of immediately adjacent areas to the sand-blasting operation.

**Sample Panel.** Whenever the contract documents specify that drainage structures be cast with integral concrete color pigment admixture, prior to casting the structures a 2 ft. by 2 ft. by 4 in. sample panel shall be cast, sandblasted and made available to the Engineer at the construction site for color and finish approval. All subsequent structures requiring integral color shall match the sample panel. The sample shall remain at the construction site to be used by the Engineer as a basis for comparison for the structures.

**Method of Measurement:**

The quantity of inlets will be measured as the number of inlets furnished of each type, installed and accepted in Maryland, in accordance with the Plans.

Integral colored concrete will not be measured but will be incidental to the contract item Drainage Inlet, Type K, Maryland. Integral colored concrete will include pigment admixture, sandblast finish, clean-up and all material, labor, equipment, tools and incidentals necessary to complete the work.

**Basis of Payment:**

The quantity of inlets will be paid for at the contract unit price for each inlet furnished, installed and accepted in Maryland. Price and payment will constitute full compensation for excavation, dewatering, ground preparation, furnishing and placing all materials including reinforcing steel, concrete, pipes, gaskets, grout, pipe bedding, backfill, and all other materials required for inlet installation, for welding and for all labor, equipment, tools, and incidentals necessary to complete the work.

11/29/11

**712531 - CHANNEL BED FILL**

**Description:**

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

**Materials:**

Provide aggregate material meeting the following requirements:

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

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

**Table 1**

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

Notes:

<sup>1</sup> Salvaged materials may contain material exceeding this size and be acceptable.

<sup>2</sup> Salvaged materials may contain up to 20% passing the 3/8-inch sieve but not to exceed 10% passing the #200 sieve when tested in accordance with T-11.

<sup>3</sup> Unless noted otherwise on plan sheets, Light gradation shall be used in locations in Sussex County

<sup>4</sup> Unless noted otherwise on plan sheets, Medium gradation shall be used in locations in Kent and New Castle Counties.

**Method of Measurement:**

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

**Basis of Payment:**

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

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

4/10/12

**712552 - RIPRAP SLOPE PROTECTION, MARYLAND**

**Description:**

This work consists of furnishing and placing dry stone riprap of the type specified in accordance with the details and locations shown on the Plans and as directed by the Engineer, at locations in Maryland. This work also includes preparing the bedding areas for the placement of riprap.

**Materials:**

**Stone:** Class as specified. Use field or quarry stone of approved quality. Stone may be certified from a source previously approved. Ensure that maximum dimension does not exceed four times the minimum dimension. Ensure that stone for riprap is uniformly graded from the smallest to the largest pieces as specified in the Contract Documents. The stone will be accepted upon visual inspection at the point of usage, as follows:

<b>CLASS OF RIP RAP</b>	<b>SIZE</b>	<b>PERCENT OF TOTAL by weight</b>
0	Heavier than 33 lb	0
	Heavier than 10 lb	50
	Less than 1 lb	10 max
I	Heavier than 150 lb	0
	Heavier than 40 lb	50
	Less than 2 lb	10 max
II	Heavier than 700 lb	0
	Heavier than 200 lb	50
	Less than 20 lb	10 max
III	Heavier than 2000 lb	0
	Heavier than 600 lb	50
	Less than 40 lb	10 max

Note: Optimum gradation is 50 percent of the stone being above and 50 percent below the midsize. Reasonable visual tolerances will apply.

**Geotextile:** Class as specified.

**Geotextile Requirements.** All geotextiles shall be listed in the National Transportation Product Evaluation Program (NTPEP) for geotextiles. The geotextile shall be manufactured from fibers consisting of long chain synthetic polymers, composed of a minimum 95 percent by weight of polyolefins or polyesters. The fibers shall be formed into a stable network so that the filaments or yarns retain their dimensional stability relative to each other, including selvages. The geotextile shall meet the following:

MARYLAND APPLICATION CLASS		TYPE OF GEOTEXTILE	GRAB STRENGTH	PUNCTURE STRENGTH	PERMITTIVITY	APPARENT OPENING SIZE, max	TRAPEZOID TEAR STRENGTH
			lb	lb	sec <sup>-1</sup>	mm	lb
			D 4632	D 6241	D 4491	D 4751	D 4533
SD	TYPE I	NONWOVEN	160	56	0.50	0.43	55
		WOVEN, MONOFILAMENT	250	90	0.50	0.43	90
	TYPE II	NONWOVEN	160	56	0.20	0.25	55
		WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
PE	TYPE I	NONWOVEN	200	80	0.70	0.43	80
		WOVEN, MONOFILAMENT	250	90	0.70	0.43	90
	TYPE II	NONWOVEN	200	80	0.20	0.25	80
		WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
	TYPE III	NONWOVEN	200	80	0.10	0.22	80
		WOVEN, MONOFILAMENT	250	90	0.10	0.22	90
SE	NONWOVEN	200	80	0.20	0.30	80	
	WOVEN	250	90	0.20	0.30	90	
ST	WOVEN	300*	110	0.05	0.15**	110	
F	WOVEN	100	-	0.05	0.60	-	
E	NONWOVEN	90	30	0.50	0.30	30	

Note 1: All property values are based on minimum average roll values in the weakest principle direction, except

for apparent opening size.

Note 2: The ultraviolet stability shall be 50 percent after 500 hours of exposure for all classes, except Class F,

which shall be 70 percent (D 4355).

\* Minimum 15 percent elongation.

\*\* This is a MINIMUM apparent opening size, not a maximum.

Only those geotextiles that have been tested by NTPEP will be considered candidates for use. In addition, the geotextiles shall meet the Contract Documents and the Geotextile Acceptance and Quality Assurance Procedure, MSMT 732.

**Riprap Color at SWM Facilities.** The riprap used at stormwater management facilities shall be brown in color. If brown riprap is not available, blue-gray or gray riprap shall be used. A sample of the stone shall be made available to the Engineer at the construction site for color and finish approval prior to installation.

**Construction Methods:**

**Excavation.** Excavate for riprap and cutoff walls to the specified lines and grades. Ensure that the subgrade is smooth and firm, free from protruding objects that would damage the geotextile, and constructed in an acceptable manner.



**Geotextile.** Place the geotextile on the prepared subgrade with the adjacent edges overlapping at least 2 ft. Replace or repair damaged geotextile as directed.

**Riprap Placement.** Ensure that the underlying surface is free of brush, trees, and stumps, and is acceptable to the Engineer. Place the first section of riprap consisting of at least 5 tons, which will be inspected by the Engineer for conformance to gradation and placement requirements. If approved, this section will be used to evaluate quality control for the remainder of the project. If the material is rejected, remove it from the project and place additional sections, each at least 5 tons.

Begin the placement of the riprap with the bottom cutoff walls or toe sections. Place the larger stones in the cutoff walls and along the outside edges of the limits of slope and channel protection. Place the riprap with equipment that produces a uniformly graded mass of stones.

Ensure that the surface elevation of completed riprap installations is flush with adjacent channel bed or bank slope elevations, and does not create an obstacle to the flow. Ensure that the outer riprap surfaces are even and present a generally neat appearance. The plus or minus tolerance of the surface of the finished riprap installation is 3 in. for Class I Riprap and 6 in. for Class II and III Riprap from the lines and grades shown on the Contract Documents when measured perpendicular to the exterior surface of the stonework.

Place and distribute the stone so the resulting layer will contain a minimum of voids and there will be no pockets of same size material. Place the stone to its full course thickness in one operation in a manner that the underlying material is not be displaced or worked into the course of riprap being placed. When an aggregate filter blanket is used, proceed with the placement of the riprap in a controlled manner to avoid disruption or damage to the layer of bedding material.

**Backfill.** Backfill any excavation voids existing along the edges of the completed slope and channel protection, and compact it in an acceptable manner.

**Method of Measurement:**

The quantity of riprap stone protection will be measured as either the actual number of square yards of riprap placed and accepted in Maryland. Quantity will be determined by computations based on field measurements taken on and along the completed finished surfaces (no horizontal projection) and the specified placement thickness for the type specified.

**Basis of Payment:**

The quantity of riprap stone protection will be paid for at the Contract unit price per square yard. Price and payment will constitute full compensation for excavating and preparing the bedding areas if applicable; for furnishing, preparing, and placing all materials, including geotextile; and for all labor, equipment, tools, and incidentals required to complete the work.

8/13/12

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

**Description:**

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

**Materials and Construction Methods:**

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

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

**Method of Measurement:**

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

**Basis of Payment:**

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

10/29/01

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

**Description:**

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

**Materials:**

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

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

Guardrail End Treatment Attenuator Type 1 shall have a minimum of 2 square feet of yellow retroreflective material on the nose. Guardrail End Treatment Attenuator, Type 2 and Type 3 shall have a minimum of 3 square feet 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" above ground level in that portion of the attenuator impacted and broken away by an errant vehicle. It is the intent that the errant vehicle not be snagged by an embedded component of the end treatment attenuator.

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

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

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

Unless otherwise noted on the Plans, the Guardrail End Treatment Attenuator, Type 1 shall be installed with a 50:1 taper beginning 50' 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 long. The 50' 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' length will be considered as part of the guardrail end treatment attenuator and not be measured separately. Measurement for the guardrail will begin 50' from the center of the nose post of the attenuator.

**Basis of Payment:**

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

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

4/7/11

**720611 - FLEXIBLE DELINEATOR, PERMANENT**

**Description:**

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

**Materials:**

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

**Construction Methods:**

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

**Method of Measurement:**

The quantity will be measured as the actual number of tubular markers installed.

**Basis of Payment:**

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

7/2/10

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

**Description:**

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

**Materials:**

Material shall conform to the requirements listed on the Plans, the applicable subsections of Sections 602 & 603 of the Standard Specifications, and as noted herein. Portland cement concrete shall be 4500 psi minimum and shall conform to the material requirements of Class A, Section 812, Portland Cement Concrete of the Standard Specifications.

Bar reinforcement shall be epoxy coated meeting the requirements Section 604 Grade 60 (Grade 400).

**Construction Methods:**

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

The Contractor shall have the option of constructing the permanent safety barriers by selecting Cast-In-Place or Slip-form methods. The Contractor shall submit his/her plans for the selected method to the Department's Materials and Research Section for approval. In case of selecting the Slip-form method, the Contractor shall be able to demonstrate his/her ability to successfully accomplish the item by his/her past involvement in doing such work. Slip-form plans shall show the sawing of 3" deep contraction joints at a maximum of 20-ft. intervals. The Contractor shall provide 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 concrete safety barrier will be measured by the linear foot along one continuous front toe of the barrier, installed in place and accepted including all barrier transitions and end sections.

**Basis of Payment:**

The quantity of concrete 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 materials, formwork, sawing of joints, joint seals and fillers, reinforcement bars, weep holes, and concrete all complete in place and accepted, for all labor, equipment, tools and incidentals necessary to complete the work. Payment for excavation and the P.C.C. footer portion of the barrier are included in this item.

11/19/12

**727507 - BRIDGE SAFETY FENCE**

**Description:**

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

**Materials:**

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

Chain-link fence shall be either galvanized steel fabric fence or aluminum-coated steel fabric fence, conforming to the appropriate requirements of AASHTO M 181.

Tubular steel posts, braces, fittings and hardware shall conform to the requirements of AASHTO M 281 and shall be galvanized in accordance with AASHTO M 111.

All base plates shall be steel conforming to the requirements of AASHTO M 270, Grade 36.

Material for anchor studs or anchor bolts shall meet ASTM A276, Type 430 or Type 304 Stainless Steel Annealed, Hot-Finished, Ultimate Strength 70,000 PSI minimum, 20% elongation. Threads may be rolled or cut.

**Construction Methods:**

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

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

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

**Method of Measurement:**

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

**Basis of Payment:**

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

11/29/11

**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. 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.

9/9/15

**727553 – DIVERSION FENCE, MARYLAND**

**Description:**

This work consists of furnishing, constructing, maintaining, and ultimately removing, Diversion Fence as a temporary measure to control sedimentation within the limits of construction. Diversion fence shall be constructed as shown on Standard Construction Detail, Diversion Fence, at the locations shown on the Plans, and as directed by the Engineer, for locations in Maryland.

**Materials:**

All materials shall conform to the standard detail for Diversion Fence in the contract drawings.

**Construction:**

Trench double 6 mil polyethylene sheeting at least 6 in. into the ground, cover at least 4 ft. from the trench line to the fence posts, extend at least 20 in. above the ground, and wrap over the fence posts to grade.

**Method of Measurement:**

The quantity of diversion fence will be measured per linear foot installed and accepted in accordance with the Plan at locations in Maryland. Overlaps of materials of any kind will not be measured.

**Basis of Payment:**

The quantity of diversion fence will be paid for at the Contract unit price per linear foot. Price and payment will constitute full compensation for furnishing all materials; for excavating and backfilling associated with the construction of the fence; for maintaining the fence during the Project construction period; for removing the fence with all related hardware after completion of the Project; for restoring the site; and for all labor, equipment, tools and incidentals required to complete the work.

11/29/11

**734555 - TEMPORARY VEGETATIVE STABILIZATION, MARYLAND**

**Description:**

The work included in this item shall consist of providing vegetative stabilization for disturbed areas in Maryland as specified on the Plan. This work shall include soil testing, fertilization, seedbed preparation, seeding and mulching on all areas to be treated in Maryland as shown on the plans or where designated by the Engineer.

**Materials:**

**Water.** Water used for the installation and establishment of vegetation shall not contain concentrations of substances that are harmful to plant growth. Water derived from public and municipal water systems shall be acceptable for irrigation, fertilization, or mixing with pesticides. Water derived from wells or other sources may be used when it has soluble salts concentration less than 500 ppm, sodium less than 50 percent of total salts, and pH between 5.0 to 7.8.

**Soil Amendments.** Soil amendments including but not limited to fertilizer and lime shall meet the requirements described on the plans

**Mulch.** Mulch materials shall meet the requirements specified on the plans, and at a minimum, materials used as mulch shall have a uniform texture and be free from foreign materials or concentrations of metals, chemicals, or other substances that are harmful to human health, water quality, or plant growth.

Straw Mulch shall consist of thoroughly threshed stems and leaves of barley, oats, rye, and wheat. Straw mulch shall be in an air-dry condition suitable for application with a mulch blower or other equipment. Straw mulch shall be visually inspected to ensure it is free of objectionable quantities of mold, foreign substances, and weed seeds.

Wood Cellulose Fiber Mulch shall be a uniformly processed wood product that is able to form a homogenous slurry with seed, fertilizer, and other materials under agitation with water. The fiber shall perform satisfactorily in hydraulic seeding equipment without clogging or damaging the system. The slurry shall contain a green dye to provide easy visual inspection for uniformity of application. The manufacturer shall furnish certification as specified in TC-1.03 of the Technical Association of Pulp and Paper Industry (TAPPI) in conformance with the following:

<b>WOOD CELLULOSE FIBER</b>	
<b>TEST PROPERTY</b>	<b>TEST VALUE</b>
Particle Length	Approx. 0.5 in.
Particle Thickness	Approx. 0.063 in.
Net Dry Weight Content	Minimum as stated on bag
pH, TAPPI Standard T 509,	4.0 – 8.5
Ash Content, TAPPI Standard T 413	7.0% maximum
Water Holding Capacity	90% minimum

**Weeds Prohibited in Seed Mixtures.** Maryland Temporary Seed Mix, and Additive Seed shall be free from seed or viable parts of the following species:

WEEDS PROHIBITED IN TURFGRASS SOD AND MARYLAND SEED MIXTURES	
COMMON NAME	SCIENTIFIC NAME
annual bluegrass	<i>Poa annua</i> L.
balloonvine	<i>Cardiospermum halicacabum</i> L.
Bermudagrass	<i>Cynodon dactylon</i> (L.) Pers.
Canada Thistle	<i>Cirsium arvense</i> (L.) Scop.
Carolina horsenettle	<i>Solanum carolinense</i> L.
common corncockle	<i>Agrostemma githago</i> L.
common reed = phragmites	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.
crested anoda = spurred anoda	<i>Anoda cristata</i> (L.) Schltl.
dodder	<i>Cuscuta spp.</i> L.
field bindweed	<i>Convolvulus arvensis</i> L.
Japanese bristlegrass = giant foxtail	<i>Setaria faberi</i> Herrm.
Java-bean = sicklepod	<i>Senna obtusifolia</i> (L.) Irwin and Barneby
Johnsongrass	<i>Sorghum halepense</i> (L.) Pers. and hybrids
meadow garlic = wild onion	<i>Allium canadense</i> L.
plumeless thistle	<i>Carduus</i> L.
quackgrass	<i>Elytrigia repens</i> (L.) Gould
Rough cocklebur	<i>Xanthium strumarium</i> L.
serrated tussock	<i>Nassella trichotoma</i> (Nees) Hack.
wild garlic	<i>Allium vineale</i> L.
yellow nutsedge	<i>Cyperus esculentus</i> L.

**Temporary and Grass Additive Seed** . Species included in Maryland Temporary Seed Mix, or used as Additive Seed with Maryland Turfgrass Seed Mix or Maryland Special Purpose Seed Mix shall conform to the following requirements for minimum percent purity, maximum percent weed seed, and minimum percent germination:

TEMPORARY and GRASS ADDITIVE SEED SPECIES			
COMMON NAME, and SCIENTIFIC NAME	PURITY Min %	WEED Max %	GERM Min %
cereal rye <i>Secale cereale</i> L.	98	0.1	85
common barley, winter type <i>Hordeum vulgare</i> L.	98	0.3	85
common oat, winter type <i>Avena sativa</i> L.	98	0.5	85
common wheat, winter type <i>Triticum aestivum</i> L.	98	0.1	85
Italian ryegrass = annual ryegrass <i>Lolium perenne</i> L. ssp. <i>multiflorum</i> (Lam.) Husnot	95	0.3	85
foxtail bristlegrass = foxtail millet <i>Setaria italica</i> (L.) P. Beauv.	99	0.1	80

**Maryland Temporary Seed Mix.**

MARYLAND TEMPORARY SEED MIX		
MIX %	SPECIES	
	Common Name	Scientific Name
95	common wheat, winter type	<i>Triticum aestivum</i> L.
	common barley, winter type	<i>Hordeum vulgare</i> L.
	common oat, winter type	<i>Avena sativa</i> L.
	cereal rye, winter type	<i>Secale cereale</i> L.
5	foxtail bristlegrass = foxtail millet	<i>Setaria italica</i> (L.) P. Beauv.

**Maryland Temporary Seed Application Rate.**

<b>APPLICATION RATES - TEMPORARY SEED</b>		
<b>MATERIAL</b>	<b>LB PER 1000 FT2</b>	<b>LB PER ACRE</b>
Maryland Temporary Seed Mix	2.9	125
Straw Mulch	91.8	4000
Wood Cellulose Fiber	17.2	750

**Construction Methods:**

**General.** This work shall consist of testing the soil, preparing the soil including adding amendments, placing the seed and mulching the seed bed as described on the plans to provide vegetative stabilization. This work shall conform to the methods described on the plans.

**Maintenance.** The Contractor shall maintain all seeded areas free from weeds and debris in accordance with Section 105.13.

**Acceptance of Temporary Vegetative Stabilization, Maryland.** Acceptance of temporary seeding will be made at time of placement, provided the seed is mixed and placed as specified in General Construction Methods above.

**Method of Measurement:**

The Engineer will measure the quantity of acceptably placed Maryland Temporary Vegetative Stabilization seed. The quantity of seeding will be measured in square yards (square meters) of surface area.

**Basis of Payment:**

The quantity and type of seeding will be paid for at the Contract unit price per square yard (square meter). Price and payment will constitute full compensation for testing the soil, preparing the ground; for furnishing and placing all materials including seed; and for all labor, equipment, tools and incidentals required to complete the work.

Payment for Temporary Vegetative Stabilization, Maryland seeding will be made at the time seed is acceptably placed.

10/10/12

**734556 - PERMANENT VEGETATIVE STABILIZATION, MARYLAND**

**Description:**

The work included in this item shall consist of providing vegetative stabilization for disturbed areas in Maryland as specified on the Plan. This work shall include soil testing, fertilization, seedbed preparation, seeding and mulching on all areas to be treated in Maryland as shown on the plans or where designated by the Engineer.

**Materials:**

**Water.** Water used for the installation and establishment of vegetation shall not contain concentrations of substances that are harmful to plant growth. Water derived from public and municipal water systems shall be acceptable for irrigation, fertilization, or mixing with pesticides. Water derived from wells or other sources may be used when it has soluble salts concentration less than 500 ppm, sodium less than 50 percent of total salts, and pH between 5.0 to 7.8.

**Soil Amendments.** Soil amendments including but not limited to fertilizer and lime shall meet the requirements described on the plans.

**Mulch.** Mulch materials shall meet the requirements specified on the plans, and at a minimum, materials used as mulch shall have a uniform texture and be free from foreign materials or concentrations of metals, chemicals, or other substances that are harmful to human health, water quality, or plant growth.

Straw Mulch shall consist of thoroughly threshed stems and leaves of barley, oats, rye, and wheat. Straw mulch shall be in an air-dry condition suitable for application with a mulch blower or other equipment. Straw mulch shall be visually inspected to ensure it is free of objectionable quantities of mold, foreign substances, and weed seeds.

Wood Cellulose Fiber Mulch shall be a uniformly processed wood product that is able to form a homogenous slurry with seed, fertilizer, and other materials under agitation with water. The fiber shall perform satisfactorily in hydraulic seeding equipment without clogging or damaging the system. The slurry shall contain a green dye to provide easy visual inspection for uniformity of application. The manufacturer shall furnish certification as specified in TC-1.03 of the Technical Association of Pulp and Paper Industry (TAPPI) in conformance with the following:

<b>WOOD CELLULOSE FIBER</b>	
<b>TEST PROPERTY</b>	<b>TEST VALUE</b>
Particle Length	Approx. 0.5 in.
Particle Thickness	Approx. 0.063 in.
Net Dry Weight Content	Minimum as stated on bag
pH, TAPPI Standard T 509,	4.0 – 8.5
Ash Content, TAPPI Standard T 413	7.0% maximum
Water Holding Capacity	90% minimum

**Prohibited Weeds**

**Weeds Prohibited in Turfgrass Sod and Seed Mixtures.** Turfgrass Sod, Maryland Turfgrass Seed Mix, Maryland and Additive Seed shall be free from seed or viable parts of the following species:

<b>WEEDS PROHIBITED IN TURFGRASS SOD AND MARYLAND SEED MIXTURES</b>	
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
annual bluegrass	<i>Poa annua</i> L.
balloonvine	<i>Cardiospermum halicacabum</i> L.
Bermudagrass	<i>Cynodon dactylon</i> (L.) Pers.
Canada Thistle	<i>Cirsium arvense</i> (L.) Scop.
Carolina horsenettle	<i>Solanum carolinense</i> L.
common corncockle	<i>Agrostemma githago</i> L.
common reed = phragmites	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.
crested anoda = spurred anoda	<i>Anoda cristata</i> (L.) Schldt.
dodder	<i>Cuscuta spp.</i> L.
field bindweed	<i>Convolvulus arvensis</i> L.
Japanese bristlegrass = giant foxtail	<i>Setaria faberi</i> Herrm.
Java-bean = sicklepod	<i>Senna obtusifolia</i> (L.) Irwin and Barneby
Johnsongrass	<i>Sorghum halepense</i> (L.) Pers. and hybrids
meadow garlic = wild onion	<i>Allium canadense</i> L.
plumeless thistle	<i>Carduus</i> L.
quackgrass	<i>Elytrigia repens</i> (L.) Gould
Rough cocklebur	<i>Xanthium strumarium</i> L.
serrated tussock	<i>Nassella trichotoma</i> (Nees) Hack.
wild garlic	<i>Allium vineale</i> L.
yellow nutsedge	<i>Cyperus esculentus</i> L.

**Weeds Prohibited in Meadow and Wildflower Seed.** Meadow and Wildflower Seed shall be free of species listed in (a) and the following species:

<b>WEEDS PROHIBITED IN MEADOW and WILDFLOWER SEED</b>	
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
asiatic tearthumb = mile-a-minute	<i>Polygonum perfoliatum</i> L.
burdock and related species	<i>Arctium</i> L.
canarygrass and related species	<i>Phalaris</i> L.
common wormwood = mugwort	<i>Artemisia vulgaris</i> L. var. <i>vulgaris</i>
dogbane and related species	<i>Apocynum</i> L.
eastern poison ivy	<i>Toxicodendron radicans</i> (L.) Kuntze
fig buttercup = lesser celandine	<i>Ranunculus ficaria</i> L. var. <i>bulbifera</i> Marsden-Jones
garlic mustard	<i>Alliaria petiolata</i> (M. Bieb.) Cavara and Grande
Giant hogweed	<i>Heracleum mantegazzianum</i> Sommier and Levier
Japanese honeysuckle, Tatarian	<i>Lonicera</i> L.

honeysuckle and related species	
Japanese Knotweed	<i>Polygonum cuspidatum</i> Siebold and Zucc.
lesser knapweed = spotted knapweed	<i>Centaurea nigra</i> L.
multiflora rose	<i>Rosa multiflora</i> Thunb.
Nepalese browntop = Japanese stiltgrass	<i>Microstegium vimineum</i> (Trin.) A. Camus
purple loosestrife and related species	<i>Lythrum</i> L.
poison hemlock	<i>Conium maculatum</i> L.
silvergrass and related species	<i>Miscanthus</i> Andersson
thistle and related species	<i>Cirsium</i> Mill., <i>Onopordum</i> L.

**Turfgrass Seed Mix and Maryland Special Purpose Seed Mix.** Species included in Maryland Turfgrass Seed Mix and Maryland Special Purpose Seed Mix shall be MDA Certified Seed of approved cultivars and conform to the following requirements for minimum percent purity, maximum percent weed seed, and minimum percent germination:

MARYLAND TURFGRASS SEED SPECIES			
COMMON NAME, and SCIENTIFIC NAME	PURITY Min %	WEED Max %	GERM Min %
Chewings fescue <i>Festuca rubra</i> L. ssp. <i>fallax</i> (Thuill.) Nyman	98	0.5	85
red fescue <i>Festuca rubra</i> L. ssp. <i>rubra</i>	98	0.5	85
hard fescue <i>Festuca brevipila</i> Tracey	98	0.5	85
Kentucky bluegrass <i>Poa pratensis</i> L. ssp. <i>pratensis</i>	95	0.4	80
perennial ryegrass <i>Lolium perenne</i> L. ssp. <i>perenne</i>	98	0.5	85
sheep fescue <i>Festuca ovina</i> L.	98	0.5	85
tall fescue <i>Schedonorus phoenix</i> (Scop.) Holub = <i>Festuca elatior</i> L.	98	0.5	85

**Maryland Turfgrass Seed Mix.**

MARYLAND TURFGRASS SEED MIX		
MIX %	SPECIES	
	Common Name	Scientific Name
90	tall fescue	<i>Schedonorus phoenix</i> (Scop.) Holub
5	Kentucky bluegrass	<i>Poa pratensis</i> L. ssp. <i>pratensis</i>
5	perennial ryegrass	<i>Lolium perenne</i> L. ssp. <i>perenne</i>



**Maryland Special Purpose Seed Mix.**

MARYLAND SPECIAL PURPOSE SEED MIX		
MIX %	SPECIES	
	Common Name	Scientific Name
75	hard fescue	<i>Festuca brevipila</i> Tracey
20	Chewings fescue	<i>Festuca rubra</i> L. ssp. <i>fallax</i> (Thuill.) Nyman
5	Kentucky bluegrass	<i>Poa pratensis</i> L. ssp. <i>pratensis</i>

**Maryland Turfgrass and Special Purpose Seed Application Rate.**

APPLICATION RATES – TURFGRASS AND SPECIAL PURPOSE SEED		
MATERIAL	LB PER 1000 FT <sup>2</sup>	LB PER ACRE
Seed Mix	4.6	200
Straw Mulch	92	4000
Wood Cellulose Fiber	17	750

**Upland Meadow, Lowland Meadow & Wet Meadow Seed Mix.** Seed shall be supplied in lots of individual species, unmixed, and conform to the following:

**(1) Purity.** Weed and/or other crop seed content shall be 2.5 percent or less by weight. Seed that does not conform to this specification may be used after approval by the Engineer in consultation with the Landscape Operations Division at increased seeding rates, or with measures to compensate for increased weed or crop seed content.

**(2) Origin.** Seed shall either be collected from native sources in USDA Hardiness Zone 5b, 6a, 6b and 7a in the States of Maryland, Pennsylvania, New York, New Jersey, Delaware, Virginia, West Virginia, or North Carolina, or shall be grown and produced from seed certified to have been collected from sites in the USDA Hardiness Zones of those States. Seed that does not conform to origin requirements may be used after review and approval by the Engineer in consultation with the Landscape Operations Division.

**(3) Species.** Seed shall conform to the following species, subspecies and varieties:

MEADOW FORB SEED SPECIES	
COMMON NAME	SCIENTIFIC NAME
Allegheny monkeyflower = square stem monkeyflower	<i>Mimulus ringens</i> L. var. <i>ringens</i>
bearded beggarticks = showy tickseed	<i>Bidens aristosa</i> (Michx.) Britton

blackeyed Susan	<i>Rudbeckia hirta</i> L. var. <i>hirta</i> <i>Rudbeckia hirta</i> L. var. <i>pulcherrima</i> Farw.
browneyed Susan	<i>Rudbeckia triloba</i> L. var. <i>triloba</i> <i>Rudbeckia triloba</i> L. var. <i>pinnatiloba</i> Torr. and A. Gray
common boneset	<i>Eupatorium perfoliatum</i> L. var. <i>perfoliatum</i>
common evening primrose	<i>Oenothera biennis</i> L.
crimsoneyed rose mallow	<i>Hibiscus moscheutos</i> L.
eastern purple coneflower	<i>Echinacea purpurea</i> (L.) Moench
flat-top goldenrod = grass-leaved goldenrod	<i>Euthamia graminifolia</i> (L.) Nutt. <i>Euthamia graminifolia</i> (L.) Nutt. var. <i>graminifolia</i> <i>Euthamia graminifolia</i> (L.) Nutt. var. <i>hirtipes</i> (Fernald) C.E.S. Taylor and R.J. Taylor
gray goldenrod	<i>Solidago nemoralis</i> Aiton var. <i>nemoralis</i>
lanceleaf tickseed = lanceleaf coreopsis	<i>Coreopsis lanceolata</i> L.
Maryland senna	<i>Senna marilandica</i> (L.) Link
Maximilian sunflower	<i>Helianthus maximiliani</i> Schrad.
New England aster	<i>Symphyotrichum novae-angliae</i> (L.) G.L. Nesom
New York aster	<i>Symphyotrichum novi-belgii</i> (L.) G.L. Nesom var. <i>elodes</i> (Torr. and A. Gray) G.L. Nesom <i>Symphyotrichum novi-belgii</i> (L.) G.L. Nesom var. <i>novi-belgii</i> <i>Symphyotrichum novi-belgii</i> (L.) G.L. Nesom var. <i>villicaule</i> (A. Gray) J. Labrecque and L. Brouillet
New York ironweed	<i>Vernonia noveboracensis</i> (L.) Michx.
partridge pea	<i>Chamaecrista fasciculata</i> (Michx.) Greene <i>Chamaecrista fasciculata</i> (Michx.) Greene var. <i>fasciculata</i> <i>Chamaecrista fasciculata</i> (Michx.) Greene var. <i>macrosperma</i> (Fernald) C.F. Reed
king of the meadow = tall meadow rue	<i>Thalictrum pubescens</i> Pursh
seedbox	<i>Ludwigia alternifolia</i> L.
smooth blue aster	<i>Symphyotrichum laeve</i> (L.) A. Löve and D. Löve var. <i>laeve</i> <i>Symphyotrichum laeve</i> (L.) A. Löve and D. Löve var. <i>concinnum</i> (Willd.) G.L. Nesom
smooth oxeye = ox-eye sunflower	<i>Heliopsis helianthoides</i> (L.) Sweet var. <i>helianthoides</i> <i>Heliopsis helianthoides</i> (L.) Sweet var. <i>scabra</i> (Dunal) Fernald
spotted trumpetweed = spotted joe pye weed	<i>Eupatoriadelphus maculatus</i> (L.) King and H. Rob. var. <i>maculatus</i>
stiff goldenrod	<i>Oligoneuron rigidum</i> (L.) Small var. <i>rigidum</i>

sundial lupine = wild blue lupine	<i>Lupinus perennis</i> L. ssp. <i>perennis</i> <i>Lupinus perennis</i> L. ssp. <i>perennis</i> var. <i>perennis</i> <i>Lupinus perennis</i> L. ssp. <i>perennis</i> var. <i>occidentalis</i> S. Watson
swamp milkweed	<i>Asclepias incarnata</i> L. <i>Asclepias incarnata</i> L. ssp. <i>incarnata</i> <i>Asclepias incarnata</i> L. ssp. <i>pulchra</i> (Ehrh. ex Willd.) Woodson
swamp sunflower = narrow-leaved sunflower	<i>Helianthus angustifolius</i> L.
swamp verbena = blue vervain	<i>Verbena hastata</i> L. var. <i>hastata</i>
talus slope penstemon = tall white beardtongue	<i>Penstemon digitalis</i> Nutt. ex Sims
trumpetweed = joe pye weed	<i>Eupatoriadelphus fistulosus</i> (Barratt) King and H. Rob.
wild bergamot	<i>Monarda fistulosa</i> L. ssp. <i>fistulosa</i> <i>Monarda fistulosa</i> L. ssp. <i>fistulosa</i> var. <i>mollis</i> (L.) Benth. <i>Monarda fistulosa</i> L. ssp. <i>fistulosa</i> var. <i>rubra</i> A. Gray <i>Monarda fistulosa</i> L. ssp. <i>brevis</i> (Fosberg and Artz) Scora, ined.

<b>MEADOW GRASS, SEDGE and RUSH SEED SPECIES</b>	
<b>COMMON NAME and CULTIVARS</b>	<b>SCIENTIFIC NAME</b>
big bluestem cv. Niagara	<i>Andropogon gerardii</i> Vitman
longhair sedge = bristly sedge	<i>Carex comosa</i> Boott
broomsedge bluestem = broomsedge	<i>Andropogon virginicus</i> L. <i>Andropogon virginicus</i> L. var. <i>virginicus</i> <i>Andropogon virginicus</i> L. var. <i>decipiens</i> C.S. Campbell
deertongue cv. 'Tioga'	<i>Dichanthelium clandestinum</i> (L.) Gould
fox sedge	<i>Carex vulpinoidea</i> Michx. var. <i>vulpinoidea</i>
gamagrass cv. 'Meadowcrest', 'Pete'	<i>Tripsacum dactyloides</i> (L.) L.
Indiangrass cv. 'Rumsey'	<i>Sorghastrum nutans</i> (L.) Nash
little bluestem cv. 'Aldous'	<i>Schizachyrium scoparium</i> (Michx.) Nash var. <i>scoparium</i> <i>Schizachyrium scoparium</i> (Michx.) Nash var. <i>divergens</i> (Hack.) Gould

shallow sedge = lurid sedge	<i>Carex lurida</i> Wahlenb.
rattlesnake mannagrass	<i>Glyceria canadensis</i> (Michx.) Trin.
common rush = soft rush = lamp rush	<i>Juncus effusus</i> L. var. <i>conglomeratus</i> (L.) Engelm.
	<i>Juncus effusus</i> L. var. <i>decipiens</i> Buchenau
	<i>Juncus effusus</i> L. var. <i>pylaei</i> (Laharpe) Fernald and Wiegand
switchgrass cv. 'Blackwell', 'Shelter'	<i>Panicum virgatum</i> L. var. <i>virgatum</i>
	<i>Panicum virgatum</i> L. var. <i>spissum</i> Linder
woolgrass	<i>Scirpus cyperinus</i> (L.) Kunth

**Upland Meadow Seed Mix.**

UPLAND MEADOW SEED MIX					
Forbs	Pure Live Seed *		Grasses	Pure Live Seed*	
	Oz per 1000 Ft <sup>2</sup>	Lb per Acre		Oz per 1000 Ft <sup>2</sup>	Lb per Acre
<b>Select 8</b>			<b>Include All</b>		
blackeyed Susan	0.18	0.5	Broomsedge	0.36	1.0
browneyed Susan	0.18	0.5	Deertongue	0.73	2.0
eastern purple coneflower	0.44	1.2	Little Bluestem	0.73	2.0
gray goldenrod	0.07	0.2	Purpletop	0.73	1.0
lanceleaf tickseed	0.51	1.4	Note: Seed Upland Meadow Seed with Maryland Special Purpose Seed Mix  * Seeding rates shall be calculated on the basis of Pure Live Seed per 1000 ft2 or acre.		
Maryland senna	0.11	0.3			
partridge pea	0.44	1.2			
smooth blue aster	0.07	0.2			
sundial lupine	0.51	1.4			
talus slope penstemon	0.07	0.2			
wild bergamot	0.07	0.2			

**Lowland Meadow Seed Mix**

<b>LOWLAND MEADOW SEED MIX</b>					
<b>Forbs</b>	<b>Pure Live Seed *</b>		<b>Grasses</b>	<b>Pure Live Seed*</b>	
	<b>Oz per 1000 Ft<sup>2</sup></b>	<b>Lb per Acre</b>		<b>Oz per 1000 Ft<sup>2</sup></b>	<b>Lb per Acre</b>
<b>Select 8</b>			<b>Include All</b>		
common boneset	0.04	0.1	big bluestem	2.0	0.73
eastern purple coneflower	0.44	1.2	gamagrass	2.0	0.73
evening primrose	0.07	0.2	Indiangrass	2.0	0.73
lanceleaf tickseed	0.55	1.5	switchgrass	1.0	0.36
Maximilian sunflower	0.18	0.5	NOTE: Seed Lowland Meadow Seed with Maryland Special Purpose Seed Mix  * Seeding rates shall be calculated on the basis of Pure Live Seed per 1000 ft <sup>2</sup> or acre.		
New England aster	0.07	0.2			
New York ironweed	0.07	0.2			
showy tickseed	0.04	0.1			
stiff goldenrod	0.11	0.3			
swamp verbena	0.26	0.7			
trumpetweed or spotted trumpetweed	0.07	0.2			

**Wet Meadow Seed Mix**

<b>WET MEADOW SEED MIX</b>					
<b>Forbs</b>	<b>Pure Live Seed *</b>		<b>Grasses, Sedges and Rushes</b>	<b>Pure Live Seed*</b>	
	<b>Oz per 1000 Ft<sup>2</sup></b>	<b>Lb per Acre</b>		<b>Oz per 1000 Ft<sup>2</sup></b>	<b>Lb per Acre</b>
<b>Select 8</b>			<b>Include All</b>		
Allegheny monkeyflower	0.07	0.2	common rush	0.29	0.8
crimsoneyed rose mallow	0.07	0.2	fox sedge	0.18	0.5
flat-top goldenrod	0.07	0.2	longhair sedge	0.11	0.3
king of the meadow	0.07	0.2	rattlesnake mannagrass	0.18	0.5

New York Aster	0.07	0.2	shallow sedge	0.11	0.3
New York Ironweed	0.07	0.2	woolgrass	0.11	0.3
seedbox	0.07	0.2	* Seeding rates shall be calculated on the basis of Pure Live Seed per 1000 ft <sup>2</sup> or acre.		
swamp milkweed	0.04	0.1			
swamp sunflower	0.11	0.3			
swamp verbena	0.26	0.7			
trumpetweed or spotted trumpetweed	0.07	0.2			

**Construction Methods:**

**General.** This work shall consist of testing the soil, preparing the soil including adding amendments, placing the seed and mulching the seed bed as described on the plans to provide vegetative stabilization. This work shall conform to the methods described on the plans.

**Seeding Season.** The calendar dates for Turfgrass seeding shall be Spring – March 1 to May 15 and Fall – August 15 to October 31. The calendar dates for Upland Meadow, Lowland Meadow and Wet Meadow seeding shall be Spring – February 1 to March 31 and Fall – September 15 to October 31

All disturbed soil areas shall be treated during the seeding seasons as follows:

- a. **Areas Meeting Final Grade.** Seeding shall be completed.
- b. **“Out of Season” Periods.** During “out of season” periods, unseeded areas shall be treated in accordance with temporary stabilization as per Section 110.09(d).
- c. **“Out of Season” Seeding.** “Out of Season” seeding shall be performed in the same manner as “in-season” seeding. Requests for out of season seeding will be considered if sufficient written justification is provided, with the understanding that in-season re-seeding will be required, at no cost to the Department, if the turf stand fails to conform to Acceptance of Maryland Seeding below.
- d. **Temporary Grass Seeding.** Temporary grass seeding, when required, prior to permanent grass seeding, shall be mowed and tracked (tracking shall be accomplished by driving cleated equipment such as a bulldozer over the surface).

**Maintenance.** The Contractor shall maintain all seeded areas free from weeds and debris in accordance with Section 105.13.

**Acceptance of Maryland Seeding.** Any area identified not meeting the acceptance criteria specified shall be repaired at the Contractor’s expense. Acceptance criteria of Permanent Vegetative Stabilization, Maryland shall be as follows:

**Turfgrass Seeding Acceptance.** Final Acceptance will be granted when the turfgrass seedlings have grown at least 4 in., exhibit dark green color, and percent coverage as follows:

<b>TURFGRASS ESTABLISHMENT COVERAGE</b>		
<b>AREAS</b>	<b>MARYLAND TURFGRASS SEED MIX or MARYLAND SPECIAL PURPOSE SEED MIX</b>	<b>OTHER DESIRABLE VEGETATION</b>
	<b>Seedling Coverage</b>	
Areas flatter than 4:1; and slopes 4:1 and steeper not tracked with cleated equipment	at least 95% *	up to 5%
Slopes 4:1 and steeper tracked with cleated equipment	at least 50% *	up to 50%

\* Includes coverage of additive species when included

**Meadow and Wet Meadow Seeding Acceptance.** Final Acceptance will be granted when the seedlings have grown at least 4 in., exhibit dark green color, and percent coverage as follows:

<b>MEADOW ESTABLISHMENT COVERAGE</b>		
<b>AREAS</b>	<b>MARYLAND SPECIAL PURPOSE SEED MIX, MARYLAND TEMPORARY SEED MIX, and MEADOW SEED</b>	<b>TOTAL VEGETATION COVER</b>
	<b>Seedling Coverage</b>	
Areas flatter than 4:1; and slopes 4:1 and steeper not tracked with bulldozer	at least 70%	at least 95%
Slopes 4:1 and steeper tracked with bulldozer	at least 45%	at least 95%

**Maintenance Bond.** Upon Substantial Completion of the Work, the Contractor shall furnish to the Department a Maintenance Bond on the form provided by the Department for Item 734556 – Permanent Vegetative Stabilization, Maryland. The Maintenance Bond shall meet the following requirements:

- a. A sum equal to 100% of the value of all Maryland Seeding 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. When Item 734556 – Permanent Vegetative Stabilization, Maryland requires completion after substantial completion of the Project, the term of the Maintenance Bond will be extended for a period of one year beyond the completion of the permanent seeding work; 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.

**Method of Measurement:**

The Engineer will measure the quantity of acceptably placed Maryland Permanent Vegetative Stabilization seed. The quantity of seeding will be measured in square yards (square meters) of surface area.

**Basis of Payment:**

The quantity and type of seeding will be paid for at the Contract unit price per square yard (square meter). Price and payment will constitute full compensation for preparing the ground; for furnishing and placing all materials including seed; and for all labor, equipment, tools, maintenance bond and incidentals required to complete the work.

Payment for Permanent Vegetative Stabilization, Maryland seeding will be made at the time seed is acceptably placed. The maintenance bond covering permanent seeding items will only be released when the permanent seeding meets the requirements of Acceptance of Maryland Seeding above.

10/10/12



**735501 - HERBICIDE APPLICATION, NOXIOUS WEEDS**

**Description:**

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

**Materials:**

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

**Construction Methods:**

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

**Method of Measurement:**

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

**Basis of Payment:**

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

7/20/15

**737523 - PLANTINGS**

**737.01 Description.**

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

**MATERIALS.**

**737.02 Plant Material.**

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

shall not be planted under any circumstances and shall be removed from the Project site by the close of the working day. Failure on the part of the Contractor to comply with any of the above procedures will require an immediate suspension of all work.

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

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

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

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

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

**737.05 Ground Cover and Herbaceous Perennials.**

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

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

**737.06 Soil Mix.**

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

*Sieve Size Minimum Percent Passing*

2" 100

No. 4 90

No. 10 80

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

b. *Peat Moss and Peat Humus.*

i. *Peat Moss. Peat moss shall be from sphagnum peat bogs. All peat moss shall be shredded, not dusty, and free of twigs, stones, hard lumps, roots, or any other undesirable materials. All peat moss must be moistened before using, but not watered to a saturated or puddled, unworkable condition. Peat moss shall show an acid reaction of 3.5 to 5.5 pH. The Contractor shall provide written certification from the manufacturer that the peat moss was obtained from sphagnum peat bogs.*

ii. *Peat Humus. Peat humus shall be a natural peat or peat humus from fresh water saturated areas, consisting of sedge, sphagnum, or reed peat and be of such physical condition that it passes through a 2" sieve. The humus shall be free from sticks, stones, roots, and other objectionable materials. Samples taken at the source of supply shall have the following analysis:*

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

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

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

Total Nitrogen (N)	20.00%
Derived from urea-formaldehyde	
7.0% water soluble nitrogen	
13.0% water insoluble nitrogen	
Available Phosphoric Acid (P2O5)	10.00%
Derived from calcium phosphate	
Soluble Potash (K2O)	5.00%
Derived from potassium sulfate	

Combined Calcium (Ca)	2.60%
Derived from calcium phosphate	
Combined Sulfur (S)	1.60%
Derived from ferrous and potassium sulfates	
Iron (expressed as elemental Fe)	0.35%
Derived from ferrous sulfate	

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

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

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

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

- a. Shredded hardwood bark shall be from a deciduous hardwood source and be mechanically ground to a maximum size of 6". In addition, the bark shall be relatively free of bark fines dust and shall exclude all foreign and toxic substances.
- b. Wood chips must be stockpiled for at least one year prior to placement as verified by the Department's inspection representative and shall not contain leaves, twigs, wood shavings and sawdust, or any foreign or toxic substances. In addition, loose, non-pelletized fertilizer with analysis in accordance with Subsection 737.07 shall be applied at the rate of 0.5 lb/yd<sup>2</sup> prior to wood chip placement.

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

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

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

**737.11 Water.** Conform to the requirements of Section 803.

**CONSTRUCTION METHODS.**

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

*Balled or Burlapped and Potted or Container Grown Plant Material:*

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

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

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

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

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

- a. *All Plants Except Ericaceous Material.* For each cubic yard of baled peat moss, or approved equal, add from 43 to 54 yd<sup>3</sup>; of planting topsoil.
- b. *Ericaceous Plants.* For each cubic yard of baled peat moss, or approved equal, add from 36 to 45 yd<sup>3</sup>; of planting topsoil. If peat humus is furnished in lieu of peat moss in the above mix, the mixture shall be based in the proportion of 1.8 yd<sup>3</sup>; of peat humus for each cubic yard (cubic meter) bale of peat moss specified for the above soil mix. Other approved equal materials shall be mixed according to manufacturer's printed recommendations which shall be submitted to the Engineer for written approval.

The above soil mixtures shall be mixed as specified in an area approved by the Engineer. No mix shall be prepared prior to notification of the Engineer at least 48 hours in advance of the

mixing operation. Where ground covers or herbaceous perennials are specified, the soil mix

may be mixed in place providing the existing topsoil conforms to the requirements of subsection

737.06.

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

- a. *Balled and Burlapped, or Container Stock.* Position the plant in the hole, and backfill no higher than halfway up the root ball. Place the recommended number of tablets evenly around the perimeter of and immediately adjacent to the root ball. Complete the backfilling, tamping, and watering.

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

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

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

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

**737.16 Planting.** All trees and shrubs shall be planted in pits as detailed on the Standard Construction Details. Pits shall not be excavated with vertical sides. Pits shall be of such a depth that, when planted and settled, the crown of the plant shall bear the same relation to finished grade as it did to soil surface in its place of growth. With the approval of the Engineer, the Contractor may elect to plant wetland grown containerized shrubs on small mounds raised no more than 2" above the final grading elevation shown on the Plans. Open plant pits shall not be allowed overnight in residential areas or in any location where it is determined by the Engineer to pose a potential hazard to pedestrians or traffic.

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

Ground cover and herbaceous perennial areas shall be prepared by rototilling to a minimum depth of 10". The mixing of peat moss, peat humus, or approved equal may be performed separately in order to obtain the proportion of ground cover or herbaceous perennial soil mixture as specified. Beyond the minimum

excavation as stated above for soil mixing, the root system of the plant shall determine the actual depth for individual plant excavation. Plants shall be backfilled with the soil mixture and compact firmly around roots. All areas shall have a smooth and uniform grade and a minimum of 2" of approved mulch.

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

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

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



Any plants that settle below or rise above the desired finished grades shall be reset at the proper grades.

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

All replacements shall be plants of the same kind, size and quality as originally specified in the Contract and they shall be furnished, planted, mulched, guyed, watered, etc. as specified herein for new plant material.

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

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

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

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

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

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

**737.20 Basis of Payment.**

The quantity of planting will be paid for at the Contract lump sum. Price and payment will constitute full compensation for furnishing and placing all materials, including plants, soil mixes, and mulch; for protecting plants after digging and prior to planting; for staking, excavating plant pits, pruning, and guying; for the cultural care of the plants until the completion and acceptance of all landscape work; for disposing of excess and waste materials; for replacement planting; for cleanup; for repairs to plant material, tree protection, wire, or staking; for repairs to damaged grassed, planted, or other landscaped area due to the Contractor's operations; for ensuring that topsoil meets the sieve analysis, acidity, and organic matter requirements; for applying sufficient materials to fertilizer that originally failed to meet the specified analysis; for using pre- or post-emergent herbicide to control grass and weeds; for the work outlined under Subsection 737.17; and for all labor, equipment, tools and incidentals required to complete the work. The quantity of watering will be paid for in accordance with the price bid for, "Watering," as detailed on the breakout sheet. Payment shall be by the M/Gal (1,000 gallons) of water applied at each watering operation. The breakout sheet attached to the proposal shows all plant material and the anticipated amount of water proposed for this Contract. The Contractor shall fill in the per each unit price and the cost (unit price times the proposed quantity) for each item listed. The lump sum price bid for 737523 - Planting shall be the sum of the total cost for all species and sizes listed.

The Department reserves the right to delete from the Contract the furnishing and installing of one or more of the species and/or sizes listed and the right to add or subtract from the quantity of each species and size listed. The lump sum to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation to the Contractor if such additions and/or deletion are made. Watering item shall be paid separately for watering completed at the bid price indicated on the Breakout Sheet. Payment for the planting as described above may be processed if, in the opinion of the Engineer all work required, except that specified under Subsection 737.17 is satisfactorily completed. No partial payment will be made for any living plant until and unless planted in accordance with these specifications. No additional payment will be made for using plants larger than specified.

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

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

7/29/15

**737531 - PLANTINGS, MARYLAND**

**Description:**

Install and establish trees, shrubs, perennials, vines, and grasses.

**Materials:**

**Soil Amendments.**

**Limestone.** Limestone shall be an approved agricultural product manufactured and labeled for increasing soil pH. Limestone shall contain at least 85 percent calcium and magnesium carbonates. Dolomitic limestone shall contain at least 10 percent magnesium as magnesium oxide and 85 percent calcium and magnesium carbonates.

Limestone shall be supplied as a fine powder, or as pellets produced from fine powder, that conforms to the following:

<b>LIMESTONE GRADING ANALYSIS</b>	
<b>SIEVE Size Number</b>	<b>PASSING BY WEIGHT Minimum %</b>
10	100
20	98
100	50

**Sulfur.** Sulfur shall be an approved agricultural product manufactured and labeled for reducing soil pH. Sulfur labeled as a fertilizer may also be used to supply sulfur as a plant nutrient. Sulfur shall be supplied as a fine powder or pelletized powder with a minimum purity of 90 percent elemental sulfur.

**Iron Sulfate.** Iron sulfate shall be an approved agricultural product manufactured and labeled for reducing soil pH. Iron sulfate labeled as a fertilizer may also be used to supply sulfur or iron as a plant nutrient. Iron sulfate shall be supplied as a fine powder or pelletized powder with a minimum purity of 15 percent water soluble iron derived from ferrous sulfate.

**Compost.**

**(a)Compost Types.** Compost shall be either Type A (biosolids) or Type B (source-separated), and will be subject to approval by the Landscape Operations Division as follows:

**(1) Biosolids Compost (Type A).** Type A Compost shall be approved for distribution by the Maryland Department of the Environment (MDE).

**(2) Source-Separated Compost (Type B).** Type B Compost shall be produced by a compost operator certified by the Maryland Department of Agriculture (MDA). Type B Compost shall be tree leaf compost or non-tree leaf compost. Type B Compost produced from lawn clippings shall be tested for contaminants in conformance with Maryland law and regulations.

**(b) Stability.** Compost shall be biologically mature and no longer able to reheat to thermophilic temperatures.

**(c) pH.** Compost shall have a pH of 6.0 to 7.5 except when specified otherwise for plantings where it shall have a pH of 6.0 to 7.0.

**(d) Soluble Salts.** Type A Compost shall have a soluble salt concentration less than 10.0 mmhos/cm, and Type B Compost shall have soluble salts concentration less than 5.0 mmhos/cm.

**(e) Moisture.** Compost shall have a moisture content of 30 to 55 percent.

**(f) Particle Size and Grading.** Compost shall be screened so that it has a uniform particle size of 0.5 in. or less, with grading analysis as follows.

COMPOST GRADING ANALYSIS	
SIEVE SIZE mm	PASSING BY VOLUME Maximum %
4.75	90
0.425	25
0.75	2.2

**FERTILIZERS.**

**Composition.** Fertilizers shall be commercial grade labeled for use as agricultural fertilizer, and shall conform to Federal and State regulations and the Standards of the Association of Official Analytical Chemists. All analyses are subject to approval prior to application. Standard and Special Fertilizers shall be the following:

**(a) Standard Fertilizer.** Standard fertilizers shall be produced of ingredients, analysis, and composition as follows:

**(1) Ingredients.** One or more of the following:

**(2) Analysis and Composition.** Standard fertilizers shall contain nitrogen (N), phosphorus (P), potassium (K), and sulfate (SO<sub>4</sub>) derived from ingredients above.

FERTILIZER INGREDIENTS	
ammonium nitrate	polymer coated urea
ammonium sulfate	potassium chloride
biosolids	potassium sulfate (SOP)
diammonium phosphate (DAP)	sulfur coated urea
isobutylidene diurea	triple super phosphate
methylene urea	urea
monoammonium phosphate (MAP)	ureaform (UF)

**(b) Special Fertilizers.** Special fertilizers shall be of ingredients, analysis, and composition as follows:

**(1) Ingredients.** Special fertilizers shall provide label analysis guaranteeing nitrogen, phosphorus, and potassium from ingredients in (a) and also include plant micronutrients, coatings, or materials to augment their performance.

**(2) Analysis and Composition.** As follows:

<b>SPECIAL FERTILIZER ANALYSIS and COMPOSITION</b>
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FERTILIZER*	USE
14-14-14 Polymer-coated with minor nutrients	Plant installation.
20-10-5 21 to 23 grams per tablet. 13% water insoluble and 7% water soluble N, with minor nutrients	Tree, shrub, vine installation.
20-20-20 Water soluble powder with minor nutrients	Fertilizer solution application after plant installation.

\*Shall be a mixture of any ingredients listed in MATERIALS , FERTILIZERS, Composition (a) (1) and (b) (1) with no more than 5% by weight of any combination of other materials.

**MULCHES.** Materials used as mulch shall have a uniform texture and be free from foreign materials or concentrations of metals, chemicals, or other substances that are harmful to human health, water quality, or plant growth.

**Shredded Hardwood Bark (SHB) Mulch.** Shall consist of natural bark derived from hardwood trees that has been milled and screened to a maximum 4 in. particle size. SHB mulch shall contain negligible quantities of sawdust or other non-bark woody materials.

**PLANT MATERIALS.**

**Certificate and Licenses.** Sellers, distributors, installers or producers of nursery stock shall possess the Plant Dealer License, Plant Broker License, or Nursery Inspection Certificate of the Maryland Department of Agriculture, or substitute a similar certificate or licenses from another State where they do business.

**Plant Material Inspection.** Plant material will be inspected for conformance with “MATERIALS-PLANT MATERIALS”, and tagged with DelDOT Inspection Seals (Seals) as follows:

**(a) Inspection.**The Plant Material Inspection will be conducted in Maryland at the nursery where the plant material is grown, or at the brokerage where the plant material is sold.

When plant material is produced by a nursery outside Maryland, the Inspection will be conducted at the Contractor’s holding area, or at the project site before planting, unless otherwise specified in the Contract Documents.

The Contractor shall ensure that the plant material is present for inspection on the scheduled date, and that it meets the requirements of “**MATERIALS-PLANT MATERIALS**”. The condition and identity of plant material will be subject to re-inspection for the duration of the Contract.

**(b) Scheduling.** The Inspection will be scheduled by the Engineer. At least 14 days notice to schedule an Inspection within Delaware, and at least 45 days notice to schedule an Inspection outside Delaware.

**(c) Seals.** DelDOT will determine which plants, if any, will be tagged with Seals.

When Seals are placed upon representative plants within a block of plant material, the plant material delivered for installation shall be similar in size, shape and character to the plant material that received Seals.

Plant material that is delivered with broken or missing Seals, or that is not similar to the plant material within the block that was tagged with Seals will be rejected.

**(d) Rejected Plants.** Plant materials which do not meet these requirements will be rejected. Plant material rejected at the nursery or holding area shall not be delivered to the project; if delivered, it shall immediately be removed. Plants shall not be installed until the Plant Material Inspection has been completed and satisfactory identification has been provided.

**Plant Material Standards.** Plant material shall be grown, identified, graded, and delivered in good condition as specified in this section.

**(a) Hardiness Zones of Origin.** Plant material shall be nursery grown within plant hardiness zones 5, 6, or 7 according to the ‘USDA Plant Hardiness Zone Map’ unless otherwise specified. Plant material shall be dug and transported in conformance ANSI Z60.1. Bare root deciduous plants shall be delivered in a dormant condition. Roots shall be adequately protected and kept moist.

**(b) Names and Identification.** Plant material shall be clearly and correctly identified by the grower or distributor. Plant materials that are misidentified, or not satisfactorily tagged or labeled, or do not conform to the accepted characteristics of the species or cultivar, will be rejected.

**(c) ANSI Standards.** Plant material shall conform to ‘American Standard for Nursery Stock (ANSI Z60.1) of the American Nursery and Landscape Association. Plant grades shall be those established in ANSI Z60.1, and shall include plants from that size up to but not including the next larger grade size. When specimen plants are specified by the Contract documents, the specimen requirement shall also be met. Plant material which does not meet the standards of this section shall be rejected.

**(d) Health and Sanitation.** Plant material shall be in good health and be declared and certified free from disease and insects as required by law for transportation, and shall be free from pest-related stress and pest damage.

Plants shall be healthy, free from physical defects and stresses, and have well-developed branches and a vigorous root system. Plants that exhibit wilt, shriveling, insufficient root mass, broken or loose root balls, or inadequate protection will be rejected.

Container grown plants shall be well rooted, vigorous and established in the size pot specified, shall have well balanced tops for their pot size, and shall not be root bound.

Plants grown in fields or containers which include Ailanthus, Canada thistle, Johnsongrass, or yellow nutsedge will be rejected.

**(e) Shade and Flowering Trees.** Shade and flowering trees shall be symmetrically balanced. Major branch unions shall not have ‘V’ shaped crotches, bark inclusion or unions derived from water sprouts (epicormic growth) capable of causing structural weakness.

Trees shall be free of unhealed branch removal wounds greater than 1 in. diameter, or wounds or scars caused by staking, wire or ties, or any other defect which could cause structural failure or disfigurement.

Shade trees and central leader flowering trees shall have a single main trunk. Trunk height to the lowest branch shall conform to the following:

HEIGHT TO LOWEST BRANCH	
CALIPER in.	HEIGHT ft
1-1/2 and 1-3/4	4
2 to 2-1/2	5
3	6

**(f) Unacceptable Plants.** Plant material that becomes unacceptable after installation shall be rejected as specified in “**CONSTRUCTION -General-Unacceptable Plants and Replacement Plants**”.

**American Holly (*Ilex opaca* Aiton).** Each lot of plants shall include 90 percent female plants and 10 percent male plants of cultivars selected from the following:

AMERICAN HOLLY CULTIVARS		
FEMALE		MALE
Angelica	Miss Helen	David
Arlene Leach	Old Heavy Berry	Jersey Knight
B and O	Patterson	Leather Leaf
Dan Fenton	Satyr Hill	Nelson West
Jersey Princess	Wyetta	North Wind

**Plant Storage and Handling.** Adequate facilities shall be provided for plant storage. Plants shall be handled with care to avoid damage.

**(a) Bulbs.** Bulbs shall be stored under appropriate climate control.

**(b) Annual Plants.** Annual plants shall be kept moist.

**(c) Bare Root Plants.** Bare root plants shall be kept moist and heeled into moist soil or other suitable material until installed. During transport, the roots shall be covered with canvas, burlap or straw.

**(d) Balled and Burlapped and Container Grown Plants.** Balled and burlapped plants and container grown plants shall be kept moist and installed within seven days of delivery, or the root balls or containers shall be covered with mulch or straw until removed for installation.

## **MARKING AND STAKING MATERIALS.**

**Outline Stakes.** Outline stakes shall be full cut 1.75 x 1.75 in. sound hardwood, 48 in. long, as approved.

**Stakes.** Stakes for supporting trees shall be rough sawn, straight grain hardwood reasonably free from bark, knot holes, excessive warping, or other imperfections. Stakes shall be full cut 2.0 x 2.0 in. thickness.

**Wire.** Wire shall be No. 12 and 14 gauge new annealed galvanized wire.

**Wire Rope.** Wire rope shall be 0.25 in. zinc coated steel wire seven strand as commonly used for guying large trees.

**Cable Clamps.** Cable clamps shall be zinc galvanized steel.

**Hose.** Hose shall be 5/8 in. inside diameter corded synthetic rubber hose.

**Turnbuckles.** Turnbuckles shall be zinc galvanized with 4.5 in. openings and 5/16 in. threaded ends with screw eyes.

**Anchors.** Tree anchors shall be earth anchors of a type commonly used for anchoring large trees.

## **WATER, PESTICIDES, AND ADJUVANTS.**

**Water.** Water used for the installation and establishment of vegetation shall not contain concentrations of substances that are harmful to plant growth.

Water derived from public and municipal water systems shall be acceptable for irrigation, fertilization, or mixing with pesticides. Water derived from wells or other sources may be used when it has soluble salts concentration less than 500 ppm, sodium less than 50 percent of total salts, and pH between 5.0 to 7.8.

**Pesticides.** Pesticides shall be EPA-approved and registered for use in Maryland to control plants, fungi, insects or other pests. Pesticides shall be approved for use, and acceptable application rates established by the Landscape Operations Division as follows:

(a) **Herbicide.** Herbicide shall control or prevent regrowth of plants or vegetation.

(b) **Insecticide.** Insecticide shall control or protect against insect or other arthropod pests.

(c) **Fungicide.** Fungicide shall control or protect against fungal or bacterial pests.

(d) **Other Pesticides.** Other pesticides shall control or protect against other pests.

**Marking Dye.** Marking dyes shall be used to color spray solutions, be nonphytotoxic, oil or water soluble, and compatible with the pesticide products they are applied with. Marking dye products and application rates shall be approved by the Engineer.

**Spray Adjuvant and Wetting Agent.** Spray adjuvant and wetting agents shall be mixable with water and compatible with the pesticides or other products they are applied with.



**Construction Methods:**

**General**

**(a) Planting Seasons.** Install plants during the following Planting Seasons unless a Modification Request is approved:

PLANTING SEASONS					
SEASON	DECIDUOUS TREES, SHRUBS, VINES		EVERGREEN TREES, SHRUBS, VINES		PERENNIALS, GRASSES
	Balled & Burlaped, Bare Root	Container Grown	Balled & Burlaped	Container Grown	Container Grown
Spring	2/15 – 4/30	3/1 – 6/15	3/15 – 4/30	3/15 – 6/15	4/15 – 6/30
Fall	10/15 – 12/15	8/15 – 12/15	9/1 – 11/15	8/15 – 11/15	9/1 – 10/30

**(b) Modification Request.** Submit a written Modification Request to perform installation out-of season, or to install plants of different species, cultivars, sizes, growth habits, or planting stock type.

The Engineer will evaluate the Request. If granted, a Notice of Approved Modification will be returned within 14 days afterwards.

**(c) Pesticide Application.** Apply pesticides in conformance with the Maryland Pesticide Applicator’s Law, and the manufacturer’s recommendations.

The Contractor shall possess a Maryland Department of Agriculture Commercial Pesticide Business License and a Pesticide Applicator Certificate for the pertinent pesticide application Category: (2) Forest; (3-A) Ornamental Plant Exterior; (3-C) Turf; (5) Aquatic; (6) Right-of-Way and Weed.

Pesticides shall be applied by a Maryland Certified Pesticide Applicator, or by a Registered Pesticide Applicator under the supervision of a Certified Pesticide Applicator.

**(d) Pesticide Application Reporting.** Record the location, acreage treated, pesticide name and quantity applied on the Pesticide Application Reporting Form. Submit the Form within 24 hours after applying pesticide.

**(e) Plant Storage and Handling.** Refer “MATERIALS-PLANT MATERIALS-Plant Storage and Handling”.

**Submittals and Inspection.** Submit the following items:

**(a) Installation Phase Schedule.** Develop a Schedule with dates for completing “PLANTINGS, MARYLAND”, including:

OPERATIONS IN INSTALLATION PHASE SCHEDULE	
1	Layout, utilities review and marking.
2	Undesirable vegetation removal and herbicide application.
3	Planting pit excavation, soil preparation, and plant installation.
4	Planting beds rototilling and soil preparation, applying shredded hardwood bark (SHB) mulch, and plant installation.
5	Applying fertilizer solution after installation, and cleanup.

Submit the written Schedule at least 30 days before beginning landscape work. The Schedule will be reviewed by the Engineer for completeness and feasibility, and will be approved or returned for correction.

**(b) Plant Material Inspection and Approval.** The Inspection will be conducted by the Engineer as specified in “MATERIALS-PLANT MATERIALS-Plant Material Standards”.

**(c) Establishment Phase Schedule & IPM Program.** Develop a Schedule with dates for completing “CONSTRUCTION -Establishment Phase”. Include an Integrated Pest Management (IPM) Plan with methods of pest monitoring (weeds, diseases, insects, mammals, etc.), pesticide selection, application rates, and scheduling.

Submit the written Establishment Phase Schedule & IPM Program at the Installation Phase Inspection.

The Schedule will be reviewed by the Engineer, and will be approved or returned for correction.

**Utilities Marking, Layout, and Inspection.**

**(a) Utilities Marking.** Contact ‘Miss Utility’ or another approved service to identify and mark utilities in the rights-of-way. Contact the District Utilities Engineer to mark utilities on Administration property.

**(b) Conflicts.** Notify the Engineer of conflicts that may involve design changes. Conflicts will be reviewed by the Engineer and resolved within 14 days after notice.

**(c) Planting Layout.** Provide the necessary materials and lay out the locations of planting pits and planting beds specified in the Contract Documents, or as adjusted by the Engineer.

**(d) Inspection.** At least 7 days notice will be required to schedule each stage of a layout inspection in consultation with the Engineer. Proceed with operations after layout approval.

**Preparing Planting Pits.** Perform the following operations when preparing planting pits for individual plants:

**(a) Undesirable Vegetation.** Eliminate undesirable vegetation as follows:

**(1) Non-Selective Herbicide.** Apply non-selective herbicide in water with wetting agent and dye at least 14 days before plant installation as follows:

NON-SELECTIVE HERBICIDE APPLICATION	
MATERIAL	RATE PER ACRE
Glyphosate Herbicide	5 lb of active ingredient
Marking Dye	6 to 15 oz
Water	40 to 50 gal

Cut and remove dead vegetation or debris that interferes with soil preparation, plant installation or future maintenance.

**(2) Manual Vegetation Removal.** Remove undesirable vegetation within Bioretention Facilities manually without the use of herbicides.

**(b) Excavation.** Excavate planting pits to the depth required for the placement of root collars as specified in **“CONSTRUCTION -Installing-Placing Root Collar”**. Retain the excavated soil for preparation as backfill soil. Remove excess soil from the site, or spread it as directed.

**(c) Pit Diameter, Compost, and Water.** Use the following table to determine the diameter of the planting pit based upon the container or root ball diameter, the volume of compost or peat moss to be mixed into the backfill soil, and the amount of water to be used per watering event.

PREPARING PLANTING PITS AND BACKFILL SOIL						
Container or Root Ball Diameter In.	ANSI Z60 Container Size	Planting Pit Diameter In.	Compost or Peat Moss Ft.3	14-14-14 Granular Fertilizer Oz.	20-10-5 Tablet Fertilizer Each	Water per Event Gal.
3	#SP3	6	0.02	0.10	-	0.15
5	#SP4	10	0.02	0.12	-	0.2
6	#SP5 or #1	12	0.03	0.18	-	0.3
8	#2	17	0.09	0.30	-	0.5
10	#3	21	0.18	0.55	-	1.0
12	#5	24	0.28	0.75	-	1.5
14	#7	28	0.44	1.0	1	2.3
16	#10	32	0.65	1.3	1	3.5
18	#15	36	0.94	1.6	1	5.0
20	#20	40	1.27	2.0	1	6.8
24	#25	48	2.20	3.0	2	12
30	-	60	4.30	4.5	3	23
36	#45	72	7.40	6.5	5	40
42	#65	84	11.80	8.8	7	60

**(1) Container Grown (CG) and Balled and Burlapped (BB).** Add 14-14-14 or 20-10-5 fertilizer to each planting pit during installation unless other rates are specified.

**(2) Bare Root (BR).** Excavate planting pits to accommodate roots when spread in natural position. Add 14-14-14 fertilizer to each planting pit during installation based upon the pit diameter unless other rates are specified.

**(d) Compost or Peat Moss.** Mix compost into the backfill soil as specified in “CONSTRUCTION - Preparing Planting Pits-(c) Pit Diameter, Compost, and Water” when installing all plants except Ericaceous species, which shall be amended with the same volume of peat moss.

**(e) pH Adjustment.** Adjust soil pH to pH 6.0 to 6.5 for all plants except Ericaceous species, which shall be adjusted to pH 5.0 to 5.5. Use limestone to raise soil pH and iron sulfate to lower soil pH as specified.

**(f) Fertilizer.** At the time of installation, mix 14-14-14 fertilizer into the backfill soil of trees, shrubs, vines, perennials and grasses, or place 20-10-5 fertilizer into the backfill soil near the mid-point depth of the planting pit of trees, shrubs and vines in lieu of 14-14-14 fertilizer. Use a scale with 0.01 oz accuracy to calibrate measures and verify application rates of 14-14-14 fertilizer.

**Preparing Planting Beds.** Perform the following operations when preparing planting beds:

**(a) Undesirable Vegetation.** Eliminate undesirable vegetation as specified in “CONSTRUCTION - Preparing Planting Pits-(a) Undesirable Vegetation”. Cut or mow dead vegetation to a height of 1 in. and remove the debris.

**(b) Fertilizer and Soil Amendments.** Uniformly apply fertilizer and soil amendments (limestone, iron sulfate, compost, peat moss) at rates specified in “CONSTRUCTION -Preparing Planting Pits-(c) Pit Diameter, Compost, and Water” unless other rates are specified. Mix 14-14-14 fertilizer or place 20-10-5 fertilizer into the backfill soil of each planting pit within the planting bed. Refer to “CONSTRUCTION - Preparing Planting Pits-(f) Fertilizer” and the following:

**(1) Areas Flatter than 4:1.** Apply compost to the soil surface of the bed to a 2 in. depth.

**(2) Slopes 4:1 and Steeper.** Mix compost or peat moss into the backfill soil of each planting pit within the bed.

**(c) Rototilling.** Rototill the soil of the bed as follows:

**(1) Areas Flatter than 4:1.** Rototill to a depth of 6 in. to thoroughly mix compost and specified fertilizer or soil amendments into the soil.

**(2) Slopes 4:1 and Steeper.** Do not rototill.

**(3) Bioretention Soil Mixture.** Do not rototill.

**(d) Debris Removal.** Remove debris, stones, and soil clods with a length or width greater than 2 in. that are uncovered during rototilling.

**(e) Leveling.** Level the soil surface after rototilling, and leave it in a condition ready for shredded hardwood bark (SHB) mulching and plant installation.

**Plant Acclimation.** Ensure that container grown plants are acclimated to prevailing weather conditions before installing. Install bare root plants while dormant when soil and air temperatures are above freezing.

**Plant Care.** Begin plant care at the time each plant is installed, and continue until Installation Phase Acceptance is granted.

**Pruning.** Prune to preserve the natural appearance of trees and shrubs.

Remove water sprouts manually with pruners. Remove damaged or undesirable wood of deciduous trees taller than 6 ft before installation. Prune deciduous trees and shrubs 6 ft or shorter at the time of installation.

**Installing.** Install plants vertically in planting pits and beds prepared as specified in “CONSTRUCTION -Preparing Planting Pits and Preparing Planting Beds”, and as follows:

**(a) Removing Containers, Burlap, Wire Baskets.** Remove synthetic fabric, plastic, and metal containers before installing plants.

Remove twine and natural burlap from the tops of root balls to a depth at least 6 in. below the surface of the backfilled planting pit.

Cut and remove the tops of wire baskets from the upper half of the rootball.

**(b) Preparing Roots.** Carefully remove the containers of container grown plants, and loosen the soil mass to eliminate girdling roots.

Spread the roots of bare root plants in a natural position, and work amended soil around the roots.

**(c) Placing Root Collar.** Place the root collar of plants at or above the average soil surface grade outside the planting pit as follows:

ROOT COLLAR PLACEMENT	
SOIL CONDITIONS	HEIGHT OF ROOT COLLAR
Normal, Well Drained	Place collar at same level to 1 in. above average surface grade.
Compacted	Place collar at 1 to 2 in. above average surface grade.
Poorly Drained or Wet	Place collar as needed to ensure 25% of root mass is above average surface grade.

**(d) Backfilling.** Remove clods, stones and other foreign material with a length or width greater than 2 in. from soil used for backfilling.

Place backfill soil that has been fertilized and amended as specified in 710.03.04 and .05 under and around roots to stabilize plants in upright position and restore the grade.

Lightly compact backfill soil to reduce air pockets. Avoid excessive compaction of Bioretention Soil Mixture (BSM).

**Soil Berming.** Form a 4 in. high berm of backfill soil around planting pits and planting beds as follows:

**(a) Planting Pits.** On areas flatter than 4:1, form the berm around the entire planting pit.

On slopes 4:1 and steeper, take soil from the upslope rim of the pit and place it on the downslope rim to form the berm.

**(b) Planting Beds.** On slopes 4:1 and steeper, form the berm as a shoulder at the lower edge of the bed.

Berm individual trees and shrubs installed within beds on slopes 4:1 and steeper as described in (a) above.

**Edging.** Cut edging at a steep angle into the mulched area to a 3 in. depth into the soil. On slopes 4:1 and steeper, cut edging outside of the bermed area on the lower edge of berm. Remove and discard excess soil.

(a) **Planting Pits.** Edge entirely around all planting pits except planting pits within planting beds.

(b) **Planting Beds.** Smoothly cut edging around all planting beds to the shapes specified.

**Staking and Guying.** Stake and guy trees the same day they are installed.

**Installation.** When two or three stakes are specified for trees, install two stakes parallel to the direction of traffic, or as directed. Drive stakes vertically to a depth of 10 in. below the bottom of the pit, and 5 to 8 in. away from roots as follows:

STAKING AND GUYING				
TREE TYPE	CALIPER In.	HEIGHT Ft	SUPPORT	
			No. of Stakes	Length, ft
Shade	Under 1	6 and 8	2	6
	1 to 2	-	2	8
	2-1/2 to 3-1/2	-	3	10
	4 and over	-	—	3 guy wires attached to tree anchors
Flowering	3/4 to 2-1/2	-	2	5-8
	3 and over	-	—	3 guy wires attached to tree anchors
Evergreen	-	5 and 6	2	5-6
	-	7, 8 and 9	3	7-8
	-	10 and over	—	3 guy wires attached to tree anchors

(b) **Maintenance.** Promptly straighten trees that become crooked after installation. Repair or replace stakes, guys, and other support materials as needed.

**Mulching.** Spread SHB mulch uniformly over the soil surface to a 3 in. depth. Promptly repair damage caused by washouts or construction activities.

(a) **Planting Pits.** Spread SHB mulch the same day that plants are installed. Mulch around the base of each plant to cover the soil of the planting pit to its outside edge, including the soil berm. Do not allow mulch to touch the bark or main stem of the plant.

(b) **Planting Beds.** SHB mulch may be spread before or after installing plants. Spread mulch over the entire bed and rake it to an even surface, including berms and shoulders. Ensure that mulch does not cover plants.

(1) **Rototilled Beds.** Spread mulch the same day after rototilling.

(2) **Non-Rototilled Beds.** Spread mulch within 3 days after plant installation. When installation is completed, ensure that mulch uniformly covers the soil to a uniform 2 in. depth.

**Fertilizing and Watering after Installation.**

**(a) Application Equipment.** Fertilizer and watering equipment shall consist of sprinklers or hoses equipped with water breaker nozzles so the materials are applied with care to prevent damage to plants and minimize disturbance to SHB mulch.

**(b) Fertilizer Solution.** Fertilizer solution shall consist of 5 lb of 20-20-20 water soluble fertilizer per 100 gal of water, applied as follows:

**(1) Planting Pits.** Apply fertilizer solution as specified in 710.03.04(c) to each installed plant.

**(2) Planting Beds.** Apply 300 gal of fertilizer solution per 1000 ft<sup>2</sup> to the entire bed area.

**(c) Follow-Up Watering.** Monitor and apply water during the Installation Phase to supply plant needs. Do not mix fertilizer with the irrigation water during the Installation Phase after the initial watering unless directed.

**Cleanup.** Remove growers tape, plant stakes, pot markers, field tags, and similar materials at the time of installation. Ensure that De/ DOT’s Material Inspection Approval Seals and plant tags remain on trees and shrubs until the end of the Establishment Phase. Keep turfgrass areas, paved surfaces, and sidewalks clean. Promptly remove excess and waste materials. Take precautions to avoid damage to existing structures, plants, and turfgrass. Repair damage caused to surrounding areas during installation, and fill ruts and reestablish turfgrass as necessary.

**Relocating Plants.** Begin plant relocation operations within 7 days after notice to relocate, and continue until work is completed. Remove plants installed in undesirable locations as directed by the Engineer, and reinstall these plants as specified herein.

**Abandoned Planting Pits.** Backfill abandoned planting pits when directed with excavated soil or approved backfill. Compact the backfill in 8 in. layers to the finished grade. Establish turfgrass as specified on the plans.

**Unacceptable Plants and Replacement Plants.** Promptly remove and replace plants that are unacceptable at any time during the Installation Phase as specified in “MATERIALS-PLANT MATERIALS”, or when requested.

Plants that are determined to be missing, dead, dying, damaged, diseased, deformed, underdeveloped, damaged by pesticides, or not true to species, cultivar, size or quality shall be replaced.

**(a) Criteria.** The following criteria will be used to identify unacceptable plants:

<b>CRITERIA FOR UNACCEPTABLE PLANTS</b>			
<b>Item</b>	<b>Plant Type</b>	<b>Condition</b>	<b>Unacceptable</b>
1	Tree, Shrub, Vine, Perennial Grass	Death or Absence	Any dead or missing plant, any cause.
2	Tree, Shrub, Vine, Perennial Grass	Defoliation	More than 25% of leaf area dead, lost or dropped.
3	Tree, Shrub, Vine	Bark Wound	More than 15% of bark circumference or 2 in. length.
4	Shrub or Vine	Height Die-back	More than 25% of the shrub or vine height.
5	Tree	Leader Die-back	More than 10% of tree height.
6	Tree	Branch Die-back	More than 6 in. on 75% of branches.

**(b) Replacement Plants.** Replacement plants shall be true to species, cultivar, size, and quality as specified in the Contract Documents unless a Substitution Request is approved.

Install replacement plants as soon as feasible during the current Planting Season, or if between Planting Seasons, during the next Planting Season.

Promptly submit a Modification Request as specified “**CONSTRUCTION -General-(b) Modification Request**” when it is not possible to obtain plants that meet specifications.

Replacement plants shall meet the specifications of “**MATERIALS-PLANT MATERIALS**”, and be installed and established as specified for 12 months, until Final Acceptance.

**Installation Phase Inspection.** Submit a request for Installation Phase Inspection when operations are completed, and provide the Establishment Phase Schedule as specified “**CONSTRUCTION -Submittals and Inspection-(d) Establishment Phase Schedule & IPM Program**”.

The Installation Phase Inspection will be scheduled by the Engineer at the project with the Contractor to verify completion. At least 14 days notice will be provided before the scheduled Inspection so that it may be completed in the company of the Contractor.

**Installation Phase Punch List.** The Engineer in consultation with the Contractor will develop the Installation Phase Punch List and list of plants to be replaced. Complete the Punch List requirements and replace plants as required.

**Installation Phase Acceptance.** Re-inspection will be performed as needed. Installation Phase Acceptance will be granted when the Punch List and all Installation Phase requirements are completed.

The following list includes key Installation Phase requirements:

REQUIREMENTS FOR INSTALLATION PHASE ACCEPTANCE		
Item	Requirement	Section
a	Submittals are accepted and Inspections are completed.	CONSTRUCTION. General (b) Modification Request, and Submittals and Inspection, and MATERIALS. PLANT MATERIALS
b	Damaging pests are controlled.	CONSTRUCTION. Submittals and Inspection (c) Plant Material Inspection and Approval
c	Layouts are inspected and approved.	CONSTRUCTION. Utilities Marking, Layout, and Inspection
d	Fertilizer and soil amendments are applied.	CONSTRUCTION. Preparing Planting Pits and Preparing Planting Beds
e	Planting pits and planting beds are weed free.	CONSTRUCTION. Preparing Planting Pits (a) Undesirable Vegetation and Preparing Planting Beds (a) Undesirable Vegetation
f	Trees and shrubs are pruned.	CONSTRUCTION. Pruning
g	Trees are installed vertically and straightened.	CONSTRUCTION. Installing
h	Planting pits and beds are bermed and edged.	CONSTRUCTION. Soil Berming and Edging
i	Staking and guying are repaired or replaced.	CONSTRUCTION. Staking and Guying
j	SHB mulch is uniformly spread to the specified depth.	CONSTRUCTION. Mulching
k	Washouts in planting pits and beds are repaired.	CONSTRUCTION. Mulching



<b>l</b>	Plants are watered and fertilized.	<u>CONSTRUCTION</u> . Preparing Planting Pits and Fertilizing and Watering after Installation
<b>m</b>	Clean up is completed, plant tags and ribbons are removed.	<u>CONSTRUCTION</u> . Cleanup
<b>n</b>	Plants are relocated to approved locations.	<u>CONSTRUCTION</u> . Relocating Plants
<b>o</b>	Abandoned planting pits are filled and seeded.	<u>CONSTRUCTION</u> . Abandoned Planting Pits
<b>p</b>	Unacceptable plants are replaced.	<u>CONSTRUCTION</u> . Unacceptable Plants and Replacement Plants
<b>q</b>	Damage repairs and Installation Punch List is completed.	<u>CONSTRUCTION</u> . Installation Phase Punch List
<b>r</b>	Pesticide Application and Nutrient Management Reporting Forms are completed.	<u>CONSTRUCTION</u> . General (d)Pesticide Application Reporting
<b>s</b>	Plants are properly installed and successfully transplanted.	<u>CONSTRUCTION</u> .
<b>t</b>	Establishment Phase Schedule & IPM Program is accepted.	<u>CONSTRUCTION</u> . Installation Phase Acceptance

**Establishment Phase.** The Establishment Phase begins upon Installation Phase Acceptance. Maintain plants as specified, and as follows:

**(a) Period of Maintenance.** Maintain plants for 12 months after installation, until Final Acceptance.

**(b) Plant Watering.** Monitor the soil moisture and water needs of plants. Promptly apply water as specified in “CONSTRUCTION -Preparing Planting Pits-(c) Pit Diameter, Compost, and Water” to planting pits, and 600 gal of water per 1000 ft<sup>2</sup> to planting beds when needed or when directed.

**(c) Pest Management.** Monitor and promptly control weeds, insects and other pests in conformance with the IPM Program, or when requested. Control weeds in mulched areas in preparation for inspection on or about the 15th of each month from March 15th to November 15th. Remove dead weeds taller than 6 in. Refer to “CONSTRUCTION -General-(d) Pesticide Application Reporting” and complete the Pesticide Application Reporting Form.

**(d) Unacceptable Plants and Replacement Plants.** Refer to “CONSTRUCTION -Unacceptable Plants and Replacement Plants”. Promptly remove and replace plants that have become unacceptable during the Establishment Phase as needed or as directed.

**(e) End-of-Season Foliage Removal.** Remove the aboveground parts of perennials and grasses that have declined during the months of November and March respectively, or as directed.

**(f) Refertilizing.** Apply 20-20-20 fertilizer solution as “CONSTRUCTION -Fertilizing and Watering after Installation” in the final 60 days of the Establishment Phase.

**(g) Removing Supports and Seals.** Remove tree supports, hoses wires, guys and Material Inspection Approval Seals in the final 30 days of the Establishment Phase. Pull stakes from the soil or cut them to ground level.

**(h) Establishment Phase Inspection and Punch List.** “CONSTRUCTION -Installation Phase Inspection, and Installation Phase Punch List”. The Inspection will be scheduled and the Establishment Phase Punch List will be developed. Perform repairs, replacements and other work as specified in the Contract Documents and Punch List.

**Final Acceptance.** Refer to “CONSTRUCTION -Installation Phase Acceptance”. Final Acceptance will be granted when the Punch List and all Establishment Phase requirements are completed.

The following list includes key establishment requirements:

<b>REQUIREMENTS FOR ESTABLISHMENT PHASE &amp; FINAL ACCEPTANCE</b>		
<b>Item</b>	<b>Requirement</b>	<b>Section</b>
1	Water sprouts are manually pruned and removed.	<u>CONSTRUCTION</u> . Pruning
2	Trees are straightened.	<u>CONSTRUCTION</u> . Installing
3	Staking and guying are repaired or replaced.	<u>CONSTRUCTION</u> . Staking and Guying
4	Washouts in planting pits and beds are repaired.	<u>CONSTRUCTION</u> . Mulching
5	Plants are relocated to approved locations.	<u>CONSTRUCTION</u> . Relocating Plants
6	Abandoned planting pits are filled and seeded.	<u>CONSTRUCTION</u> . Abandoned Planting Pits
7	Plants are successfully established for 12 months.	<u>CONSTRUCTION</u> . Establishment Phase (a) Period of Maintenance and (b) Plant Watering
8	Damaging pests are controlled.	<u>CONSTRUCTION</u> . Establishment Phase (c) Pest Management
9	Planting pits and planting beds are weed free.	<u>CONSTRUCTION</u> . Establishment Phase (c) Pest Management
10	Unacceptable plants are replaced.	<u>CONSTRUCTION</u> . Establishment Phase (d) Unacceptable Plants and Replacement Plants
11	Annual foliage dieback of perennials and grasses is cut and removed.	<u>CONSTRUCTION</u> . Establishment Phase (e) End-of-Season Foliage Removal
12	Plants are refertilized.	<u>CONSTRUCTION</u> . Establishment Phase (f) Refertilizing
13	Pesticide Application and Nutrient Management Reporting Forms are completed.	<u>CONSTRUCTION</u> . General (d)Pesticide Application Reporting
14	Staking, guying, and Material Inspection Seals are removed.	<u>CONSTRUCTION</u> . Establishment Phase (g) Removing Supports and Seals
15	Damage repairs and Establishment Punch List are completed.	<u>CONSTRUCTION</u> . Establishment Phase (h) Establishment Phase Inspection and Punch List

**Method of Measurement:**

The quantity of “**PLANTINGS, MARYLAND**” will not be measured.

**Basis of Payment:**

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

**NOTE:**

When more than one planting material is required, the Contractor shall submit a cost breakdown of his Lump Sum price bid for this item showing the dollar value amount for each planting material, the sum of which is to equal the lump sum price bid. The breakout sheet attached to the proposal shows all materials proposed for this item.

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

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

10/10/12

- 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 "DeIDOT" (Types 6, 8, and 10) or "DeIDOT 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 "DeIDOT 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

**744519 - RELOCATION OF EXISTING JUNCTION WELL**

**Description:**

This work consists of relocating an existing Type 1, Type 4, Type 5, Type 6, Type 7, Type 8, or Type 10 junction well to clear utilities or other construction work. This item may consist of moving a junction well from a few inches (centimeters) to no more than six feet (1.8 m) in any direction in sodded or dirt areas only. Moves of more than six feet (1.8 m ) shall be paid under other items in this contract.

**Construction Methods:**

The junction well shall be relocated in a manner so as not to damage the junction well, frame and lid, or precast polymer concrete cover. Any conduit or cables that need to be removed or installed shall be paid under separate items in this contract.

If the conduit that is connected to the junction well needs to be moved with the junction well, the conduit is to be exposed to the distance necessary to move the junction well, caution is to be used as not to place excessive stress on the conduit or its couplings.

The entire work area where the junction well and conduits are relocated shall be backfilled and tamped as directed by the Engineer. Any extra fill needed to complete the backfill shall be considered part of this item.

**Method of Measurement:**

The quantity of relocated junction wells to be measured under this item shall be the actual number of junction wells relocated complete, in place, and accepted.

Any conduits that need to be added to extend into the junction well shall be paid for under "Supply of Conduit".

**Basis of Payment:**

The number of junction wells relocated, as determined above, shall be paid for at the Contract unit price per each. Price and payment will constitute full compensation for all labor, equipment, tools, and incidentals required to complete the work.

01/15/03

- 744533 - FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 1
- 744534 - FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 4
- 744535 - FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 5
- 744536 - FURNISH & INSTALL PRECAST POLYMER COVER FOR JUNCTION WELL, TYPE  
6
- 744537 - FURNISH & INSTALL PRECAST POLYMER COVER FOR JUNCTION WELL, TYPE  
7
- 744538 - FURNISH & INSTALL PRECAST POLYMER COVER FOR JUNCTION WELL, TYPE  
8
- 744539 - FURNISH & INSTALL PRECAST POLYMER COVER FOR JUNCTION WELL, TYPE  
9
- 744540 - FURNISH & INSTALL PRECAST POLYMER COVER FOR JUNCTION WELL, TYPE  
10
- 744541 - FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 11
- 744542 - FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 14
- 744543 - FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 15

**Description:**

This work consists of furnishing and installing cast iron frames and lids or precast polymer concrete covers for existing junction wells only. The item shall not be used when furnishing new junction wells as the frames and lids are included in the price for the new units. The frames and lids are as shown on the Standard Construction or applicable Plan Details. The work includes furnishing and installing all required materials and hardware to properly ground the unit, including wire and splicing if required and as shown on the Standard Construction or applicable Plan Details.

**Materials:**

Castings for frames, lids, and ½” dia. x 1 ¼” grounding lugs shall conform to Section 708.05 of the Standard Specifications and Standard Construction Details or applicable Plan Details.

Precast polymer concrete covers shall be reinforced by heavy-weave fiberglass. All precast polymer concrete covers shall be the heavy-duty type with a design load of 15,000 lbs. over a 10" square and a coefficient of friction greater than 0.5. The precast polymer concrete cover logo shall bear the inscription "DelDOT Traffic" for Types 6, 8, and 10 and "DelDOT Traffic Fiber Optics" for Type 7. The precast polymer concrete cover Type 11, 14, and 15 logo shall bear the inscription "DelDOT ELECTRIC".

Material for Grounding, bonding, and all related hardware and wire (including splicing if required) shall be as shown on the Standard Construction or applicable Plan Details.

**Method of Measurement:**

The quantity of spare frames and lids or precast polymer concrete covers shall be the actual number of frames and lids or precast polymer concrete covers by type furnished, installed, bonded, grounded and accepted.

**Basis of Payment:**

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

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

**Method of Measurement:**

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

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

**Basis of Payment:**

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

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

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

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

For conduit installed on a structure, the linear foot payment also includes 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, conduit, 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

**746509 - RELOCATING LIGHT POLE**

**Description:**

This work consists of relocating the existing light pole(s) with illumination assemblies at the location(s) shown on the Plans and/or as directed by the Engineer. Unless shown otherwise on the Plan, the new foundations provided shall be a Pole Base, Type 6 constructed in accordance with Special Provision 746852 and details on the Plans.

**Materials and Construction Methods:**

All materials furnished by the Contractor under these items shall be in accordance with the details shown on the Plans, and/or as required by the Standards and Specifications of the owner of the light-pole. In absence of such details, standards, and specifications, requirements of the National Electrical Code shall be applicable. The concrete for the foundation shall be Class B, and shall conform to Section 812 of the Delaware Standard specifications.

The illumination assemblies shall be carefully removed from the poles to avoid any damage. Should any damage occur to the illumination assemblies, and in the opinion of the Engineer adequate precaution was not exercised by the Contractor during the relocation operation, the Contractor shall at his expense replace the damaged assembly in kind or better as determined by the Engineer. Where salvage of any material is required in accordance with the notes on Plans, the cost shall be included in this item.

Final acceptance of the light pole assembly unit shall be made only after its satisfactory operation as determined by the Engineer, and/or by the owner of the light pole. The Contractor shall make every effort to avoid excessive delay in relocating the light pole.

**Method of Measurement:**

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

**Basis of Payment:**

The quantity of light poles relocated will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for relocating the existing light pole, erecting and connecting illumination assemblies, furnishing all materials including lamp(s), for salvaging the materials specified in the Contract, for disposing of the discarded materials, and for all labor, tools, equipment, and incidentals to complete the work.

**NOTE**

This work shall also include the adjustment and/or relocation of the affected electrical conduits that supply power to the light poles.

8/25/2015

746511 - CABLES, 1/#4 AWG  
746512 - CABLES, 1/#6 AWG  
746513 - CABLES, 1/#8 AWG  
746514 - CABLES, 1/#10 AWG  
746515 - INSULATED GROUND CABLE, 1/#6  
746527 - CABLES, 1/#2 AWG  
746543 - CABLES, 1/#9 AWG  
746546 - CABLES, 1/#12 AWG  
746564 - INSULATED GROUND CABLE, 1/#4  
746565 - CABLES, 1/#3/0 AWG  
746566 - CABLES, 1/#1 AWG  
746567 - CABLES, 1/#1/0 AWG  
746577 - INSULATED GROUND CABLE, 1/#8  
746598 - INSULATED GROUND CABLE, 1/#2  
746605 - INSULATED GROUND CABLE, 1/#10  
746622 - CABLES, 1/#4/0 AWG  
746658 - INSULATED GROUND CABLE, 1/#1/0  
746690 - INSULATED GROUND CABLE 1/#12  
746817 - CABLES, 1/#2/0 AWG  
746861 - INSULATED GROUND CABLES, 1/350 KCMIL  
746903 - INSULATED GROUND CABLES, 1/#2/0  
746904 - INSULATED GROUND CABLES, 1/#4/0

**Description:**

This work consists of furnishing all cables of the size(s) required by the Contract in accordance with the notes and details shown on the Plans and/or as directed by the Engineer.

**Materials and Construction Methods:**

All wire(s) to be used in this contract shall be manufactured in conformance with the National Electrical Code, insulated for 600 volts, and be of the type USE and/or RHW.

**Method of Measurement:**

The quantity of cables will be measured as the number of linear feet (linear meters) of each size along the longitudinal axis of each cable.

**Basis of Payment:**

The quantity of cables will be paid for at the Contract price per linear foot (linear meter). Price and payment will constitute full compensation for furnishing the cables.

No separate payment will be made for furnishing the connector kits with #10 AWG wiring of the type as indicated on the plan for the lighting standards as shall be included in the items for lighting standards.

9/09/2010

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

**Description:**

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

**Materials and Construction Methods:**

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

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

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

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

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

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

Also included in the foundations will be ground rods which shall be copper clad steel 3/4" diameter 26' long, complete with ground clamp and square head bolt equal to Joslyn's Cat. No. J8350, Line Materials Cat. No. 119960 or A. B. Chance Co. Cat. No. 8450, or approved equal.

New aluminum lighting standards shall consist of a tapered aluminum shaft having a base welded to the lower end. The pole shaft, pole extensions, and davit arms shall each be spun from one piece of seamless tubing, the strut and arm plates shall be extruded, all of which conform to the requirements of ASTM B221 aluminum alloy 6063-T6. The shaft shall have no circumferential welds, except at the lower end joining the shaft to the base and shall conform to the dimensions listed in the chart below. The shaft shall contain an internal vibration dampening device positioned approximately 2/3 the height of the pole. The top of the lighting standard shaft shall be drilled for two 1/2" (13 mm) lockbolts to secure the davit bracket to the lighting standard shaft. If the pole is not placed on a transformer base, it will have one 3" x 5" (75 mm x 125 mm) handhole which after pole is set should face so that maintainer may view oncoming traffic.

HEIGHT OF POLE	DAVIT ARM LENGTH	OUTER DIAMETER	WALL THICKNESS
30'	8'	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'	8'	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 8' 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 slipfitter 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 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  
GE M-250 A2 Power/Door

Cat. #OVY25SWN3ET4 (Multi Tap 277V)  
Cat. #OVY25SWW3ET4 (Multi Tap 120V)  
Cat. #M2AC25S0A2GMC32 (Multi Volt)

LUMINAIRE 150 Watt High Pressure Sodium Roadway, with Photo Cell Receptacle and Field Replaceable 9110-60-27 Regulated Multi Voltage Ballast, Type III Light Pattern, or as shown on Plans, 1 1/2" - 2" (36 mm - 50 mm) Slipfitter

Cooper/Crouse-Hinds OVX Swing-down  
GE M-250A2 Power/Door

Cat. # OVY15SWW3ET4 (Multi Tap 120V)  
Cat. #OVY155WN3ET4 (Multi Tap 277V)  
Cat. #M2AC15SOA2GMC32

Foundations: Foundations shall be cast-in-place monolithically at the prescribed locations as shown in detail on Plans. If, not otherwise specified, a Type 6 Base as shown in the Standard Construction Details will be used. Exact locations of the bases will be determined in the field in order to avoid existing obstructions such as utilities or existing pole bases.

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

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

**Method of Measurement:**

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

**Basis of Payment:**

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

4/22/13

**746541 - INSTALLATION OF ELECTRICAL WIRE OR CABLE IN EMPTY CONDUITS**  
**746542 - INSTALLATION OF ELECTRICAL WIRE OR CABLE IN CONDUITS WITH**  
**EXISTING CABLE**

**Description:**

This item consists of installing various types and sizes of electrical wire or cable in existing conduits which may or may not have existing wire or cable in them.

**Materials:**

All cable will be supplied by the Contractor under a separate item in this contract. All cable must be transported and unreeled by employing the use of cable trailers. The laying of cable reels on the ground and subsequent removal of cable from this position will not be permitted.

The weight of cable reels will range from 150 lbs (150#) (70 kg) to 2,000 lbs (2000#) (900 kg). The diameter of cable reels will range from 2' (.6 m) to 6' (1.8 m). The width of cable reels will range from 1' (.3 m) to 4' (1.2 m).

All wire will be supplied by the Contractor under a separate item in this contract.

The following are the basic types and sizes of cable to be used under this item, however, under special circumstances other types and sizes may be used:

1. XHHW #14 single conductor detector wire.
2. TW or THWN or bare copper lighting cable #2, #4, #6, or 8 - 1 conductor, copper or aluminum.
3. Underground Feeder Cable
4. Signal Cable #18 through #14 with 4 through 26 conductors diameters: 1/4" to 1" approximate.
5. Direct Burial Telephone Cable #19 - 6 pairs, 12 pairs w/integral messenger diameter: 1/2" (12 mm) approximate; 3/4" (19 mm) respectively.

**Construction Methods:**

**General:** The installation of electrical wire or cable in existing conduits shall be accomplished by pulling the cable through conduits of 1 1/2" (38 mm) or larger, using the hand method of pulling. If approved by Field Engineer, a power assisted method may be used. This method must have a short piece of material that will part if the strain exceeds 150 lbs (70 kg). The material will be fastened to a pulling grip, kellems or equal, on one end and the pulling medium from power winch on the other end. These cables are to be hand fed into conduit. The number of cables to be pulled through each conduit will be as shown on the Plans or as directed by the Field Engineer. The Contractor shall be responsible for any damage to the cable resulting from the pulling operation. The cost of damaged cable shall be deducted from monies due to the contractor.

When, in the opinion of the Engineer, additional radius is required to prevent damage to the cable, it will be necessary to use a sleeve. Where the use of this sleeve is deemed necessary, there will be no additional payment made for sleeves or their use.

**Signal Cable:** For signal cable, all cable runs shall be a continuous run and will not be splices in junction wells. The pulling of all cable for a complete intersection shall begin at the control box location. For cable runs other than a complete intersection, the pulling procedure shall be as directed by the Field Engineer. When the cables are pulled through junction wells, there will be 10' (3 m) of spare cable left in each junction well. At the control box there will be 6' (1.8 m) of spare cable left on each cable. At the end of each cable run, there will be 5' (1.5 m) of spare cable left at each termination point.

**Lighting Cable:** The procedure for cable installation for highway lighting and sign lighting will be as shown on the plans or as directed by the Engineer. However, the general rules as stated in these specifications shall apply.

Existing Cable: When cables already exist in a conduit, the contractor shall ensure that the placement of a fish does not damage or entangle the existing cables. 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 cable when the fish is extracted.

The above stated specifications shall also apply when any additional cables are being pulled into the conduit.

**Method of Measurement:**

The number of linear feet (meters) of wire or cable actually pulled through a conduit in accordance with these specifications shall be the measured quantity under this item. The number of cables pulled through a conduit may vary from one (1) to four (4) or more.

**Basis of Payment:**

The number of linear feet (meters) of wire or cable pulled through a conduit measured as provided above shall be paid for at the unit prices bid per foot (meter) for "Installation of Electrical Wire or Cable in Empty Conduits" and "Installation of Electrical Wire or Cable in Conduits with Existing Cable", which price and payment shall constitute full compensation for placing all materials, for all labor, equipment, tools, and incidentals necessary to complete the item(s) as required by the contract.

8/25/06

**746586 - RELOCATE SIGN**

**Description:**

This work consists of relocating the existing sign to the location shown on the Plans and as directed by the Engineer.

**Materials and Construction Methods:**

The Contractor shall carefully relocate and reinstall the existing sign. The Contractor shall safely store the sign, if necessary, until it can be reinstalled. The sign shall be set in Class B concrete conforming to the requirements of Section 812 of the Standard Specifications at the same elevations as the original installation.

If the sign is damaged during the relocation process, the Contractor shall furnish a new sign with no cost to the Department.

**Method of Measurements:**

The quantity of relocated signs will be measured as the total square footage of signs relocated and accepted.

**Basis of Payment:**

The quantity of relocated signs will be paid for at the Contract unit price per square foot. Price and payment will constitute full compensation for all of the work necessary to relocate the sign, including removing the existing sign, relocating the sign, re-installing the sign and for all labor, tools, equipment and incidentals necessary to complete the work.

10/30/2009

**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 3/4" 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

**746594 - LUMINAIRE (HPS) 250 WATT**

**Description:**

This work consists of furnishing and installing 250 watt high pressure sodium fixtures on poles, in accordance with these specifications and as shown on the Plans.

**Materials:**

The complete luminaire shall be a 250 watt high pressure sodium type powered from a nominal 120 or 240 volt, 60 hertz source. The luminaire shall have a heavy-duty die-cast aluminum housing with an electrocoat gray finish and a hinged and removable door assembly with a heat/impact resistant glass prismatic lens. The luminaire shall be provided with internal two-inch slipfitter mounting and photocell control. The ballast shall be a multi-tap (120/208/240/277 volt) auto-regulating type, capable of starting and operating the lamp down to temperatures of 78°F (28°C). The optical assembly shall be sealed with a perimeter gasket and activated charcoal filter.

The fixture shall have medium, cutoff NEMA Type 3 distribution and shall be General Electric Catalog Number MSCL-25-S-0-M-2-G-MC3-C or approved equal.

**Method of Measurement:**

The quantity of 250 watt (HPS) luminaires will be measured as the actual number of luminaires provided complete in place and accepted.

**Basis of Payment:**

The quantity of 250 watt (HPS) luminaires will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials, and for all labor, tools, equipment, and incidentals necessary to complete the item installation.

3/10/14

- 746595 - ALUMINUM LIGHTING STANDARD, 40' POLE**
- 746612 - ALUMINUM LIGHTING STANDARD, 20' POLE**
- 746654 - ALUMINUM LIGHTING STANDARD, 45' POLE**
- 746655 - ALUMINUM LIGHTING STANDARD, 30' POLE**
- 746682 - ALUMINUM LIGHTING STANDARD, 35' POLE**

**Description:**

This work consists of furnishing and installing lighting standards, in accordance with these specifications and as detailed on the Plans. The foundation provided as part of this item shall be a Pole Base, Type 6 constructed in accordance with Section 746 and details on these Plans and paid for under a separate item.

**Materials:**

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

The aluminum shaft, shall be spun from one piece of extruded tubing meeting the requirements of ASTM B 241, 6000 series alloy. The shaft shall be cold worked to form the specified taper. Aluminum castings shall conform to ASTM B 108, alloy 356-T6. All welding shall be of the metallic-arc-consumable-electrode-inert-gas-shielded-process. After welding, the entire assembly shall be precipitation heat treated to the T6 temper using an approved method and rotary sand finished. The shaft shall contain an internal vibration dampening device positioned approximately 2/3 the height of the pole. The pole shall be supplied with a standard 2" tenon or other hardware/fitting called for on the Plans or as required to mount the proposed luminaire.

<b>Height of Pole Feet</b>	<b>Outer Diameter Inches</b>	<b>Wall Thickness Inches</b>
20	10	.156
30	10	.156
35	10	.156
40	10	.188
45	10	.188

Breakaway support systems (transformer bases), when required, shall be provided with each pole, and shall not be paid for separately, but will be considered incidental to this item. Transformer bases will meet the breakaway requirements of ASSHTO and FHWA.

A grounding lug shall be provided at each pole, integral with either the pole shaft or the transformer base. Included in the foundations will be ground rods which shall be copper clad steel 3/4" in diameter and 20' long.

Each lighting standard shall be provided with a permanent tag which shall be 2" by 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.



**Method of Measurement:**

The quantity of aluminum lighting standards will be measured as the actual number of poles complete in place and accepted.

**Basis of Payment:**

The quantity of aluminum lighting standards, will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for, furnishing and placing/erecting all materials; and for all labor , equipment, tools and incidentals necessary to complete the item.

8/24/06

**746615 – PVC SCHEDULE 40 DUCT, 6"**

**Description:**

This work consists of furnishing all materials required and extending the existing 6" schedule 40 PVC encasement around the 1½" schedule 40 PVC effluent pipe in accordance with locations, notes, and details shown on the Plans and as directed by the Engineer. This work shall be coordinated with Delaware State Police that occupy the Weigh Station Administration Building. If a shutdown of the weigh station sanitary sewer facilities is required, work shall be performed when the weigh station building is not occupied, unless otherwise directed by the Engineer.

**Materials:**

Material shall conform to the requirements listed on the Plans, and as noted herein. All pipe and fittings shall be free from defects, and the defective materials as determined by the Engineer, shall be rejected and replaced.

Warning tape for sanitary sewer or force main shall be printed polyethylene plastic tape with a metallic core, manufactured specifically for warning and identification of buried utility lines. The tape shall be of a roll type, 2" (50 mm) minimum width, and color coded for sewer (green), with warning and identification imprinted in bold black letters continuously and repeatedly over entire length of tape. The code and letter color shall be permanent and unaffected by moisture and other substances contained in trench backfill materials. Imprinted on the tape shall be "Caution, Buried Sewer Line Below", or a similar message as approved by the Engineer.

Delaware No. 57 Stone shall conform to the requirements of Section 813 of the Standard Specifications. Sand shall conform to the requirements of Section 804. Geotextiles shall conform to the requirements of Section 713.

**Construction Methods:**

The Contractor shall apply for and obtain all necessary permits required for the alteration of an existing septic system prior to starting work. All pipes shall be thoroughly cleaned before they are laid and shall be kept clean until the completed work is accepted. The excavation and backfill for the pipe shall be performed in accordance with the Construction Details. The pipe shall be re-installed in its original location or as directed by the Engineer. Sand shall be blown between the 1½" PVC pipe and the 6" PVC sleeve to fill the annulus. During backfill of the sewer or force main the Contractor shall install the specified warning tape as per the Construction Details or as directed and approved by the Engineer.

**Method of Measurement:**

The quantity of PVC Schedule 40 Duct, 6" will be measured from end to end in linear feet of pipe completed and accepted.

**Basis of Payment:**

The quantity of PVC Schedule 40 Duct, 6" will be paid for at the Contract unit price per linear foot. Price and payment will constitute full compensation for furnishing and installing sanitary sewer pipes (including all connections); for furnishing and installing warning tape; for excavation; for furnishing and placing Delaware No. 57 stone, sand and geotextiles; for all labor, tools, equipment, permits, permit fees, testing and incidentals to complete the work and make the sewer system functional. Payment for Borrow Type F, Borrow Type C, topsoil, and seeding will be made under their respective items.

8/28/12

**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

**746669 - LUMINAIRE (HPS) 150 WATT**

**Description:**

This work consists of furnishing and installing Type A and Type B 150 watt high pressure sodium fixtures on poles, in accordance with these specifications and as shown on the Plans.

**Materials:**

The complete Type A or Type B luminaire shall be a 150 watt high pressure sodium type powered from a nominal 240 or 277 volt, 60 hertz source. The luminaire shall have a heavy-duty die-cast aluminum housing with an electrocoat gray finish and a hinged and removable door assembly with a heat/impact resistant glass prismatic lens. The luminaire shall be provided with internal two-inch slipfitter mounting and photocell control. The ballast shall be a multi-tap (120/208/240/277 volt) auto-regulating type, capable of starting and operating the lamp down to temperatures of 78°F (28°C). The optical assembly shall be sealed with a perimeter gasket and activated charcoal filter.

The Type A fixture shall have medium, semi-cutoff NEMA Type 3 distribution and shall be General Electric Catalog Number M4AR-25-S-0-M-2-G-MS3-2, Lithonia Lighting CHLD-250S-R3-DLG-TB-MRB-PEU-CF or approved equal.

The Type B fixture shall have medium, non-cutoff NEMA Type 4 distribution and shall be General Electric Catalog Number M4AR-25-S-0-M-2-G-MN4-2-F or Holophane Vector Model No. HL2A250HPMTKGR-PR or approved equal.

**Method of Measurement:**

The quantity of 150 watt (HPS) luminaires will be measured as the actual number of luminaires provided complete in place and accepted.

**Basis of Payment:**

The quantity of 150 watt (HPS) luminaires will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials, and for all labor, tools, equipment, and incidentals necessary to complete the item installation.

12/21/10

**746717 - ELECTRIC SERVICE ON RACK WITH SERVICE RISER**

**Description:**

This work consists of the installation of an electrical service, underground, on a galvanized C channel Rack with service riser as indicated on the contract drawings and as required.

**Materials:**

Concrete. Concrete used for the C Channel footing shall be Class B conforming to the requirements of Section 812.

Shop drawings and catalog cuts shall be submitted for the pedestal support members for approval.

All electrical materials shall conform to the requirements of the National Electric Code of the National Fire Protection Association, to all local and special laws, and/or to ordinances governing such installation. When these requirements do not govern, and where not otherwise specified, electrical materials shall conform to the Standardization Rules of the Institute of Electrical and Electronic Engineers. Shop drawings and catalog cuts for all electrical and related materials shall be submitted by the Contractor for approval.

**Construction Methods:**

Electric Service on Rack with Service Riser:

Install the Rack on concrete footings as shown on plans. The Rack will be installed within 10 feet (3 m) of the utility company's wood pole. If the distance from the Rack to the utility company's wood pole exceeds 10 feet (3 m), the additional work and material will be covered under other items of this contract. Install a length of 1 1/4" galvanized conduit under the meter pan, so that the conduit will have 2 feet (0.6 m) of cover after a 1 1/4" (32 mm) galvanized elbow is installed. Connect the required length of 1 1/4" (32 mm) conduit to the elbow and install a second 1 1/4" (32 mm) galvanized elbow so that it is in direct contact with the utility company's wood pole. Install a 1 1/4" x 3' (50 mm x 0.9 m) nipple to the elbow. Reduce the 1 1/4" (32 mm) conduit to 3/4" (19 mm) with an approved reducing bushing. Install 30 feet (9 m) of 3/4" (19 mm) galvanized conduit above the conduit reducer, securing it to the wood pole within 12" (300 mm) of the conduit reducer and then at intervals not exceeding 3 feet (0.9 m). On the top of the 3/4" (19 mm) aluminum conduit install a 3/4" (19 mm) weatherhead, and secure the conduit to the wood pole within 12" (300 mm) of the weatherhead.

Install 3 (three) THHN (size as shown on the plans) stranded conductors {1 red, 1 black and 1 white} from the line side of the meter pan to the weatherhead, leaving 5 feet (1.5 m) coiled and taped outside for connection by others. Connect the other end inside the meter pan using an anti oxidation

**Method of Measurement:**

The quantity of electrical services will be measured as the number of services installed in accordance with these specifications, complete in place, and accepted.

**Basis of Payment:**

The quantity of electrical services will be paid for at the Contract unit price per each. Price and payment shall include full compensation for installing the service, all utility permits, all materials and for all labor, tools, equipment, and incidentals necessary to complete the item.

11/21/11

**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 minimum range 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

**746924 - FURNISH & INSTALL LOOP WIRE 1 - CONDUCTOR #14 AWG CABLE ENCASED  
IN ¼" FLEXIBLE TUBING IN A LOOP SAWCUT**

**Description:**

Sawcut and seal existing pavement, furnish and install loop detector wire, as shown on the Plans and applicable Standard Construction Details.

**Materials:**

1. **1-conductor #14 AWG Cable in ¼" Flexible Tubing** - shall consist of cable preinstalled in a polyethylene (PE) plastic duct meeting IMSA 51-5. Cable shall be rated for 600 volts. The cable shall have a temperature tolerance range of at least - 65 to + 176 degrees Fahrenheit. The conductor is AWG #14 stranded copper. Outside diameter of the cable is 0.25 inches. Referred to as "loop wire"
2. **2-conductor #14 AWG Aluminum Shielded Cable** – see specifications for furnish and install cable. Referred to as "home-run cable".
3. **Flexible embedding sealer** - a cold poured, resilient type epoxy joint sealer, Bondo P 606 or Duracote D115 for concrete or asphalt pavement or E Poxy Industry 36 1 for concrete or E Poxy Industry 11 1 for asphalt pavement, or approved equal. A sealer accelerant or retarder may be added per the manufacturer's specifications.
4. **Backer Rod** - 5/8" closed cell foam
5. **Tape** - Vinyl electrical tape shall have a PVC base with rubber based pressure sensitive adhesive. The tape shall be a minimum 7 mils thick and be UL listed and marked per UL Standard 510 as flame retardant and cold resistant. It shall be compatible with synthetic cable insulations, jackets and splicing compounds and rated for wire and cable splices up to 600-volts.
6. For splices in Junction Well (see plan or Standard Construction detail):
  - a. **Dual Wall Heat Shrink Tubing** – Heat-shrink tubing shall be medium or heavy wall thickness, irradiated polyolefin tubing containing an adhesive mastic inner wall. Minimum wall thickness prior to contraction shall be 40 mils. When heated, the inner wall shall melt and fill all crevices and interstices of the object being covered while the outer wall shrinks to form a waterproof insulation. Each end of the heat-shrink tube or the open end of the end cap of heat-shrink tubing shall, after contraction, overlap the conductor insulation at least one and one-half inches. Heat-shrink tubing shall conform to the requirements in UL Standard 468D and ANSI C119.1, for extruded insulated tubing at 600 V.
  - b. Soldering iron with Rosin Core solder
  - c. Splicing Kit- In-line barrel type design, resin encapsulating compound kit with UL486 rating. Suitable for use in wet or direct buried locations. Resin encapsulating compounds shall be acceptable for use at 16 degrees C.

**Construction Methods:**

**Loop Wire Installation:**

The pavement saw cut shall be 5/8" wide and 3½" deep. It shall be "wet-cut" in the directions and sizes specified on the Plans, Standard Details or as directed by the Engineer. Contractor shall remove sharp edges in the saw cut and round the corners. The saw cut shall be blown out with compressed air to remove all dust, water and particles of loose material prior to sealing.

The loop detector wire will then be installed using blunt tools so as to prevent damage to the polyethylene outer cover. One end of a loop detector wire shall be tagged to indicate start ("S"). A 5/8" backer rod shall be placed into the entire length of the saw cut to secure the wiring. All loop detector wires shall be laid in saw cuts in a clockwise rotation beginning with "S". The Engineer may require a High Voltage Ground Test with a 500 VDC megger after the loop detector installation is complete and prior to sealing saw cuts. If the resistance to ground is less than 100 megohms, this work will be rejected.

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

Two loop detector wires shall be installed in a saw cut from the loop to the edge of the road. These two wires shall then extend from the end of the saw cut to a junction well (see Plan Details). Wires shall be parallel, twisted a minimum of 5 wraps per foot, and taped every 12" to 18" from the end of the saw cut to a junction well up to the splice.

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

**Home-run Wire Installation** - refer to furnish and install cable specifications and conduit installation specifications. Refer to plans for details.

**Splicing** - splices between the loop detector wire and home-run cable shall be done in accordance with the Standard Construction or plan details.

Conductors to be soldered shall be placed side by side with the exposed copper aligned. The copper shall then be twisted clockwise with pliers until a good mechanical connection is affected. The splice shall be coated with flux, heated with a soldering iron, and rosin core soldered in a manner that minimizes insulation damage. After each soldered connection is completed, it shall be properly insulated with heat shrink tubing.

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

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

**Method of Measurement:**

The quantity of loop detector wire to be measured under this item shall be the number of linear feet of sawcut in which loop detector wire is installed, sealed, tested, and accepted. Sealer, sealer accelerant or retarder shall be incidental to this item.

Loop detector wire routed through the rotary drill penetration is considered incidental to the cost of the loop installation.

Conduit and associated home-run cable between the junction well and cabinet will be measured and paid for under their respective items, separate from this specification.

Splicing of the loop detector wire to a home-run cable in a junction well shall be incidental to the cost of the loop wire.

**Basis of Payment:**

The quantity of loop detector wire supplied and installed will be paid for at the Contract unit price per linear foot, determined by measuring the footage of sawcut described above. Price and payment shall constitute full compensation for “wet”-sawcutting, furnishing and placing all materials including loop detector wire, backer rod, sealer, drilling required for installation, concrete and pavement patching, sealing the conduit ends, internal bushings shown on the plans, and for all labor, equipment, tools, and splicing in the junction well.

The price bid per linear foot of this item shall also include drilling required for installation, concrete and pavement patching at the loop wire installation location, sealing the conduit ends, internal bushings shown on the plans, and all incidentals necessary to complete the item.

1/8/15

**746951 - RELOCATING POLE AND MAST ARM**

**Description:**

This work consists of removing, relocating and erecting an existing steel CVISN compliance pole and mast arm structure with antenna and control cabinet, in accordance with the location, notes and details on the Plans and as directed by the Engineer. Such work shall include the concrete foundation, excavation and backfill and temporary shoring as required and shall include all materials, labor, tools, equipment, and incidentals necessary to complete the work.

**Materials:**

**Structural**

Anchor Ring Plate: ASTM A 709, Grade 36

**Fasteners**

Anchor Bolts: ASTM F 1554, Grade 55

Anchor Nuts: ASTM A 563, Grade DH or ASTM A 194, Grade 2H

Anchor Washers: ASTM F 436

Connection Bolts: ASTM A 325

Heavy Hex Nuts: ASTM A 563, Grade DH or ASTM A 194, Grade 2H

Washers: ASTM F 436

**Finish**

Structural: Galvanized finish ASTM A 123

Fasteners and anchor bolts: Galvanized finish ASTM A 153

Galvanizing shall comply with ASTM A 143 and A 385

**Foundations & Concrete Maintainer Pad**

Concrete: Class B per Sections 602 and 812, except for tremie method use concrete with a slump of 6 inches  $\pm$  1 inch.

Reinforcement: Section 603.

**Construction Methods:**

**General**

The CVISN antenna and pole mounted control cabinet shall be carefully removed from the pole to avoid any damage. The steel pole and mast arm structure shall be carefully dismantled and all members including bolts, nuts, and all related hardware shall be stored for reuse. Rusted or damaged bolts and nuts shall be replaced in kind and shall conform to the requirements of Section 605 of the Standard Specifications.

Should any damage occur to the pole, mast arm, antenna unit, or control cabinet, and in the opinion of the Engineer adequate precaution was not exercised by the Contractor during the relocation operation, the Contractor shall at his expense replace the damaged units in kind or better as determined by the Engineer.

### Foundations

Prior to excavation for the foundation, the contractor shall obtain the Engineer's approval regarding the location.

The pole shall not be erected upon the completed footing until authorized, but the minimum time allowed for the hardening of the concrete before any load is placed thereon shall be 7 calendar days.

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.

The top surface of the concrete caisson shall be leveled off at a distance below the bottom of the base plate so as to provide room for the lower leveling nuts and washers as shown on the Plans. The distance between the bottom of the leveling nuts and the top of the concrete caisson shall not exceed one bolt diameter. The top surface of the concrete caisson shall be edged and have a broom finish.

Ground the pole using a #2 AWG ground wire connected to the grounding stud and ground rod in the junction well.

The reinforcing steel shall be placed so that the outer edges of the reinforcing cage are located so as to provide the clear dimension shown on the Plans.

### Shop Drawings

Shop drawings shall be submitted in accordance with subsection 105.04 of the Standard Specifications. Shop drawings shall be submitted for the formwork, caisson shells and the reinforcement steel associated with the concrete caisson.

### Formwork

All formwork shall conform to the requirements of Section 602 of the Standard Specifications.

### Excavation

Excavate to the dimensions and elevations indicated, or required by the site conditions. Unless otherwise indicated, bore shafts for vertical caissons, plumb, to a tolerance equal to 2% of the caisson length. However, do not place the top of shafts out of the indicated position by more than 3 inches. When bells are required, excavate to form a bearing area of the size and shape indicated. Blasting not permitted.

If satisfactory foundation materials are not encountered at indicated elevations, drill deeper, as directed by the Engineer.

Use shells for shaft excavations to prevent caving of the material or to prevent water seepage. For space outside of shells left in place, fill with concrete.

If caving conditions or excess ground water is encountered, no further drilling will be allowed until a construction method is employed which satisfactorily prevents caving. Drilling in a mud slurry without removal of cuttings or using other construction methods that can not control the size of excavation will not be permitted.



### Tolerance

Rock projecting 3 inches or more into the designated area shall be removed.

### Inspection

Do not place concrete until the foundation material at the bottom of caissons has been inspected and accepted by the Engineer. Place the concrete in the caisson as soon as possible after the inspection. If visual inspection cannot be made, because of inability to dewater the caissons using acceptable pumping methods, provide drilling logs and screenings to the Engineer for determining the quality of the foundation material.

### Concrete

Mix, place, consolidate, and cure the concrete, as specified in Sections 602 and 812. Keep the excavation free from accumulated seepage water and loose material, until the concrete is placed. If the Engineer determines that the leakage of water makes it inadvisable to place concrete in the dry, fill the caisson to the top with clean water and place the concrete by the tremie method, to the cut-off elevation, in one continuous operation. Submit details of the method to the Engineer for review and acceptance.

Pumping will be permitted as an alternative to the tremie method, provided the Contractor can satisfactorily document or demonstrate that he has the required experience and is qualified to use the pumping method.

### Reinforcement Bars

All reinforcing steel shall be placed in conformance with the requirements of Section 603 of the Standard Specifications. Do not place reinforcement bars until immediately before starting concreting operations.

### Drilling Caissons, Shaft Section

If the top of shaft elevation is below ground level at the time the concrete is placed, provide an oversized casing, from ground elevation to a point below the top of the shaft, to prevent any extraneous material from falling into the freshly placed concrete.

When shells are used, withdraw each section in partial stages, except the last section, as the concrete is deposited, at a rate which keeps the bottom of the shell below the top of the fresh concrete, provided there are no indications of reduction in shaft cross section due to lateral pressure. As the shells are being withdrawn, thoroughly work and consolidate the concrete to a point 2 feet below the indicated top of shaft elevation. Place the concrete in each shaft in one continuous operation. If cavities or unstable material are encountered and the danger exists of losing concrete or of the concrete becoming mixed with extraneous material, cut off the shells and leave them in place, or place separate shells as directed.

### Erection

Poles shall be erected in position to engage the leveling nuts on the anchor bolts above the top of the concrete cap or barrier.

The installation and tightening of the anchor bolts shall be performed in strict conformance with the sequence outlined in Appendix A, Part 1 and 2, Section 5.2 of the National Cooperative Highway Research Program (NCHRP) Report 469 – Fatigue Resistance Design of Cantilevered Signal, Sign and Light Supports.

### Re-Installation

Upon re-installing the control cabinet and CVISN antenna verify that the communication and power system is fully operational and properly installed.

Removal of Existing Foundation

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

**Method of Measurement:**

The quantity of relocating pole and mast arm will be measured as the actual number of poles relocated and accepted.

**Basis of Payment:**

The quantity of relocating pole and mast arm will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for relocating the existing pole and mast arm, constructing a new foundation, for furnishing all materials such as concrete, anchor bolts, new hardware if required, for excavation and backfill in accordance with Section 207, installing and subsequent removal of temporary sheeting, if required, constructing the foundation to the line and grade shown on the Plans, disposal of the surplus materials, removal of the existing foundation, grading and seeding of the existing area, for all labor, equipment, tools and incidentals necessary to complete the work.

8/29/12

**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

**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:

<b>% BY WEIGHT</b>		
	<b>WHITE:</b>	<b>YELLOW:</b>
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<sub>2</sub> (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  $\pm 5$  °F. (23  $\pm 3$  °C).

- a. Color. The white epoxy composition when applied at a minimum wet film thickness of 20 $\pm$ 1 mils (500  $\mu$ m) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

The yellow epoxy composition when applied at a minimum wet film thickness of 20 $\pm$ 1 mils (500  $\mu$ m) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

- b. Directional Reflectance. The white epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 84% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

The yellow epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 55% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

- c. Drying Time (Laboratory). The epoxy composition, when mixed in the proper ratio and applied at a 20 $\pm$ 1 mils (500  $\mu$ m) minimum wet film thickness, and immediately dressed with large reflective glass spheres (Federal Spec. Type 4) at a rate of 12 lb/gal (1.4 kg/l) of epoxy pavement marking materials, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 lb/gal (1.4 kg/L) of epoxy pavement marking material, shall exhibit a no-track

condition in 15 minutes or less (ASTM D711). A Bird Applicator or any other doctor blade shall be used to produce a uniform film thickness.

- d. Drying Time (Field). When installed at a minimum wet film thickness of 20+1 mils (500 or 625 um) and reflectorized with glass spheres, the maximum drying times shall correspond to these temperatures:

80°F (27°C)	10 minutes
70°F (21°C)	10 minutes
60°F (16°C)	15 minutes
50°F (10°C)	25 minutes
40°F (4°C)	45 minutes
35°F (2°C)	60 minutes

The composition shall dry to “no-tracking” in approximately 10 minutes, and after thirty (30) minutes shall show no damaging effect from traffic. Dry to “no-tracking” shall be considered as the condition where no visual deposition of the epoxy marking to the pavement surface is observed when viewed from a distance of 100 feet (30 meters), after a passenger car is passed over the line. Regardless of the temperature at the time of installation, the installation contractor shall be responsible for protection of the markings material until dry to a non-tracking state.

- e. Abrasion Resistance. The wear index of the composition shall not exceed 82 when tested in accordance with ASTM C501 using a CS-17 wheel and under a load of 1000 grams for 1000 cycles.
- f. Tensile Strength. The tensile strength of the epoxy composition shall not be less than 6000 psi (41 MPa) when tested in accordance with ASTM D638 using a Type IV specimen [0.125" ± 0.010" (3.18 ± 0.25 mm) thick]. Tests shall be conducted at an ambient temperature of 75 ± 5°F (24 ± 3°C). The testing machine shall operate at a speed of 0.20" (5.1 mm) per minute.

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing, shall not be less than 24 hours nor more than 96 hours.

Test specimens for tensile strength determination will be prepared as follows:

A 1/8 inch (3 mm) thick sheet of epoxy material is cast from a reservoir-type mold, fabricated from polytetrafluorethylene (PTFE), 1/8" deep x 10" x 10" (3 mm deep x 250 mm x 250 mm).

Prior to casting, the mold is sprayed with a suitable release agent. A sufficient amount of epoxy composition is mixed in the proper proportions (A:B) and poured level with the top of the mold. Care should be taken so as not to decrease or exceed the 1/8" (3 mm) thickness.

After a period of 1 to 4 hours, the material will have set into a semi-rigid sheet that is flexible enough to die-cut yet rigid enough to retain its shape. While the material is in this “plastic” state, five (5) specimens shall be die-cut and then placed on a flat, smooth, PTFE surface for the completion of the specified conditioning period.

- g. Compressive Strength. The compressive strength of the epoxy composition shall not be less than 12,000 psi (83 MPa) when tested in accordance with ASTM D695 except that a compression tool shall not be necessary. The test specimen shall be a right cylinder [0.50 inch diameter by 1.0 inch length (12 mm diameter by 25 mm length)]. Tests shall be conducted at an ambient temperature of 75 ± 5°F (24 ± 3°C).

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing shall not be less than 24 hours nor more than 96 hours.

Test specimens for compressive strength determinations will be prepared as follows:

Five molds will be prepared from 1/2" (12 mm) I.D., 1/16" (1.5 mm) wall thickness acrylic tubing, cut in 1 1/2" (38 mm) lengths. After spraying the inside of the mold with a suitable release agent,<sup>(1)</sup> 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>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>
#20 (850µm)	0	100
#30 (600µm)	5-25	75-95
#50 (300µm)	40-65	15-35
#100 (150µm)	15-35	0-5
Pan	0-5	

Type 4 Large Spheres

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

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

Type IV glass spheres shall be treated with an adhesion coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from



dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The adhesion coating property of the Type IV beads shall be tested in accordance with the dansyl-chloride test.

C. Black Epoxy Contrast Markings

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

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

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

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

D. Black Aggregate

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

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

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

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

E. Packaging and Shipment

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

- a. Name of Product
- b. Lot Number
- c. Batch Number
- d. Test Number
- e. Date of Manufacture
- f. Date of expiration of acceptance (12 months from date of manufacture)
- g. The statement (as appropriate)

Part A - Contains Pigment & Epoxy Resin

Part B - Contains Catalyst

- h. Quantity
- i. Mixing proportions, Application Temperature and Instructions
- j. Safety Information
- k. Manufacturer's Name and Address

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

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

Epoxy Application Equipment:

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

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

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

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

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

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

simultaneous sequence of operations as described below in Construction Details, D. Applications of Epoxy Reflectorized Pavement Markings of this Special Provisions.

**Construction Details.**

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

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

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

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

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

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

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

- C. Surface Preparations: The Contractor shall clean the pavement or existing durable marking to the satisfaction of the Engineer.

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

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

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

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

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

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

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

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

Black epoxy contrast pavement markings shall be applied at a minimum uniform thickness of 20 mils (500  $\mu\text{m}$ ) on all Portland cement concrete surfaces followed by a single drop of graded black aggregate.

The width of black epoxy line shall be applied for the following situations:

Center Skip Line - On Portland cement concrete pavements a black contrast skip line shall be 10 feet (3 m) in length of the same width as the white epoxy reflectorized skip. It is to lead the white skip and stop at the beginning of the white skip. The black contrast skip is to have a single application of graded black aggregate.

Edge Lines - 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  $20 \pm 1$  mils (500  $\mu\text{m}$ ) as applicable] and line widths; insufficient glass bead coverage or inadequate glass bead retention.

Repair Method: Prepare the surface of the defective epoxy marking by shot blasting, sand blasting, or water blasting. No other cleaning methods will be allowed. Surface preparation shall be performed to the extent that a substantial amount of the reflective glass spheres are removed and a roughened epoxy marking surface remains.

Immediately after surface preparation remove loose particles and foreign debris by brooming or blasting with compressed air.

Repair shall be made by re-striping over the cleaned surface, in accordance with the requirements of this specification and at a full  $20 \pm 1$  mils (500  $\mu\text{m}$ ) minimum line thickness as applicable.

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

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

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

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

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

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

3. Reflectivity for epoxy resin paint.

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

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

White 450  
Yellow 325

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

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

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

**Method of Measurement:**

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

**Basis of Payment:**

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 3", 4", 5", 6", 8", 9", 10", 12", 14", 16" (75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 225 mm, 250 mm, 300 mm, 350 mm, or 400 mm) line and the Contract unit price per square foot (meter) of symbol. The quantity of permanent pavement marking (white, yellow, or black epoxy resin paint) will be paid for at the Contract unit price per linear foot (meter) of line and the Contract unit price per square foot (meter) of symbol. Price and payment shall include striping layout, cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

**NOTE:**

For information only:

The following manufacturers are known to us which manufacturer Epoxy Resin Paint for Pavement Striping. The Department does not endorse or require the use of any of the manufacturers listed below. However, a bidder wishes to use another manufacturer's product, it shall be submitted for review and approval prior to submitting a bid proposal. Should the product be deemed unacceptable by the Department, the successful bidder will be required to use only an approved product.

1. POLY CARB, Inc.  
33095 Bainbridge Road  
Solon, Ohio 44139  
Tel. 1-800-CALLMIX
2. IPS - Ennis Paint  
P.O. Box 13582  
Research Triangle Park, North Carolina 27709  
Tel. 1-877-477-7623
3. Epoplex  
One Park Avenue  
Maple Shade, NJ 08052  
Tel. 1-800-822-6920
4. Or an approved equal.

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  $[(\text{mcd} \cdot \text{ft}^{-2}) \cdot \text{fc}^{-1}]$ . The metric equivalent shall be expressed as millicandelas per square meter per lux  $[(\text{mcd} \cdot \text{m}^{-2}) \cdot \text{lx}^{-1}]$ .

Retroreflectance values shall be measured under dry conditions in accordance with the testing procedures of ASTM D4061. Retroreflectance values shall be measured under wet conditions in accordance with ASTM

E2176 or ASTM E2177. Wet retroreflectance values measured under a “condition of continuous wetting” (simulated rain) shall be in accordance with ASTM E2176. Wet retroreflectance values measured under a “condition of wetness” shall be in accordance with ASTM E2177.

<b>Table 1</b>		
<b>Expected Initial <math>R_L</math> under dry, wet, and rainy conditions</b>		
<u>White</u>	<u>Dry</u>	<u>Wet &amp; Rainy</u>
Entrance Angle	88.76°	88.76°
Observation Angle	1.05°	1.05°
Retroreflected Luminance	500	250
$R_L [(mcd \cdot m^{-2}) \cdot lx^{-1}]$		
<u>Yellow</u>	<u>Dry</u>	<u>Wet &amp; Rainy</u>
Entrance Angle	88.76°	88.76°
Observation Angle	1.05°	1.05°
Retroreflected Luminance	300	250
$R_L [(mcd \cdot m^{-2}) \cdot lx^{-1}]$		

**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.

<b>Warranty Periods</b>		
<b>Application</b>	<b>Dry Retroreflectivity Warranty Period</b>	<b>Wet Retroreflectivity Warranty Period</b>
Longitudinal Markings	4 years	2 years
Symbols and Legends	2 years	1 year

**748525 - TEMPORARY MARKINGS, TAPE, 4"**  
**748526 - TEMPORARY MARKINGS, TAPE, 6"**  
**748527 - TEMPORARY MARKINGS, TAPE, WORDS/SYMBOLS**  
**748570 - TEMPORARY MARKINGS, TAPE, 5"**

**Description:**

This work shall consist of furnishing, installing, removing or obliterating pavement markings in work zones in accordance with this provision and in reasonably close conformity with the dimensions and lines shown on the plans or established by the Engineer.

**Materials:**

The markings shall consist of white or yellow retro reflective pavement marking on a conformable backing.

The quality of the pavement marking shall be such that the performance requirements for the marking shall be met.

The markings shall be precoated with a pressure sensitive adhesive and shall be capable of being adhered to Asphalt concrete or Portland cement concrete at temperatures as low as 50°F (10°C) in accordance with the manufacturer's recommendations. A surface preparation adhesive recommended by the manufacturer shall be used for all applications to improve initial and long term adhesion.

When stored in a cool dry area indoors, the materials shall be suitable for use for one year after the date of purchase.

**Classification:**

The removable retro reflective pavement marking tape must be designed and constructed in such a manner that it can be readily removed when the markings are no longer applicable. The tape shall be capable of performing for the duration of a normal construction season and shall then be capable of being removed intact or in large pieces. The tape shall be wet and dry reflective throughout its useful life. (A normal construction season is defined as the time after the last snowplowing in the spring and before the first snowplowing in the fall/winter. In non-snow removal locations, a normal construction season is limited to the calendar year at the time of installation.)

**Requirements:**

Composition

The removable, retro reflective pavement markings shall consist of a highly reflective white or yellow enclosed lens pavement marking with a thin, flexible, conformable backing which is precoated with a pressure sensitive adhesive.

Retro reflectance

The enclosed lens white and yellow pavement markings shall have the initial minimum retroreflectance values as shown in Table 1 under dry, wet, and rainy conditions at 1.05° observation angle and 88.76° entrance angle. These angles represent a simulated driver viewing geometry at 30 meters distance. The photometric quantity to be measured shall be the coefficient of retroreflected luminance ( $R_L$ ), and shall be expressed as millicandelas per square meter per lux  $[(\text{mcd} \cdot \text{m}^{-2}) \cdot \text{lx}^{-1}]$ . The English equivalent shall be expressed as millicandelas per square foot per foot candle  $[(\text{mcd} \cdot \text{ft}^{-2}) \cdot \text{fc}^{-1}]$

Retroreflectance values shall be measured under dry conditions in accordance with ASTM E-1710. The angular aperture of both the photoreceptor and light projector shall be 6 minutes of arc. The reference center shall be the geometric center of the sample, and the reference axis shall be taken perpendicular to the test sample.

Values measured under wet conditions shall be measured in accordance with ASTM E 2176 or ASTM E 2177 using a portable retroreflectometer. Wet retroreflectance values measured under a “condition of continuous wetting” (simulated rain) shall be in accordance with ASTM E 2176. Wet retroreflectance values measured under a “condition of wetness” shall be in accordance with ASTM E 2176.

Visually, the reflective performance shall be similar whether the material is dry or wet.

Table 1: Minimum initial $R_L$ under dry, wet and rainy conditions		
	White	Yellow
Entrance Angle	88.76°	88.76°
Observation Angle	1.05°	1.05°
Retroreflected Luminance (Dry Conditions)	800	500
Retroreflected Luminance (Wet Conditions)	400	350
$R_L [(mcd \cdot m^{-2}) \cdot lx^{-1}]$		

#### Removability

The marking film shall be removable from Asphalt concrete and Portland cement concrete intact or in large pieces, at temperatures above freezing without the use of heat, solvents, grinding or blasting without permanently scarring the roadway surface.

#### Skid Resistance

The surface of the markings when new provides an average skid resistance value of 50 BPN when tested according to ASTM E 303.

#### Color

The x,y chromaticity co-ordinates for dry markings shall lie within the regions defined by the following corner points:

	1		2		3		4	
	x	y	x	y	x	y	x	y
White	0.355	0.355	0.305	0.305	0.285	0.325	0.335	0.375
Yellow	0.560	0.440	0.460	0.400	0.420	0.440	0.490	0.510

#### Daytime appearance<sup>1</sup>

The appearance of the marking in daylight or under road lighting conditions can be determined by measuring the reflection in diffuse conditions. The luminance coefficient in diffuse illumination (Qd) is measured using a portable Qd reflectometer incorporating “30 meter” geometry. The Qd shall be greater than 130 [(mcd · ft<sup>-2</sup>) · fc<sup>-1</sup>] when newly applied.

**Note:** The luminance coefficient (Qd) under diffuse illumination represents the brightness of a road marking as seen by drivers of motorized vehicles in typical or average daylight or under road lighting conditions.

<sup>1</sup>Reference CEN Standard EN 1436.

**Construction Methods:**

Pavement markings in work zones shall be placed in accordance with the following provisions:

At the end of each day's work, pavement markings shall be in place on each paving lift that is open to normal traffic flow. Materials requiring removal shall be specified above, and marking configurations shall be in accordance with the Manual on Uniform Traffic Control Devices.

The pavement markings shall be maintained and replaced by the Contractor without additional compensation until they have served their purpose, at which time the contractor will be required to remove them.

Pavement markings shall be applied to clean dry surfaces in accordance with the manufacturer's installation instructions or a method approved by the Engineer.

**Method of Measurement:**

Linear pavement markings will be measured in linear feet complete-in-place for the width specified.

Removal or obliteration of pavement markings in construction work zones will not be measured for payment, but shall be considered incidental to the work.

**Basis of Payment:**

Retro reflective pavement markings will be paid for at the contract unit price, which price shall be full compensation for cleaning and preparing the pavement surface, for furnishing and placing all materials, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Marking, Tape, linear	Linear Foot
Temporary Marking, Tape, words/symbol	Square foot

2/17/14

**748530 - REMOVAL OF PAVEMENT STRIPING**

**Description:**

This work consists of removing pavement markings of all kinds including paint, tape, etc., in accordance with this special provision, notes on Plans and/or as directed by the Engineer. The Contractor shall coordinate with the Engineer for maintaining traffic during the operation, prior to starting the work.

**Materials and Construction Methods:**

**Paint and Epoxy Resins:**

Shot/abrasive grit blasting or water blasting equipment shall be used for removal of markings from pavement surfaces.

**Alkyd Thermoplastic:**

In addition to the removal techniques discussed for paint and epoxy, burning or grinding (erasing machines) equipment may also be used for removal of markings from pavement surfaces.

The removal operation shall be performed in a manner that will not damage the pavement surface.

The Contractor shall collect and dispose of all shot/abrasive grit and pavement marking materials removed from the pavement surface. Washing or sweeping such material to the roadside will not be permitted.

After removal of striping on bituminous concrete, approved flat black paint or asphalt sealer shall be used to cover any exposed aggregate or embedded paint at no additional cost.

**Method of Measurement:**

The quantity of pavement striping removal will be measured as the number of square feet 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 for "Removal of Pavement Striping". Price and payment shall be full compensation for furnishing all materials, removing the pavement markings, disposing of the removed marking material, covering up the exposed aggregate, and for all labor, equipment, tools and incidentals necessary to complete the work.

**Note:**

There will be no measurement and payment for removal of pavement markings placed incorrectly by the Contractor.

01/09/06

- 748541 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
4"
- 748542 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
6"
- 748543 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
8"
- 748544 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
12"
- 748545 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
16"
- 748546 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
SYMBOL/LEGEND
- 748553 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
BIKE SYMBOL
- 748554 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
PEDESTRIAN SYMBOL
- 748555 - PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS,  
HANDICAP SYMBOL

**Description:**

This work consists of furnishing and installing preformed retroreflective thermoplastic pavement marking with a preapplied Federal Specification Type IV glass bead coating throughout its entire cross section on bituminous asphalt pavement at the locations and in accordance with the patterns on the Plans, or as directed by the Engineer.

The preformed retroreflective markings shall conform to the size and dimensions as shown in the Federal "Standard Highway Signs" book found at: <http://mutcd.fhwa.dot.gov/SHSe/pavement.pdf> as referred to in the Delaware Manual on Uniform Traffic Control Devices, Part 3, Markings.

**Materials:**

**General:** Only materials listed on the Department's Approved Pavement Markings Material List will be used for this item. The preformed retroreflective markings shall be fusible to bituminous asphalt pavement by means of the normal heat of a propane type of torch. Adhesives, primers or sealers are not necessary prior to the preformed retroreflective markings application on bituminous asphalt pavement.

The preformed retroreflective markings shall conform to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics and be capable of fusing to itself and previously applied worn hydrocarbon and/or alkyd thermoplastic pavement markings.

The preformed retroreflective markings shall be capable of application on bituminous asphalt pavement wearing courses during the paving operation in accordance with the manufacturer's instructions. After application the markings shall be immediately ready for traffic. The preformed retroreflective markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

The preformed retroreflective thermoplastic markings shall not be brittle and must be sufficiently cohesive and flexible at temperatures exceeding 50°F (10°C) for one person to carry without the danger of fracturing the material prior to application.

**Composition:** The retroreflective pliant rosin ester thermoplastic pavement markings shall consist of a homogeneous mixture of high quality polymeric thermoplastic binders, pigments, fillers and glass beads. The



thermoplastic material must conform to AASHTO M249-79(86) with the exception of the relevant differences due to the material being preformed, and identified herein.

**Intermix Glass Beads:** The preformed retroreflective material shall contain a minimum of 30% glass spheres which shall conform to AASHTO M247-81 Type 1. Glass spheres shall have a minimum of 80% true spheres overall.

**Top Beads:** To provide the required retroreflectivity, the preapplied factory top coating of glass beads shall be a combination of both Federal Spec. Type IV and AASHTO M247-81 Type I beads. Federal Spec. Type IV beads shall be evenly disbursed across the entire surface of the product at a minimum rate of 4 lb. per 100 ft<sup>2</sup> and the AASHTO at 3 lb. per 100 ft<sup>2</sup>. In combination, the total glass bead coverage shall be 7-8 lb. per 100 ft<sup>2</sup>. 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. 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-applied 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" for all Longitudinal lines and a thickness of .125" 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 of cross section, at .002" thickness, when tested according to ASTM D638-76 except that a sample 6" by 1" shall be tested at a temperature between 70°F and 80°F using a jaw speed of 10" to 12" 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" sample is bent through an arc of 90 degrees at a uniform rate in 10 seconds (9 degrees per second) over a 1" mandrel, no cracking occurs in the test sample. The sample must be conditioned prior to testing at 50°F±2 degrees for a minimum of four hours. At least two specimens tested must meet the flexibility requirements at 50°F 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) in accordance to ASTM Standard Test Method

for Bond Strength of thermoplastic marking Material D4796-88. Place a coarse brick in a 400°F oven for 5 minutes. Prepare a 4 square inch test specimen. Place the test specimen on the brick and further heat in the 400°F 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  $\pm 3^{\circ}\text{F}$  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" specimen shall be applied on a coarse concrete brick. Using a Gardner Impact Tester, a 2 lb weight is dropped from a height of 80". The specimen when tested at room temperature  $73.4^{\circ}\pm 3^{\circ}\text{F}$  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' lengths up to 2' in width. The material shall be packed in suitable cartons clearly labeled for ease of identifying the contents.

### **Construction Methods:**

The markings shall be applied in strict accordance with the manufacturer's recommendations on clean and dry surfaces. Marking configurations shall be in accordance with the "Delaware Manual on Uniform Traffic Control Devices, Part 3, Markings."

The preformed retroreflective thermoplastic material shall be fusible to the pavement by means of a propane torch recommended by the manufacturer. Preheating the surface to remove any latent moisture will be done just prior to the placement and installation of the Symbol/ Legend.

No markings shall be placed when the ambient temperature is below 40°F. The material shall be kept in a location above 55°F 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 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 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 for 4", 6", 8", 12" and 16" line. The quantity of symbol/legend will be paid for at the Contract unit price per square foot. 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

**748560 - 5" PERMANENT PREFORMED PATTERNED REFLECTIVE PAVEMENT MARKINGS, MARYLAND**

**Description:**

This work consists of furnishing and applying permanent preformed patterned reflective pavement (PPPRP) markings in accordance with the details and as shown on the Plans and as directed by the Engineer, for locations in Maryland.

**Materials:**

**Permanent Preformed Patterned Reflective Pavement Marking Materials**

The material shall be capable of adhering to hot mix asphalt and portland cement concrete surfaces, and to any existing pavement markings in accordance with manufacturer's recommendations by a pre-coated pressure sensitive adhesive. A primer shall be used to precondition the surface if recommended by the manufacturer. The markings shall be capable of being inlaid in new hot mix asphalt surfaces during the paving operation.

The material shall be highly durable and retroreflective and shall be fabricated of a polymeric material designed for longitudinal and legend/symbol markings subjected to high traffic volumes and severe wear conditions, such as shear action from crossover or encroachment on typical longitudinal configurations, and where high levels of reflectivity are required to ensure the safety of the motoring public.

The material shall be of good appearance and free from cracks. Edges shall be true, straight and unbroken. Line marking material shall be in rolls having no more than three splices per 150 ft of length. All marking materials shall be packaged in conformance with accepted commercial standards and shall have a minimum shelf life of one year.

The material shall remain in place on the pavement surface without being displaced by traffic, and shall not be affected by weather conditions.

**Composition.** The material shall consist of a mixture of polymeric materials, pigments and reflective spheres distributed throughout the base cross-sectional area and reflective spheres bonded to the topcoat surface to provide immediate and continuing retroreflection.

**Restrictions.** The combined total of lead, cadmium, mercury and hexavalent chromium shall not exceed 100 ppm. Diarylde based pigments and non-leachable lead pigmentation are not acceptable. The presence of these compounds shall be tested for compliance to the specification by X-ray diffraction, ICP, or another comparable method, capable of this level of detection.

**Construction:**

**General.** PPPRP markings shall be applied in conformance with the manufacturer's recommendations or as directed by the Engineer.

On new hot mix asphalt projects, the PPPRP markings shall be inlaid into the hot surface of the top course of pavement. No top course paving shall be permitted unless the stripping crew and marking materials are at the project site.

When the Contract Documents specifies the use of PPPRP markings on concrete pavements or existing asphalt pavements, the Contractor shall use heat, solvent, or other type of adhesive primer in conformance with the manufacturer's recommendations.

PPPRP markings shall conform to pavement contours and be resistant to deformation by traffic and damage from snow removal equipment. Surface preparation, use of solvents and primers and equipment used

in the application of PPPRP markings shall conform with the manufacturer's recommendations and be approved by the Engineer. After PPPRP markings are applied, they shall be immediately ready for traffic.

**Quality Assurance/Quality Control.** At least 30 days prior to the prestripping meeting, submit in writing a proposed Quality Control Plan (QCP).

Address procedures for random sampling as specified in MSMT 729, and show how the equipment and material will be controlled to ensure conformance with the Specifications. Include the material manufacturer's application recommendations, personnel certifications, inspection and record keeping procedures, and minimum frequencies of sampling and testing as specified in MSMT 729. Detail when and how corrective action will be taken for unsatisfactory construction practices and deviations from the Specifications. Any deviation from the QCP shall be cause for immediate suspension of the marking operation. Operations shall not resume without approval.

- a. Placement.** Do not begin placement operations until the QCP is approved and a walkthrough has been performed to approve the layout with the Engineer, Contractor, and pavement marking foreman.

**Widths.** The traveled way lane widths and width of longitudinal lines shall be as specified. Lane widths shall be measured from center to center of the lane lines once a control line is established for the lane configuration of the roadway. When measurements are taken from existing longitudinal lines, the point of reference shall be the center of the single line or the center of the space between dual lines. The traveled way lane widths are in compliance when they have an acceptable appearance and are within 2 in. from the proposed lane width.

**Alignment.** Place markings in a straight and uniform manner. Lane lines are in compliance when they have an acceptable appearance and are visually in alignment, with no more than a 3/8 in. variation in any 40 ft section of traveled way. Maintain longitudinal alignment through all intersections and breaks, even though the lines themselves may discontinue. Do not apply pavement line markings over longitudinal joints; Offset the markings 2 in.

**Layout Markings.** Remove layout markings that detract from the overall appearance or function of the final markings as determined by the Engineer at no additional cost to the Administration.

- b. Certified Technicians.** Provide Administration certified technicians to perform quality control testing and sampling. The technicians shall demonstrate that they have a thorough knowledge of sampling and testing procedures as specified in MSMT 729. Perform quality control during the marking operations in conformance with the approved QCP. Identify the location of quality control tests. Should a certified technician be delinquent in any of their duties (i.e., fail to have all the proper test equipment on the site, fail to perform tests, fail to submit documents to the Engineer at the end of the day, report information that varies substantially from the Administration's results, etc.), then the technician's certification shall become invalid and a recertification shall be required. All pavement marking operations shall be suspended until the Contractor provides a certified replacement technician.
- c. Records.** Maintain complete records of quality control inspection results, including actions taken to correct problems. Submit a copy of the QC results, signed by the certified technician, daily. Identify the location of the following quality control tests:

- (1) Ambient temperature.
- (2) Pavement surface temperature.
- (3) Material temperature.
- (4) Material thickness.
- (5) Retroreflectivity.
- (6) Alignment.
- (7) Color.

**d. Quality Assurance.** The Administration will provide quality assurance by:

- (1) Conducting independent sampling and testing.
- (2) Periodically observing testing performed by the Contractor.
- (3) Directing the Contractor to take additional samples and perform additional tests at any time and at any location.
- (4) Monitoring Contractor conformance with the Quality Control Plan.
- (5) Evaluation of quality control results and testing performed by the Administration will provide the basis for final acceptance. The Administration will perform independent assurance audits to confirm and assure that both the quality control personnel's test methods and quality control test equipment are in reasonable conformity with Administration specifications.

**Cleaning Pavement Surfaces.** Pavement surfaces shall be dry and free of oil, dirt, grease, and other contaminants prior to application of pavement markings. Clean nonconforming surfaces to a width 4 to 6 in. wider than the markings.

**Application.** Refer to the following:

- (a) **Manufacturer's Recommendations.** The Contractor shall provide a copy of the manufacturer's recommendations to the Engineer, and shall follow them for the installation of the line markings.
- (b) **Adherence.** Adherence of PPPRP markings shall be randomly checked by using a paint scraper or another approved tool, which shall be held nearly parallel with the highway surface, so there is no dislodging of the tape.
- (c) **Thickness.** The finished thickness of the PPPRP markings shall have a minimum caliper of 0.060 in. at the thickest portion of the patterned cross section, and a minimum caliper of 0.020 in. at the thinnest portion of the cross section. Measurements shall be made from the top of finished pavement surface.
- (d) **Color.** The color of the markings shall match Federal Standard 595 (33538 - yellow, 37886 - white, or 37038 - black). The Contractor shall supply the specified color chips for the Engineer's use to visually determine that the PPPRP markings match the specified color.
- (e) **Retroreflectance.** Refer to MSMT 729 and the following:

**MINIMUM RETROREFLECTANCE**

<b><u>COLOR</u></b>	<b><u>RETROREFLECTIVITY</u></b>	<b><u>CORRECTIVE ACTION</u></b>
White	350 or higher	None
Yellow	250 or higher	None
White	less than 350	Necessary corrective actions, removal, replacement
Yellow	less than 250	Necessary corrective actions, removal, replacement

- (f) **Width.** Refer to *Quality Assurance/Quality Control Section (a)* above.
- (g) **Alignment.** Refer to *Quality Assurance/Quality Control Section (a)* above.
- (h) **Layout Markings.** Refer to *Quality Assurance/Quality Control Section (a)* above.
- (i) **Frictional Resistance.** The surface of the retroreflective pliant polymer shall provide a minimum initial average skid resistance value of 45 BPN when tested according to ASTM E 303.

**Quality Control Test Strip.** As specified, or as directed, place a 200 to 300 ft cumulative quality control test strip of pavement marking material that conforms to the Contract Documents at a location determined by the Engineer. Place additional control strips as directed. Authorization to proceed will be given when the quality control test strip conforms to the Contract Documents.

**Observation Period.** The Contractor shall be responsible for any defects in materials and workmanship of the PPPRP markings for a period of 180 days from the date the markings are applied and under traffic.

The Engineer will not assess time charges during the observation period provided all other work on the Contract is complete. At the end of the observation period, the Engineer will inspect the pavement marking for durability, color, reflectivity, and inform the Contractor of all pavement markings that have failed and require replacement. The pavement marking will be considered failed for any of the following conditions:

- (a) More than five percent of the substrate is exposed in any 2000 ft section of longitudinal pavement marking line.
- (b) Retroreflectance values have dropped below 300 mcd/L/m<sup>2</sup> for white or 220 mcd/L/m<sup>2</sup> for yellow.
- (c) Marking is discolored on a visual comparison with the color chips.

The Contractor shall remove and replace all failed PPPRP markings within 30 days of receiving written notification from the Engineer at no additional cost to the Administration. Work shall be in conformance with the manufacturer's recommendation and as approved by the Engineer before the project is accepted. The replacement markings shall conform to the same requirements as the original markings. If the work is not completed in this period, the Engineer will resume time charges until this work is completed.

At the end of the observation period, the Engineer will accept the work and terminate the Contractor's responsibilities upon satisfactory inspection of the PPPRP markings.

**Method of Measurement:**

Permanent Preformed Patterned Reflective Pavement Markings, Maryland will be measured per linear foot installed on the pavement and accepted in accordance with the Plans for the color and width specified.

The reflectometer will become the property of the Contractor at the completion of the project.

**Basis of Payment:**

The quantity of Permanent Preformed Patterned Reflective Pavement Markings, Maryland will be paid for at the Contract unit price per linear foot and will constitute full compensation for all pavement preparation, furnishing and placing of markings, testing, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

11/29/11

**748563 – SNOWPLOWABLE RAISED PAVEMENT MARKERS, MARYLAND**

**Description:**

This work consists of furnishing and installing new Snowplowable Raised Pavement Markers (SPRPM) and replacement components as specified in the Contract Documents or as directed by the Engineer, for locations in Maryland.

**Materials:**

**Pavement Marker Reflector Lenses.** Pavement marker reflector lenses shall conform to the requirements of D 4383 and shall be comprised of materials with adequate chemical, water and UV resistance for the intended use. The reflector lens shall contain one or two prismatic reflective faces to reflect incident light from opposite directions. The reflector lens shall be in the shape of a shallow frustum of a pyramid. The bottom of the reflector lens shall be equipped with an elastomeric pad to permit its attachment to the surface of the casting using the manufacturer's recommended adhesive. The lens faces shall provide extremely hard and durable abrasion resistant surfaces.

Pavement marker reflector lenses shall be 4.00 x 2.00 x 0.46 in. The slope of the reflecting surface shall be 30 degrees and the area of each reflecting surface shall be 1.7in.<sup>2</sup>. The outer surface of the shell shall be smooth except in identification areas.

The pavement marker reflector lens shall be imprinted with the model number and the manufacturer's name.

The following models have been tested and approved by the Administration and shall be used or an approved equal:

1. 3M Corporation - 3M Series 190 Marker RPM (05-OH)-02
2. Ennis Paint, Inc. - Ennis/Stimsonite Model C40 (v) RPM (04-OH)-03
3. Ennis Paint, Inc. - Ennis/Stimsonite Model C40 (d) RPM (04-OH)-02
4. Ennis Paint, Inc. - Ennis Model 944
5. Hallen Product, Ltd. - Ray O Lite Division, PAC Tec, Inc. RPM (05OH)-04 Model #2004

**SPRPM Casting.** Both ends of the casting shall be shaped to deflect a snow plow blade. The bottom of the casting shall incorporate two parallel keels and an accurately shaped web designed to fit into a grooved surface. Casting dimensions shall be a minimum of 9.25 x 5.86 x 1.69 in. and shall not exceed 10.5 x 7.25 x 1.69 in. The installed height shall not exceed 0.25 in. above the road surface.

The casting shall be nodular iron conforming to A 536, Grade 80-55-06, hardened to 51 to 55 R<sub>C</sub>. Recycled iron castings are prohibited. The surface of the keel and web shall be free of scale, dirt, oil, grease or any other contaminant, which may reduce its bond to the epoxy adhesive.

The casting shall be imprinted with the model number and the manufacturer's name.

The following models have been tested and approved by the Administration and shall be used or an approved equal:

1. Ennis Paint, Inc.- Stimsonite Model 96 RPMM (05-OH)-03
2. Ennis Paint, Inc. - Stimsonite Model 101 LP RPM (04-OH)-03
3. Ennis Paint, Inc. - Stimsonite Model 101 LPS
4. Ray-O-Lite - Ironstar 664 Housing
5. Hallen Products, Ltd. - Model H 1010 RPM (04-OH)-04



**Recessed Pavement Marker Adhesive.** The adhesive used to fasten the pavement marker lens to the pavement surface shall conform to D 4383-05 Table X1.4.2.3 M 237 Type II. Rapid Set Type adhesives shall not be used.

**Casting Adhesive.** The epoxy adhesive used to fasten the castings to the pavement surface shall conform to D 4383-05 Table X1.1.

**Reflector Lens Adhesive in Casting.** The adhesive used to fasten the reflector lens to the casting shall conform to the manufacturers' recommendations.

**Construction:**

Snowplowable Raised Pavement Markers shall be installed and located as specified in the Contract Documents and in conformance with the Maryland Manual of Uniform Traffic Control Devices (MdMUTCD).

**General Installation Requirements.** The Contractor shall install the SRPM no later than two weeks after the completion of the final surface or as directed by the Engineer.

At the time of installation, the road surface and ambient temperature shall be as specified in the manufacturers' recommendations. Installing markers on wet pavement surfaces as determined in MSMT 729 is prohibited.

At the time of installation, the Contractor shall have on the jobsite all the materials necessary to complete the installation.

The quality control test strip containing a minimum of 10 groove cuts spaced as specified in the Contract Document shall be constructed to verify the accuracy and ability of the equipment and personnel. The contractor shall replace at no additional cost to the Department any incorrect groove cuts and any incorrect casting placements within the test strip.

At the time of installation, SRPM castings delivered with Pavement Marker Reflector Lens affixed should be free of dirt, dust, oil, grease, rust, moisture, or any foreign matter that will impair adhesion to the pavement. Any residual material that inhibits retroreflectivity of the reflector lens shall be removed without damage to the lens surface. It shall be the contractor's responsibility to clean each contaminated casting by sand blasting, wire brushing or other procedure approved by the Engineer to remove all foreign matter prior to installation. The use of chemicals to remove rust from the castings is prohibited.

The Contractor shall replace at no additional cost to the Department any incorrect groove cut and any incorrect casting placement. An additional test strip may be required by the Engineer in the event of incorrect installations. Incorrect installations, as determined by the Engineer, shall be corrected and repaired by the contractor at no additional cost to the Department.

**Pavement Marker Reflector Lens.** Reflector lenses for pavement markers shall be the same color as the adjacent pavement marking except the back side shall be as follows;

One-Way Applications: The backside for One-Way Markers shall be red or blank as specified in the Contract Documents or as directed by the Engineer.

Two-Way Applications: The backside for Two-Way Markers shall be the same color as the adjacent pavement marking.

The pavement marker reflector lens shall be imprinted with the model/batch number and the manufacturer's name.

**New Installation.** The SRPM shall be installed in accordance with manufacturer's recommendations and D 4383. The installed height shall not exceed 0.25 in. above the road surface. The surface of the keel and web

shall be free of scale, dirt, oil, grease or any other contaminant which may reduce its bond to the epoxy adhesive. All requirements of the manufacturer's installation instructions shall be met.

The groove cut for the casting shall be the appropriate dimensions to allow 0.125 in. movement side to side of the casting. All leveling lugs on the casting must contact the pavement. The leading and trailing edges of the casting must lie below the pavement surface and the casting properly seated. All other requirements of the manufacturer's installation instructions shall be met.

Lenses used shall be of a type specifically manufactured and approved for use as SRPM reflector lenses. Lenses that are manufactured exclusively for recessed pavement markers are not permitted as substitutes for SRPM reflector lenses.

**Observation Period.** The Contractor shall replace at no additional cost to the Department, any SRPM or Pavement Marker Reflector Lenses found to be damaged, non-retroreflective, or missing due to improper installation or manufacturing defects within 180 days after opening to traffic.

**Material Shipment.** The components shall be shipped in containers sealed by the manufacturer. The label on each container shall include the following information:

- a. Manufacturer's Name.
- b. Place of Manufacture.
- c. Color of Material and Component Type.
- d. Date of Manufacture (month-year).
- e. Batch and Lot Identification Number.
- f. Size/quantity of lot represented.

**Method of Measurement:**

Snowplowable Raised Pavement Markers, Maryland, will be measured as the number of snowplowable raised pavement markers furnished, installed and accepted in Maryland.

**Basis of Payment:**

The quantity of Snowplowable Raised Pavement Markers, Maryland, will be paid for at the Contract unit price for each Snowplowable Raised Pavement Markers, Maryland. Price and payment will constitute full compensation for all pavement preparation, furnishing and placement of SPRPM's including casting, reflector, adhesive and grooving, testing, removal, groove cutting, repair and all materials, labor, equipment, tools and all incidentals necessary to complete the work.

11/29/11

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

**Description:**

This work consists of furnishing all materials, fabrication, and erection of new extruded aluminum sign panels, complete with demountable copy, connections to supports, and other incidentals as are shown on the Plans, or described in the special provisions to be used for all federally funded projects.

The item shall also include removing and transporting of the existing sign panels before fabricating and erecting new sign panels, if such requirement is specified on the Plans.

**Design:**

Sign panels and their connections to supports shall be designed for applicable loadings and allowable stresses specified for supports. All panels, stiffeners and subframing shall conform with any pertinent requirements set forth in the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals" with subsequent revisions. No method of stiffening will be allowed which would require rivets, bolts, screws, or nuts perforating the message face. The Contractor shall submit detail drawings showing the details for fabrications of the panels and support connections for prior approval.

**Extruded Aluminum:**

Extruded aluminum sign panels shall have demountable copy. After installation of the signs is completed, they will be inspected. If specular reflection is apparent on any sign, its positioning shall be adjusted by the Contractor, as directed by the Engineer.

Sign Panel Size: Sizes of sign panels having demountable copy have been based on the 3M Company spacing charts. All letters shall be placed in accordance with manufacturer's spacing charts. Overall horizontal and vertical dimensions shall be in 6" increments.

**Materials:**

The overhead sign sheeting shall be wide angle, prismatic, retroreflective sheeting. The coefficients of retroreflection,  $R_A$ , shall not be less than the minimum values specified in the following table when tested in accordance with ASTM E 810. This table contains "core" values as found in ASTM D 4956. The 0.1 observation angle is not required for this item.

Minimum Coefficient of Retroreflection  $R_A$   
 (Candelas per lux per square meter)

TABLE 3 Type IX Sheeting <sup>A</sup>							
Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue
0.1° <sup>A</sup>	-4°	660	500	250	66	130	30
0.1° <sup>B</sup>	+30°	370	280	140	37	74	17
0.2°	-4°	380	285	145	38	76	17
0.2°	+30°	215	162	82	22	43	10
0.5°	-4°	240	180	90	24	48	11
0.5°	+30°	135	100	50	14	27	6.0
1.0°	-4°	80	60	30	8.0	16	3.6
1.0°	+30°	45	34	17	4.5	9.0	2.0

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

<sup>B</sup> Values for 0.1° observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

The ground mounted sign sheeting shall meet or exceed the following values. The coefficients of Retroreflection shall be determined in accordance with ASTM E-810. This table contains “core” values as found in ASTM D 4956. The 0.1 observation angle is not required for this item.

Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue	Brown
0.1° <sup>B</sup>	-4°	300	200	120	54	54	24	14
0.1° <sup>B</sup>	+30°	180	120	72	32	32	14	10
0.2°	-4°	250	170	100	45	45	20	12
0.2°	+30°	150	100	60	25	25	11	8.5
0.5°	-4°	95	62	30	15	15	7.5	5.0
0.5°	+30°	65	45	25	10	10	5.0	3.5

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

<sup>B</sup> Values for 0.1° observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

**WARRANTY**

The sheeting manufacturer shall submit with each lot or shipment, a certification that states the material supplied will meet all the requirements listed herein.

**Field Performance Requirements:**

The retroreflective sheeting will be considered unsatisfactory if it has deteriorated due to natural causes to the extent that: (1) the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions; or (2) the coefficient of retroreflection is less than the minimum specified for that sheeting during that period listed.

- 85% of values listed in Table 7 Type III after 10 years
- 80% of values listed in Table 3 Type IX after 12 years.

All measurements shall be made after sign cleaning according to sheeting manufacturer’s recommendations.

**Sheeting Manufacturer’s Replacement Obligation:**

Where it can be shown that retroreflective signs supplied and used according to the sheeting manufacturer’s recommendations, have not met the performance requirements of this specification the sheeting manufacturer shall cover restoration costs as follows for sheeting shown to be unsatisfactory during:

The entire 12 years (Type IX) and 8 years (Type III): the sheeting manufacturer will replace the sign in it's entirety inclusive of the sign panel, sign sheeting, labor, and M.O.T required to restore the sign surface to its original effectiveness.

**Extruded Aluminum:**

**Extruded Aluminum Sign Panels and Edge Strip.** Extruded aluminum sign panels and edge strip shall conform to B221, alloy 6063 T6.

**Hardware:** hardware shall be clear anodized, conforming to one of the following: B209, alloy 2024 T4; B211, alloy 2024 T4, 6262 T9, 6061 T6, 7075 T6 or 2017 T4.

**Extruded Aluminum:**

The front faces of the sign panels shall be degreased by one of the following methods:

1. Vapor degreasing by total immersion in a saturated vapor of trichlorethylene or perchloroethylene. Trademark printing shall be removed with lacquer thinner or by a controlled alkaline cleaning system.
2. Alkaline degreasing by total immersion in a tank containing alkaline solutions controlled and titrated to the solution manufacturer's specification. Rinse thoroughly with clean running water.

Immersion time shall depend upon the amount of grease or dirt present and the gage of the metal, and shall be sufficient to effect complete removal of all corrosion, white rust, and dirt.

Following degreasing, the front faces shall be etched by one of the following methods:

1. Acid etching in a 6 to 8 percent phosphoric acid solution at 100 °F, or proprietary acid etching solution. Rinse thoroughly with cold, then hot running water.
2. Alkaline etching in an approved alkaline etching material that is controlled by titration. The etching time, temperature, and concentration shall be as specified by the solution manufacturer. Smut shall be removed with an acidic chromium compound type solution as specified by the solution manufacturer, and shall be rinsed thoroughly with clean running water.

The surface etch shall provide a clean mat, or non-glare finish, suitable for the application of the retroreflective sheeting. This finish shall also be suitable for the uncovered reverse sides of the signs. Any protective film or coating applied to resulting from chemical action on the aluminum surface shall be light, tight, and free from all powdery residue.

As an alternate to the above etching systems, any one of the following metal preparation systems, employing a chemical conversions coating, may be used providing it complies fully with the recommendations and specifications furnished by the respective preparation manufacturer:

1. "Alodine" 1200 or 1200S, by Amchem Products, Inc.
2. "Bonderite" 723 with Process Specification No. 249, by Parker Rust Proof Company.
3. "Chromicoat", by Oakite Products, Inc.
4. Other approved system(s), producing a conversion coat meeting the requirements of Military Specification MIL-C-5541.

Alternate coats shall be light, tight, and free from any powdery residue.

After degreasing and etching, the panels shall be dried by the use of forced, hot air.

Panels shall not be handled except by device or clean canvas gloves, from the time degreasing is started to the time of application of retroreflective sheeting, nor shall contaminants be permitted to come into contact with the panels during that period.

**Construction Methods:**

**Sign Face Finishing:** All retroreflective sheeting, backgrounds, letters, numerals, symbols, and borders shall be clean-cut and sharp, and the messages on all signs shall be as indicated on the plans. Application of retroreflective sheeting to aluminum panels shall be in accordance with sheeting manufacturer's

recommendations. Retroreflective sheeting shall be color matched and marked. The height of characters and the alphabet series to be employed for the signs shall conform to the Plans and their references. The alphabet series used on the sign panels shall be those of the publication titled "Standard Alphabets for Highways Signs" of the Federal Highway Administration.

The working drawings prepared by the Contractor shall clearly indicate the proposed spacing of the letters and the locations and arrangements of symbols and borders.

After the panel has been degreased and etched, the retroreflective sheeting shall be applied by a method described elsewhere in these Special Provisions.

No sheeting shall be applied when the temperature is less than 50 °F.

Whenever it is necessary to construct the background of a sign face with two or more pieces of retroreflective sheeting, they must be carefully matched for color prior to application and sign fabrication, to provide uniform appearance and brilliance, day and night. Each full width section of retroreflective sheeting mounted adjacent to another full width section taken consecutively from the same roll shall be rotated and mounted 180 degrees with respect to that adjacent section. This rule shall also be observed as a guide when partial width sheets of retroreflective sheeting are used.

Non-conformance may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting which will render signs unacceptable. The entire background of each sign shall be uniform in color, brilliance, texture, and general appearance as seen in the daytime and under typical automobile illumination at night. No more sections of retroreflective sheeting shall be used for backgrounds than is necessary; remnants, scraps, and odd sized pieces of sheeting shall not be used in the fabrication of any signs manufactured for this contract. Joints between retroreflective sheeting sections shall either butt or overlap no more than 3/8". Horizontal joints between retroreflective sheeting sections shall not be allowed.

Sign Panel Erection: Signs shall be slip-sheeted, packed, and shipped in such manner as to ensure arrival at their respective places of erection in an undamaged condition. All signs arriving at the erection site(s) in a condition which in the opinion of the Engineer, renders them unsuitable for use, shall be removed and replaced by the Contractor at his sole expense. Sign Panels shall not be shipped for erection in such a manner that results in horizontal joints of the retroreflective sheeting.

Signing requiring more than one sign panel conveying a singular message when mounted on a structure shall be positioned so that no vertical gap between panels is present in the final configuration. Costs for any required adjustments in this regard are incidental to Item 749500, Sign Panel.

It is not anticipated that there will be any sign panels which are required to be mounted whose messages will be inappropriate to the guiding of traffic at the time of sign erection. However, in the event that the Engineer determines that certain sign messages are inappropriate, the panels of such signs shall be covered by an opaque material, until such time as the sign messages become appropriate. The covering material and the manner of securing the material to the sign panel(s), shall meet with the approval of the Engineer. The Engineer will indicate to the Contractor which signs, if any, must be covered, and when to remove the covers.

Sign Covers: Sign covers shall be 10 ounce cotton duck conforming to ASTM D-320, Army Duck, and dyed to a dark green approximating the green for sign backgrounds.

Identification Tags: The Contractor shall furnish and place identification tags or decals which state the Contract number, month and year of erection on the lower reverse side of the panel, near the point closest to the roadway shoulder.

**Method of Measurement:**

The quantity of sign panels will be measured as the actual number of square feet of front sign face surface area of all sign panels constructed, installed and accepted. The area will be computed from the maximum width and height dimensions of each sign panel, as shown on the Plans, or on the approved sign panel shop

drawings, (verified by field measurements). All sign panels will be considered either square or rectangular in shape, as the case may be, and no area deductions will be made for rounding of corners.

**Basis of Payment:**

The quantity of sign panel will be paid for at the Contract unit price per square foot. Price and payment will constitute full compensation for furnishing, fabricating, and erecting sign panels complete in place and accepted, with retroreflective materials, copy, symbols, borders, connections to supports, degreasing, etching, covering and uncovering sign messages where necessary, and for all labor, materials, tools, equipment, and incidentals required to complete the item.

Unless otherwise indicated on the Plans, the cost of removing and transporting to the nearest highway maintenance yard the existing sign panels and accessories shall also be included under this item if such requirement is indicated on the Plans.

7/20/15

**749516 – REINFORCED CONCRETE SIGN FOUNDATION, W-6**  
**749517 – REINFORCED CONCRETE SIGN FOUNDATION, W-8**  
**749518 – REINFORCED CONCRETE SIGN FOUNDATION, W-10**  
**749519 – REINFORCED CONCRETE SIGN FOUNDATION, W-12**  
**749520 – REINFORCED CONCRETE SIGN FOUNDATION, W-14**  
**749581 - REINFORCED CONCRETE SIGN FOUNDATION, W-18**

**Description:**

This work consists of furnishing all material and installing sign foundations.

**Materials:**

Bar Reinforcement shall conform to the requirements of Subsection 603.02 of the Standard Specifications.

Portland Cement Concrete shall be Class B and shall conform to the requirements of Section 812 of the Standard Specifications.

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

Nuts, Bolts and Cap Screws shall meet AASHTO M 164 (m 164M). All nuts, bolts and cap screws shall be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per AASHTO M232/M 232M.

**Construction Methods:**

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

Excavation for the foundation may not exceed the dimension of the foundation by more than 1 foot (300 mm) in any one direction. If a form is used in the excavation more than 18 inches (460 mm) below the ground surface, it is necessary that the excavation be filled and tamped on all sides in layers not to exceed 6 inches (150 mm).

The excavated material shall be disposed of and the area shall be properly graded. After grading, the area shall be returned to its original condition around the supports with mulching, seeding or other landscaping as necessary or as directed by the Engineer.

Anchor bolts shall be set to template for alignment and elevation and shall be secured in position to prevent displacement while concrete is being placed. The steel reinforcement and conduit elbows shall have been placed and secured before the placing of concrete.

**Method of Measurement:**

The quantity of sign foundations will be measured as the number of foundations for the specified size of beam constructed in accordance with these specifications, complete in place, and accepted.

**Basis of Payment:**

The quantity of sign foundations will be paid for at the contract unit price per each foundation of the type specified. Price and payment will constitute full compensation all materials and sign foundation installation complete in place and for all labor, equipment, tools, and incidentals required to complete the work. Payment will also include returning the area around the sign post to its original conditions by mulch, seeding or other landscaping necessary.

10/27/2009



**749521 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-6**  
**749522 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-8**  
**749523 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-10**  
**749524 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-12**  
**749525 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-14**  
**749563 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-4**  
**749582 - SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-18**

**Description:**

This work consists of furnishing all materials for ground mount breakaway type sign posts and breakaway assemblies to the job order site in conformance with the details and notes shown on the Plans, and as directed by the Engineer.

**Materials:**

Structural Steel shall meet the applicable requirements of Subsection 605.02 of the Standard Specifications and AASHTO M 270/M 270M, GR36 (GR250), GR50 (GR345), or GR50W (GR 345W) as detailed on the plans. Steel posts shall be galvanized in accordance with the requirements of AASHTO M 111/M 11M.

Breakaway Couplings shall be made from alloy steel which conforms to AISI 4340, 4130 or an equivalent material, and shall have a minimum tensile yield stress of 175,000 psi (1200 MPa). The Rockwell C hardness shall be 26 minimum. The couplings shall have tensile breaking strength ranges as noted below; and shall be of the type as shown on the Plans:

Type A	17,000 – 21,000 lb (75 – 93 kN)
Type B	47,000 – 57,000 lb (209 – 253 kN)

This steel shall conform to the requirements of the current ASTM designation A-370.

The couplings shall be clean, dry and free from any foreign material and shall be primed and coated with a suitable paint which shall be baked or fused with a polyurethane additive. The color of the coating shall be as follows:

Type A	Yellow
Type B	Red

Chipped areas on the coating surface shall be repaired. All threaded surfaces, after coating, shall be cleaned to all them to function properly.

Brackets shall be made from aluminum alloy 6061 T-6 or an equivalent material. Upper brackets shall incorporate the load concentrating member or bass which shall be made from the following material:

Type A	Aluminum alloy 6061 T-6 or equivalent as part of brackets
Type B	Stainless steel 416 or equivalent ASTM A582-Rockwell C35-C45

The type of bass shall be as shown on the Plans.

Location holes for the breakaway coupling shall be accurately positioned relative to the load concentrating member in accordance with the Engineer's requirements. All Brackets shall be permanently labeled with bracket number to reflect the hole positioning.

Hinge Plates shall be made from alloy steel which conforms to AISI 4340, 4130 or an equivalent material and shall have a minimum tensile yield stress of 90,000 psi (620 MPa). The hinge plates shall have tensile breaking strength ranges as follows:

HI-10	11,450 – 13,900 lb (50.9 – 61.8 kN)
HI-1	16,400 – 19,700 lb (72.9 – 87.6 kN)
HI-2	6,700 – 8,100 lb (29.8 – 36.0 kN)

Nuts, Bolts and Cap Screws shall meet AASHTO M 164 (m 164M). All nuts, bolts and cap screws shall be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per AASHTO M232/M 232M.

**Construction Methods:**

Working Drawings. Working drawings shall be submitted in accordance with subsection 105.04 of the Standard Specifications. Minor variations in details may be permitted; however, any major departure from the design will not be accepted.

Fabrications. Loading, transporting, unloading and erection of structural materials shall be done so that the metal will be kept clean and free from injury in handling.

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

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

When sign support structures are subcontracted, the subcontract shall be in accordance with Subsection 108.01 of the Standard Specifications except that the value of the subcontract will be based on the value of the work for fabrication.

Repair Galvanizing. Galvanized areas damaged during shipping or erection shall be repaired by any of the three methods specified under ASTM A780. In all cases, the repair shall achieve the minimum coating thickness specified.

Erection. Material shall not be dropped, thrown or dragged over the ground. The Contractor shall supply detailed, written instructions and drawings for the erection of all sign structure components.

**Method of Measurement:**

The quantity of supplying ground mount breakaway type sign posts and breakaway assemblies will be measured as linear feet for the length and size of ground mount breakaway sign post furnished as specified and accepted.

**Basis of Payment:**

The quantity of supplying ground mount breakaway type sign posts and breakaway assemblies will be paid for at the Contract unit price per linear feet for the length and size of ground mount breakaway sign post specified. Price and payment will constitute full compensation for furnishing hinge plates, breakaway couplings, nuts, bolts and cap screws and all other materials for the sign posts and breakaway assemblies in accordance with the details and notes shown on the Plans, and as directed by the Engineer; and for all labor, equipment, tools and incidentals necessary to complete the work.

3/6/08

**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<sup>2</sup>)

- 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

FYG	-4	30
0.2	455	170

0.5	300	11
1	90	34

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 Retroreflective 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



**749550 - INSTALLATION OF BREAKAWAY I-BEAM SIGN POSTS**  
**749551 -REMOVAL OF BREAKAWAY I-BEAM SIGN POSTS**

**Description:**

This work consists of installing or removing breakaway I-beam sign posts and breakaway assemblies on sign bases previously installed or installed under other items in this contract.

**Materials:**

Steel I-beams and all mounting hardware to be used will be paid for under other items of this contract or may be furnished by the Department. The supply of the material will be designated in the job order. All I-beams will be cut to the correct length and marked for the area they are to be installed.

**Construction Methods:**

The I-beams are to be installed in a manner as not to damage the base that the I-beam is to be installed on and care taken to not interfere with overhead utility lines.

When re-installing an existing sign post and breakaway assemblies, removal of broken couplings and bolts in existing I-beams and removal of broken anchor bolts in existing bases shall be considered part of this item.

Where an existing sign has been knocked down, this item will pay for the repair of breakaway couplings and standing up the existing sign. No additional compensation will be made for removal or installation of sign unless a new sign is required.

In the removal of the I-beams, all hardware is to be returned to the Department at the Dover Sign Shop.

**Method of Measurement:**

The quantity of installation or removal of breakaway posts and breakaway assemblies will be measured as the number of breakaway posts and breakaway assemblies installed as specified, complete and in place, or removed and returned to the Department at the Dover Sign Shop.

**Basis of Payment:**

The quantity of installation or removal of breakaway posts and breakaway assemblies will be paid for at the contract unit price per each. Price and payment will constitute full compensations for all labor, equipment, tools, and incidentals required to complete the work.

10/26/05

**749687 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON SINGLE SIGN POST**

**Description:**

This work consists of installing or removing traffic sign(s) on a single post or other type of pole at the locations indicated on the Plans or as directed by the Engineer. This specification also includes installation of posts in boring holes constructed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than or equal to 48 inches shall be installed on multiple sign posts under Item 749690 - Installation or Removal of Traffic Sign on Multiple Sign Posts.

**Materials:**

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

**Construction Methods:**

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the Delaware MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. Signs and plaques shall be mounted no lower than the minimum mounting height specified in the Delaware MUTCD. Signs and plaques shall be mounted no higher than one foot above the minimum mounting height specified in the Delaware MUTCD. Any excess sign post protruding above the top of the top sign shall be cut off and removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. The Contractor is responsible for disposal of all signing material removed from the project

**Method of Measurement:**

The number of single sign installations or removals will be measured as the actual number of signs installed or removed and accepted.

**Basis of Payment:**

The quantity of single sign post installations or removals will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed in accordance with the Delaware MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

5/28/2013

**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 Delaware MUTCD or as directed by the Engineer. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. Signs and plaques shall be mounted no lower than the minimum mounting height specified in the Delaware MUTCD. Signs and plaques shall be mounted no higher than one foot above the minimum mounting height specified in the Delaware MUTCD. Any excess sign post protruding above the top of the top sign shall be cut off and removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. The Contractor is responsible for disposal of all signing material removed from the project..

**Method of Measurement:**

The number of sign installations or removals will be measured as the total square foot of the sign(s) installed or removed and accepted.

**Basis of Payment:**

The quantity of sign installations or removals will be paid for at the Contract unit price per square foot. Price and Payment will constitute full compensation for installing or removing signs and sign materials, pick-up and delivery of sign materials, grading disturbed areas, and for all labor, equipment, tools, and incidentals required to complete the work. Signs that are not installed accordance with the Delaware MUTCD or signs installed in the incorrect location shall be moved at no additional cost to the Department.

5/28/2013

- 753501 - INSTALLING SANITARY SEWER, PVC 8"
- 753502 - INSTALLING SANITARY SEWER, PVC 10"
- 753503 - INSTALLING SANITARY SEWER, PVC 12"
- 753504 - INSTALLING SANITARY SEWER, PVC 15"
- 753505 - INSTALLING SANITARY SEWER, PVC 18"
- 753506 - INSTALLING SANITARY SEWER, PVC 21"
- 753507 - INSTALLING SANITARY SEWER, DIP 30"
- 753508 - INSTALLING SANITARY SEWER, DIP 42"
- 753509 - INSTALLING SANITARY SEWER (FORCE MAIN), PVC 4"
- 753510 - INSTALLING SANITARY SEWER (FORCE MAIN), PVC 8"
- 753511 - INSTALLING SANITARY SEWER, DIP 4"
- 753512 - INSTALLING SANITARY SEWER, RCP 24"
- 753513 - INSTALLING SANITARY SEWER, DIP 12"
- 753514 - INSTALLING SANITARY SEWER (FORCE MAIN), PVC 6"
- 753515 - INSTALLING SANITARY SEWER (FORCE MAIN), PVC 2"
- 753517 - INSTALLING SANITARY SEWER, PVC 6"
- 753518 - INSTALLING SANITARY SEWER, DIP 6"
- 753520 - INSTALLING SANITARY SEWER, DIP 8"
- 753522 - INSTALLING SANITARY SEWER, PVC 24"
- 753524 - INSTALLING SANITARY SEWER, DIP 10"
- 753525 - INSTALLING SANITARY SEWER (FORCE MAIN), DIP 10"
- 753526 - INSTALLING SANITARY SEWER (FORCE MAIN), PVC 3"
- 753527 - INSTALLING SANITARY SEWER, DIP 24"
- 753528 - INSTALLING SANITARY SEWER, DIP 24"
- 753529 - INSTALLING SANITARY SEWER, DIP 8"
- 753530 - INSTALLING SANITARY SEWER, DIP 16"
- 753531 - INSTALLING SANITARY SEWER, RCP 30"
- 753532 - INSTALLING SANITARY SEWER, PVC 4"
- 753533 - INSTALLING SANITARY SEWER (FORCE MAIN), PVC 1 1/2"
- 753534 - INSTALLING SANITARY SEWER (FORCE MAIN), PVC 2 1/2"
- 753539 - INSTALLING SANITARY SEWER (FORCE MAIN), DIP, 4"
- 753540 - INSTALLING SANITARY SEWER (FORCE MAIN), DIP, 24"
- 753541 - INSTALLING SANITARY SEWER (FORCE MAIN), DIP, 8"
- 753542 - INSTALLING SANITARY SEWER, DIP, 18"
- 753543 - INSTALLING SANITARY SEWER (FORCE MAIN), DIP, 6"
- 754544 - INSTALLING SANITARY SEWER (FORCE MAIN), HDPE, 8"

**Description:**

This work consists of furnishing all materials including pipes with all required fittings with bends Wyes, clean-outs, etc., and installing sanitary sewer in accordance with these Special Provisions, Delaware Standard Specifications, and requirements of the Standard Specifications of the Owner of the sewer line. In case of any conflict between the notes and details on the Plans; Special Provisions; Standards and Specifications of the Owner of the Utility; the Standards and Specifications of the Owner of the Utility shall prevail. The Contractor shall obtain the Standards and Specifications of the Owner of the utility and study for materials cost before submitting the bids. The Owner could be a city, municipality or a county, and from hereafter shall be addressed as the Owner.

**General Requirements:** All work shall be subject to inspection and subsequent approval/disapproval of the Engineer and the representative of the Owner of the utility; and the Contractor shall be required to correct the discrepancies at his/her expense.

Included in this work are the connections of all existing commercial, industrial, and residential sanitary sewer services to the new sanitary sewer system. All modifications to such services, as required by the present Standards and Specifications of the Owner, and all relocations of such services necessary to avoid conflicts with

utilities and highway drainage facilities are included in the work. Since the exact locations of the conflicts cannot be determined prior to trench excavation operations, the Contractor must coordinate and schedule any required relocation efforts of each sanitary sewer connection on an individual basis with the utility Owner and the property owner.

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

Any and all emergency repairs required during the period of this Contract shall be the responsibility of the Contractor. In the event the Owner is unable to contact the Contractor for the immediate emergency repair items of work, or in the event the Contractor does not take action when contacted within a reasonable length of time, the Owner of the utility reserves the right to attend to any and all emergency repair work items and to resubmit the costs directly to the Contractor for complete payment.

**Materials:**

The requirements for the materials as applicable to the Contract are as noted below, unless otherwise stated on the Plans and/or required by the Owner of the sewer system. The Contractor shall verify the compatibility of these materials specifications with the Owner before placing order for the Contract.

The Polyvinyl Chloride Pipe (PVC pipe) suitable for non-pressure drainage of sewage and fittings shall conform to the applicable requirements of ASTM D3033 Type PSP, and/or ASTM D3034 Type PSM, and pipe shall be of SDR-35 or SDR-41 or SDR-42 of the nominal size required by the Plans and/or as required by the Owner.

PVC pipe and fittings for Force Main shall conform to the requirements of ASTM D-2241 and AWWA C 900 (SDR-14) utilizing the bell and spigot concept with a single sealing synthetic rubber gasket provided by the same manufacturer in conformance with ASTM D1859. Pressure rating of PVC pipe for force mains shall be 1034 kPa minimum.

Ductile Iron Pipe shall be centrifugally cast, and all pipe and fittings shall conform to the applicable specifications of AWWA C-151 and ANSI and shall be Class 52 for gravity and force mains unless otherwise specified on the Plans.

Reinforced Concrete Pipe shall meet the applicable requirements of Section 612 of the Delaware Standard Specifications.

All the pipe and fittings shall be free from defects, and the defective materials as determined by the Engineer or the Owner, shall be rejected and replaced.

Warning tape for sanitary sewer or force main shall be printed polyethylene plastic tape with a metallic core, manufactured specifically for warning and identification of buried utility lines. The tape shall be of a roll type, 2" (50 mm) minimum width, and color coded for sewer (green), with warning and identification imprinted in bold black letters continuously and repeatedly over entire length of tape. The code and letter color shall be permanent and unaffected by moisture and other substances contained in trench backfill materials. Imprinted on the tape shall be "Caution, Buried Sewer Line Below", or a similar message as approved by the Engineer.

Concrete for the thrust blocks and clear-outs shall meet the requirements of Section 812, Class B of Standard Specifications. Thrust blocks and clean-outs shall be constructed in accordance with the Standard Detail Drawings of the Owner or as directed.

Borrow Type C and sand for backfilling when required by the Contract and specified on the Plans shall conform to the respective requirements of Sections 210 and 804 of the Standard Specifications. Concrete required for the work shall be Class B, and shall conform to the requirements of Section 812.

Unless shown otherwise on the Plans or required by the owner, all commercial, industrial, and residential connections shall be constructed of the same class of material as the sewer mains to which they are connected. Minimum grade and size of the lateral pipes shall be as required by the Owner's Standards and Specifications.

**Construction Methods:**

All pipes shall be thoroughly cleaned before they are laid and shall be kept clean until the completed work is accepted.

The excavation and backfill for the pipe shall be performed in accordance with the applicable requirements including backfill requirements of Section 612 of the Delaware Standard Specifications, unless otherwise modified on the Plans, or in conflict with the requirements of the Owner. If there is a conflict between the Delaware Standard Specifications (including these Special Provisions) and the Specifications of the Owner of the utility, the latter will prevail. The Contractor is advised to obtain and be fully acquainted with the applicable specifications of the Owner. The pipe shall be installed at the locations and to the lines, grades, and dimensions shown on the Plans or as directed by the Engineer.

During backfill of the sewer or force main the Contractor shall install the specified warning tape at a depth of 8" (200 mm) to 12" (300 mm) below finished grade or as directed and approved by the Engineer/Owner.

No pipe shall be laid upon a foundation into which frost has penetrated nor at any time when the Engineer shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation, unless the minimum length of open trench and promptness of refilling are observed.

The Contractor shall build all future service connections to the existing houses, businesses, and others, complete to the property line, right-of-way lines or other designated points. The ends of all such service connections shall be closed with stoppers as directed and approved by the Engineer/Owner.

**Acceptance Testing:**

Prior to the request for inspection by the Engineer, it shall be the Contractor's responsibility to examine all completed pipe lines to insure that they are laid to the proper alignment and grade and free from foreign material. After this has been done to the satisfaction of the Engineer, he/she will order tests to be made on all portions of the sewers built under the Contract.

The Contractor shall cooperate and furnish all assistance necessary to perform the tests as specified herein and as further required and directed by the Engineer and the representative of the Owner.

Sanitary sewer lines shall be tested for the maximum amount of allowable leakage as specified by the Owner in the presence of the Engineer and the representative of the Owner. If a maximum leakage rate is not specified by the Owner, the allowable leakage rate will be 25 gallons per inch of diameter per mile (59 liters per 25 mm of diameter per kilometer) per day.

- A. All sewers above the ground water line with a diameter of 39" (990 mm) or less will be tested by the low air pressure method. Sewers greater than 39" (990 mm) in diameter will be tested by the exfiltration method. This test will be made by plugging the lower manhole and filling the pipe section between manholes with water until the upper manhole is filled to the top or to a level designated by the Engineer. The quantity of water leakage will be measured by the drop in the level of the water in the upper manhole.
- B. All sewers below the ground water line will be tested by the infiltration method. This test will be made by measuring the amount of water infiltration at the lower end of the pipe section at the end of the manhole stretch by means of a weir installed in the pipe or other means, as approved by the Engineer.

- C. All sewers shall be tested in individual sections or an accumulation of series of sections in lengths approved by the Engineer. If the series method is used, each section between manholes shall meet the infiltration and exfiltration requirements specified herein.

All sewers before they are tested shall be carefully plugged and backfilled to a depth not less than 2 feet (0.6 meters) above the top of the pipe. Water shall be furnished by the Contractor and maintained at such levels as directed by the Engineer for a period of at least twenty hours immediately prior to the time of the test and during the test. The Contractor shall replace or repair all defects on sections of sewers failing to meet the requirements of these tests.

For conducting low pressure test, all branch fittings and ends of lateral stubs shall be securely plugged to withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced when required.

Air shall be slowly supplied to the plugged pipe line until the internal air pressure reaches 4 psi (28 kPa) greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 psi (24 to 17 kPa). When the Owner of the utility is satisfied that the sewer main is functional, then the sewer main will be accepted.

The Contractor shall furnish all equipment and personnel to conduct the tests specified herein and/or any proposed by the Owner of the utility.

The Contractor shall not make connections to existing sanitary sewers until after the final inspection and tests have been approved. All material and labor required for tests shall be furnished by the Contractor and the cost thereof included in the prices bid for installing sanitary pipe. Water for leakage test shall be furnished by the Contractor.

**Method of Measurement and Basis of Payment:**

Payment for the item Installing Sanitary Sewer of respective diameter(s) as required by the Contract measured along the centerline from end-to-end shall be paid for at the Contract unit price per linear foot (linear meter) for "Installing Sanitary Sewer", of the size(s) and type(s) required by the Contract, which price and payment will constitute full compensation for furnishing and installing sanitary sewer pipes; bends, Wyes, clean-outs including valves and related fittings including concrete thrust blocks in the sewer line which are not covered by a separate Contract item(s); for furnishing and installing warning tape; for excavation, backfill Borrow Type C, and backfilling for pipe sizes under 24" (600 mm); for all labor, tools, equipment, and incidentals to complete the work and make the sewer system functional.

Sanitary sewer installed for services will be measured and paid for at the Contract unit price per linear foot (linear meter) for "Installing Sanitary Sewer" of the size(s) and type(s) required for the service, which price and payment will constitute full compensation for furnishing and installing sanitary sewer pipes, bends, Wyes, clean-outs including valves and related fittings; for furnishing and installing warning tape; for excavation, backfill Borrow Type C, and backfilling for pipe under 24" (600 mm) for all labor, tools, equipment, and incidentals to complete the work and make the sewer service functional.

Payment for the use of Del. No. 57 stone shall be incidental to the respective sizes of sanitary sewer installed, unless otherwise Del. No. 57 stone is a separate bid item of this Contract.

For pipe of internal diameter 24" (600 mm) and over, payment for excavation, backfill and backfilling shall be in accordance with Section 208.

7/24/02



**759506 - FIELD OFFICE, TYPE II.22 SPECIAL COMPLEX**

**Description:**

This Field Office, Type II.22 Special Complex item provides a field office complex which consists of erecting, furnishing, equipping, maintaining, and removing two (2) double wide modular office units, their entrances, and their adjacent parking areas. Equivalent rented space may be substituted for the modular offices and their parking areas as approved by the Engineer. Rented space may be no more than one and a half miles from the project limits. The Contractor shall submit a specific location layout drawing and construction details for each office unit, its entrance, and its adjacent parking area for approval by the Engineer. Each office unit and its adjacent parking area shall be for the exclusive use of Department Officials, Engineers, Consultants, and Inspectors.

Each office unit shall be free of asbestos and/or other hazardous materials. Each office unit, its entrance, and its adjacent parking area shall be constructed and installed in accordance with all applicable city, county, state, and federal codes. The Contractor shall be responsible for obtaining all required licenses and permits for installation and placement of each office unit, its entrance, and its adjacent parking area. The costs of obtaining such licenses and permits are to be incidental to the "Field Office, Type II.22 Special Complex" Item. Each office unit shall be available for use by the Department continuously throughout the duration of the project.

**Construction of and Equipment for the Office Units:**

Each office unit shall be new and have a minimum floor space of 1,200 square feet with minimum exterior dimensions of 50'-0" length by 24'-0" width. The floor to ceiling height of each office unit shall be nominal 8'-0". The exterior walls, ceiling, and floor of each office unit shall be insulated. Each office unit shall be of weather-proof construction, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, safely secured to its support if the support is an inground anchored foundation or otherwise by tie-downs to the ground, and fully skirted with rigid watertight covering overlapping the bottom of the exterior siding to the existing ground.

The Contractor shall provide entries to each office unit by constructing a stair and deck platform with canopy at each exterior door. Each entry shall have an exterior light. These entries shall be fabricated using treated dimension lumber, be constructed with hand and safety railing, be designed to last the life of the Contract, and conform to the requirements of the Architectural Accessibility Board and other federal, state and local boards, bodies and/or courts having jurisdiction in the Contract limits.

The Contractor shall construct and maintain an all-weather parking area adjacent to each office unit of at least 6000 square feet having a minimum of 16 functional parking spaces striped for full size cars. Lighting of the parking areas shall be provided. An entrance shall be constructed to each office unit from its point of access to its parking area as determined by its approved location layout drawing and construction details, the cost to be incidental to the "Field Office, Type II.22 Special Complex" Item. All weather pathways from the parking area to the entrances of each office unit shall also be constructed and maintained. This parking area and entrance pathways shall have a minimum of 2" type "C" hot mix on top of minimum 6" graded aggregate subbase. Snow and/or ice shall be removed from the entrance, the parking area, and the entrance pathways of each office unit within 12 hours after each occurrence. Costs for furnishing, placing, and maintaining the aggregate base and hot mix, and for snow and/or ice removal, to be incidental to the "Field Office, Type II.22 Special Complex" Item.

The ground area 30'-0" from around the perimeter of each office unit shall be landscaped and maintained. If the earthen grounds do not have a stand of weed free grass, the surface of this area shall be loosened to a depth of 4" and a satisfactory seedbed shall be prepared free of debris and extraneous matter. The area shall be seeded to a healthy stand of grass or sodded, after which the area shall be watered, mowed, and trimmed a minimum of three times a month during the growing seasons. Cost for this landscaping and maintenance is incidental to the "Field Office, Type II.22 Special Complex" Item.

Each office unit shall have full carpeting, kitchenette facilities, interior paneling, lighting, and plumbing fixtures. Each office unit shall have a minimum of two (2) exterior doors, each door having a passage and a deadbolt lock. These door locks shall be keyed alike and at least 2 complete sets of keys shall be supplied to the Engineer's representatives. The exterior doors of each office unit shall be insulated or have storm doors. Each office unit shall have a minimum of six (6) windows, each window having a minimum glass area of 1,150 square inches and a horizontal mini-blind covering the full glass area. The windows of each office unit shall be insulated or have storm windows, shall be equipped with a locking device, and shall have screens installed and repaired when damaged.

At least two (2) outside water service connections shall be provided at each office unit. Each water connection shall have a 3/4" frost proof hose bib with vacuum breaker and shall include 100 linear feet of 5/8" minimum diameter reinforced, industrial or commercial grade, and soft rubber hose with spray nozzle per connection.

Each office unit shall be provided with sufficient natural and artificial light and shall be adequately heated and cooled to provide comfortable working conditions.

Each office unit shall have satisfactory lighting, electrical outlets, heating equipment, exhaust fan, and air-conditioning connected to an operational power source. Plan and drawing areas shall have individual fluorescent lights situated over their worktables. Replacement fluorescent lights shall be furnished as required. Electrical current, water, and any fuel for heating equipment shall be furnished and the cost of such shall be borne by the Contractor. Maintenance of the heating, exhaust fan, and air-conditioning equipment for each office unit shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

The Contractor shall furnish and maintain two fire extinguishers and provide one lighted "Exit" sign for each exterior passage door of the office units. Fire extinguisher(s) may be chemical or dry powder and shall be UL Classification 10-B:C(min.) and shall be suitable for Types A:B:C fires. A commercial or industrial type first aid and safety kit suitable for project conditions and hazards (including snakebite) shall be provided and maintained to full capacity on a monthly basis in each office unit.

The Contractor shall provide an alarm system in each office unit for security with electronic, direct connection to a security service provider. The security systems shall have interior motion, window, and entrance detectors and built in manual fire alarms. All windows of each office unit shall be covered with steel bar grids as a deterrent to forced entry. The Contractor shall provide validated monitoring and service contracts for the length of the Contract for each office unit. These contracts shall allow a Department authorized project person to deal directly with the security service provider to request service and/or repair.

The Contractor shall furnish and maintain in each office unit a hot and cold water dispenser with continuous adequate supply of 5-gallon bottled water, running potable water, a minimum 23 cubic foot new refrigerator, and a minimum 900-watt new microwave oven. Maintenance of the hot and cold water dispenser, running potable water supply, refrigerator, and microwave shall be provided for by validated service contracts for the length of the Contract. These service contracts shall allow a Department authorized project person to deal directly with the service organization to request repair.

Suitable indoor toilet facilities, conforming to the requirements of the State and Local Boards of Health or of other bodies or courts having jurisdiction in the area, shall be provided for each office unit.. Signs indicating the toilet facilities as being for Men, Women, or Unisex shall be placed on the doorway and an adequate positive locking system shall be provided on the inside of the doorway to insure privacy. The facility(s) shall be maintained by the Contractor to be clean and in good working condition and shall be stocked by the Contractor with adequate lavatory and sanitary supplies at all times during the period of the Contract.

For each office unit the Contractor shall be responsible for performing or for making arrangements for all necessary telephone connections and/or for their maintenance; for providing a new telephone equipment system, for payment of all connections and the new telephone system equipment and its installation; and for final disconnection of the telephones.

The telephone system for the field office complex shall have a total of 6 lines consisting of 5 direct single lines with call forward busy feature and 1 dedicated facsimile line and have 13 key sets consisting of 1 master key set having privacy feature, and 12 six-button key sets having privacy feature (1 set which may be for wall mounting) and 2 TLS or T1 circuit line for data transmission, all for the official and exclusive use of the Engineer and other representatives of the Department. Location of telephone lines and key sets shall be as directed by the Engineer. Arrangement shall be made to allow a Department authorized project person to deal directly with the telephone company to report outages and/or request repair. The Contractor shall arrange for the installation and initial setup of the specified telephone system including phone company provision of a termination point with smart-jack. Initial installation and setup costs shall be the responsibility of the Contractor as well. All subsequent monthly billings, after initial installation and setup, for the field office complex telephone system and the TLS or T1 circuit lines shall be received and paid by the Contractor. A copy of each of these subsequent bills shall be forwarded to the Project Resident for reimbursement on the contract pay estimate and the reimbursement will be for the amount of the bill only and shall not include any additional mark-up or profit. An intercom system shall be provided for use in and between office units; the intercom system may be integrated with the telephone system.

For all other utilities, the Contractor shall be responsible for performing or for making arrangements for all necessary utility connections and for their maintenance; for payment of all utility connections, installations, service fees and bills; and for final disconnection of utilities.

The Contractor shall provide new and maintain the following office furnishings, all which are to be approved by the Engineer prior to installation in the field office complex. Placement of these furnishings in the office units shall be as directed by the Engineer. These furnishings consist of 4 drafting tables with sufficient drawers for standard size plans, either attached to the tables or in cabinet form, each drafting table to have an ergonomic design spring back stool with five leg base having wheel casters, 12 full size office desks each with filing drawer and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 2 computer stations with acoustical panels having minimum 60 NRC rating for privacy screen and fully adjustable ergonomic design swivel chair with armrests and five leg base having wheel casters, 1 large conference table for a minimum of 12 people with surrounding chairs with armrests, 4 folding tables minimum 6'-0" by 3'-0" each with ergonomic design straight back chair with armrests, 2 work tables, 2 supply cabinets, 2 or more clothes closets of ample size to meet inspection manpower requirements, 4 rough plan racks, 4 legal size filing cabinets with 4 drawers, 2 legal size fire-resistant filing cabinets with lock and key with 4 drawers and meeting fire underwriters' approval for not less than one hour test, 2 stackable steel flat file cabinets for 43" by 32" size plan sheets each cabinet having 5 drawers with full suspension, rear hood, and hinged front depressor, 2 book shelves minimum 3'- 6" by 4'- 6" each, 4 vertical surface legal size three compartment pockets, 2 dry erase boards minimum 4' by 3' each with markers and erasers, and 2 cork bulletin boards minimum 3' by 2'. These office furnishings will remain the property of the Contractor at the conclusion of the project.

The Contractor shall also furnish new and maintain the following office equipment for the field office complex, all which are to be approved by the Engineer prior to installation. Location of the office equipment shall be as directed by the Engineer. The required equipment will enable the Department to synchronize project record keeping and office functions. The equipment shall be delivered in working and useable condition:

8 heavy-duty calculators having extra large 12-digit fluorescent display, full size keyboard with contoured keys, two-color ribbon printer, and AC powered;

1 Printer, multifunction having print, scan, copy, and e-media interface capability having print resolution up to 2400x1200 optimized dpi from 1200x1200 input dpi and optimization from photo paper selected, margins roll 0.2x0.2x0.2 in, ink cartridges cyan, gray, magenta, matte black, photo black and yellow, minimum line width 0.02 mm (GL/2 addressable and guaranteed line width 0.06 mm (ISO/IEC 13660:2001; Scan resolution up to 600 dpi, maximum scan size 36x93.6 in and maximum scan thickness 0.03 in; Copy reduction/enlargement 25 to 400%, copier setting – quality, color, roll, content type, original paper type, background removal, contrast and de-skew; Media handling - printer: sheet feed, 2 automatic roll feeds, automatic roll-switching and automatic cutter - scanner: straight-through scan paper path for sheet and cardboard originals, media types – printer bond and coated paper, technical paper, film, photographic paper, backlit and self adhesive – scanner: non-abrasive paper,

vellum, translucent, Mylar, recycled, blueprints and cardboard; Memory, 32GB (virtual) and 160GB hard disk; and Connectivity – interfaces (standard): Gigabit Ethernet (1000Base-T), Hi-Speed USB 2.0 certified, EIO Jetdirect accessory slot – printing languages (standard) ... eMFP: TIFF, JPEG, HP-GL/2, HP-RTL, CALS G4 and HP PCL 3 GUI ... PostScript eMFP: Adobe PostScript 3, Adobe PDF 1.7, TIFF, JPEG, HP-GL/2 HP-RTL, CALS G4, and HP PCL 3 GUI, including drivers supporting the printing languages;

1 Konica Minolta bizhub C280 full color printer/copier/scanner/fax unit or approved equal all-in-one copier which includes scanner, printer, and fax unit. Unit to have high speed wireless and network capability. Unit shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on the field office complex local network. Unit to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity with automatic stapling capacity;

1 compact plain paper copying machine and cabinet with stationary platen, bypass feeding, and dual loading cassette system with cassettes for letter, legal, and ledger size paper. Copy machine to have zoom and preset reduction and enlargement features, automatic two (2) sided copying, automatic document feeder with minimum 30 sheet capacity, and 20 bin collator with automatic stapling capacity;

1 micro cassette recorder, having fast playback, voice-activated system, three-digit tape counter, silent auto-stop and pause, two tape speeds, one-touch and follow-up, built-in condenser microphone, cue and review, and rechargeable with combination battery charger/AC adapter;

1 telephone answering machine having all-digital recording, 14 minute message capacity, selectable message time, voice prompt assistance, day/time stamp, call screening, two-digit LED message indicator, toll saver, power failure memory back-up, and message interrupt from any station;

6 compact digital cameras with 10 megapixels or greater, maximum dimensions of 3" x 5" x 3, built in flash, autofocus, video mode LCD for review of images, LCD viewfinder acceptable, removable memory compatible with compact flash, or secure digital (SD) or secure digital high capacity (SDHC), ISO compatible with 100, 200, 400 standard of quality of better, and memory cards supported by camera of 8 GB or better;

1 Canon Vixia HF M300, Panasonic HDC SD60, Samsung HMX-R10 or approved equal digital video camera, 1080p, CMOS optical sensor, digital format H.264, digital photo mode, camcorder sensor resolution 3.2 mega-pixels or greater, SD memory expansion card for still images, connection type, HDMI, USB, component video/audio output;

1 video projector, DLP projector, resolution of 1280x720 or greater, 16.7 million colors, contrast ratios of minimum 2000:1 or greater, video inputs to include SVGA, HDMI, S-Video and RGB, component, video modes minimum 720p or greater;

1 heavy duty 3-hole punch with minimum 40 sheet capacity;

2 extra heavy duty staplers with anti-jam feature having capacity up to 200 sheets; and

1 comb binding machine with manual punching capacity of 10 sheets having a minimum binding capacity of 150 sheets.

Consumables as required to manage the business of the project for the field office complex shall be provided for all office equipment for the length of the Contract. These consumables shall be furnished on request and shall include but not be limited to paper, tapes, ribbons, various size plastic combs, rolls, toner, cleaning kits, microcassette tapes and batteries, answering machine cassettes, camera batteries and memory cards/sticks, DVD and CD R/RW media, printer paper rolls for full and half size plans, ink cartridges, etc.

Maintenance of all office equipment in the field office complex shall be provided for by a validated service contract for the length of the Contract. This service contract shall allow a Department authorized project person to deal directly with the service organization to request repair.

### **Computer Requirements for the Field Office Complex:**

The field office complex shall have twelve (12) IBM compatible Microcomputer Systems to be furnished and maintained by the Contractor for use by the Engineer, the cost to be incidental to the "Field Office, Type II.22 Special Complex" Item. The specified computer systems will synchronize the construction management functions of the Department to monitor, report, and perform the accounting of the project work. The computer systems and all their related equipment specified below shall be furnished new and remain the property of the Contractor at the conclusion of the Contract. A detailed listing of the proposed computer systems and all their related equipment to be provided by the Contractor shall be submitted for approval by the Engineer prior to furnishing the Microcomputer Systems. The Microcomputer Systems shall be Laptop Computer Systems each with docking station, unless otherwise determined by the Engineer. Each of the twelve (12) Microcomputer Systems shall consist of:

#### Central Processing Unit (CPU) – Lap Top

Intel Core i7 series processor and wireless networking capability included,

Minimum 6.0 GB RAM with expansion capability to at least 10.0 GB, and

Microsoft "Windows® 7 Professional with 64 bit support operating system with latest updates;

#### Memory (Storage)

DVD+RW or Blue Ray BD-RE (rewritable) drive with support for DVD RW support capability, and 120GB hard drive minimum, integrated Ethernet 10/100. Included software shall support system and data backups with the DVD/Blue Ray device using double/dual layer DVD discs;

#### Monitor (LCD)

Monitor for docking station and docking station. 21" minimum diagonal visual area flat panel capable of multiple frequency color graphics, 1440x900(wide) or 1280x1024 or better resolution, 16.7 million display colors, 5 ms response time, D-Sub and DVI video input ports;

Laptop - shall have 15.4" diagonal display minimum and anti-glare screen feature;

#### Color Graphics Card

PCIe video card or integrated video;

#### Keyboard

Keyboard shall be ergonomic, enhanced layout minimum with keyboard interface cable;

#### Software

The latest version programs for application management (operating system), word processing, spreadsheet, and anti-virus shall be provided with all user manuals. Upgrades, maintenance, and full technical support by the manufacturer shall be provided for the length of the Contract. The required software will enable the Department to synchronize accounting and record keeping functions between the project, District, and Department offices. A list of programs to be provided shall be submitted to the Engineer for approval. Software, other than for application management and anti-virus, is to be delivered unopened to the Department's administrative office. All software is to be compatible with and for use to run on "Windows® 7 Professional"

or "Windows® XP Professional". The required applications software follows and is to be latest version unless noted:

collection - "Office 2013 Business Professional", or latest edition, with Word, Excel, antivirus - "Norton™", schedule - Primavera Project Planner® version 7.0 or latest, replication - Adobe Acrobat X Suite Software w/Adobe Photoshop® CS5 suite, and software - supporting creation of DVD +/- R/RW disks (supporting double layer media writing) and DVDR and DVDRW disks using DVDRW drive, for example: Ahead Nero, Roxio DVD/CD Creator, or some equivalent product. Note: software commonly included as part of the standard CDRW upgrade/standalone package is acceptable if included with the unit, An electrical outlet with dedicated circuit for the main computer unit,

A wireless optical mouse with proper driving software having complete Microsoft emulation,

Necessary cables for proper operation,

24 bit Sound Blaster compatible PCI soundcard with quality desktop speakers,

A combination surge, spike, and noise protection device with receptacles for all peripherals (may be in combination with the UPS power supply),

A wrist rest suitable for use with the furnished keyboard, and

All cards, hardware, and operating, anti-virus, and equipment software to be fully installed and operational;

#### Related Equipment for Field Office Complex

Wireless networking hub/router, 802.11g or better with all associated hardware (adapters, cables, etc) and software to enable wireless networking for resource/equipment sharing among all office computers and printers, the cost of wireless and network connections and service to be incidental to the "Field Office, Type II.22 Special Complex" Item,

2 laser printers, color, capable of printing 8-1/2"x11", 11"x17" and envelope, having wireless and hard line network connectivity, printers shall have all necessary software and cables for proper operation and shall be connected to high speed wireless and connected for use to share on a local network, and

An uninterruptible power supply (UPS) unit for protection from power loss or fluctuation, minimum of 6 outlets, adequate to provide a minimum of 30 minutes backup power for an orderly shutdown of the field office complex computer system with software and connections for automatic field office complex system shutdown;

#### Maintenance and Service

Maintenance of all specified equipment and components shall be provided for by a validated service agreement for the length of the Contract. Maintenance (upgrades, replacement, full technical support) for each software application shall be provided for by validated maintenance agreement for the length of the Contract. These agreements shall allow an authorized project person to deal directly with the service organization to request repair or the maintenance organization to request assistance; and

#### Supplies

Consumables as required to manage the business of the project shall be provided for the Microcomputer Systems in the field office complex for the length of the Contract. These consumables shall be furnished on request and include but not be limited to memory cards/sticks compatible with provided digital cameras having 8 GB or greater capacity and compatible with provided computers, DVDR and DVDRW media compatible

supporting operational minimum to maximum speed of the DVD/RW drive unit, cut sheet paper and labels compatible with the printers, hardware and screen cleaners, printer ink cartridges, and toner cartridges.

**Maintenance Requirements for the Field Office Complex:**

Maintenance of each office unit, its entrance, and its adjacent parking area, for the time required, shall consist of maintenance and/or replacement of all provided items, security system, furniture and equipment, computer systems, providing lavatory supplies, providing trash containers and waste baskets, providing entrance mats at each door, providing replacement items for lighting fixtures, maintaining all utilities, providing vermin and pest control by professional exterminator(s), providing satisfactory and sanitary janitorial and waste disposal services twice a week, providing cleanup of trash and debris on the parking area and landscaped area once a week, and shall be included in the monthly unit cost.

The Contractor shall provide a current copy of all validated office equipment and computer maintenance, service, assistance and/or monitoring agreements and/or contracts for the field office complex as mentioned hereinabove to the Department's administrative office on or before the first day each office unit is ready for use.

**Method of Measurement:**

This item will not be measured but will be paid for on a monthly basis. Partial months will be paid at the rate of 0.033 months per day.

**Basis of Payment:**

The field office complex will be paid for on a unit price bid per month, which price shall be full compensation for performing the work specified, obtaining all licenses and permits, and furnishing of all materials, labor, tools, equipment and incidentals necessary to construct and maintain each office unit, its entrance, and its adjacent parking area and restore each office unit area, its entrance, and its adjacent parking area to match their original site condition. No separate payment will be made for costs involved for removing hazardous material or underground tanks to install these office units, their entrances, and their parking areas. One (1) unit of payment will constitute erecting, furnishing, equipping, maintaining, and removing two (2) double wide modular office units, their entrances, and their adjacent parking areas.

Payment will be made only for the actual number of months that the field office complex is acceptably provided by the Contractor.

Per Standard Specification subsection 108.02, the Engineer shall issue a Notice to Proceed and stipulate the date on or before which the Contractor is expected to begin work. The office units, their entrances, and their adjacent parking areas and all materials and equipment shall be ready for use at least seven (7) calendar days prior to the date which the Contractor is expected to begin work as stipulated in the Notice to Proceed and before any construction operations begin. Contract time charges shall begin on the day work actually starts or on the date stipulated in the notice to proceed, whichever is earlier. There will be no delays in beginning the contract time charges due to delays in preparing the field office complex.

7/20/15

**760507 - PROFILE MILLING, HOT-MIX**  
**760508 - PROFILE MILLING, CONCRETE**

**Description:**

This work consists of furnishing a pavement-milling machine or cold planer and planing the existing bituminous concrete pavement or P.C.C. Pavement at the locations and to the nominal depths shown on the Plans and/or as directed by the Engineer to obtain a smooth profile on the existing roadway surface. Unless otherwise noted on the Plans or specifications the Contractor shall reuse, salvage and/or dispose of the milled material.

**Equipment:**

The milling equipment shall be a commercially designed and manufactured milling machine capable of performing the work in a manner satisfactory to the Engineer. The machine shall be power-operated and self-propelled, shall have sufficient power, traction and stability to remove a thickness of material to a specified depth. In addition, the machine must accurately and automatically establish profile grades by referencing the existing pavement surface. This shall be accomplished by means of 1.) a ski of 30' minimum length with an accuracy of  $\pm 1/8''$  in 30' or 2.) a minimum of three (3) ultra sonic, non-ground contacting sensors with an accuracy of  $\pm 0.100''$  in 25'. If noted on the Plans, a profile grade shall be established independent of the existing pavement surface. In such case the machine shall be capable of following the independent grade line (e.g. string line). The machine shall have an automatic system for controlling grade elevation and cross slope. The machine shall also be equipped with a means to effectively control dust generated by the cutting operation.

**Construction Methods:**

The surface resulting from the planing operation shall be in accordance with notes and details on the Plans and shall be characterized by uniform, discontinuous longitudinal striations and shall not be gouged or torn. Imperfections exceeding  $5/16''$  at any point along the surface as a result of missing teeth or faulty operation shall be removed by approved methods.

Before opening the milled surface to traffic, all loose material shall be removed from the surface with a power vacuum sweeper.

Whenever the milling operation causes water to pond or lay within the wheelpaths of the roadway the Contractor shall alleviate this problem by cutting bleeders into the shoulder or median to provide positive drainage. Cost for such work will be incidental to this item.

If the road is to remain open to traffic, longitudinal vertical drop-offs in excess of 2" at lane lines or at the centerline shall not be left overnight.

Transverse faces at the beginning and end of the milling operation existing at the end of a work period shall be tapered 20:1 or flatter in a manner approved by the Engineer to avoid a hazard for traffic.

Surface material that cannot be removed by cold planing equipment because of physical or geometrical restraints shall be removed by other methods acceptable to the Engineer.

If independent grade reference is required, it shall be designated in the Plans and/or Contract documents and elevations shall be provided by the Plans or at the direction of the Engineer.

If a severe bump exist in the pavement surface extra effort shall be taken at these locations to improve the profile. Manual changes to the cutter head may be needed at these locations to achieve this. It is the intent to remove bumps and irregularities in the pavement and produce a smooth milled surface for hot-mix resurfacing.



If the existing bituminous surface is over concrete the intent is to remove all of the existing bituminous material to the top of the concrete surface unless otherwise directed by the Plans or the Engineer.

If milling to remove open graded hot mix, the milling operation must remove all of the open graded hot mix from the roadway surface.

**Method of Measurement:**

The quantity of pavement milling will be measured as the number of square yards per inch of depth as shown on the Plans or established by the Engineer. The nominal depth shown on the Plans and initially set on the milling machine, even though it will vary automatically during profiling, will be the depth measured and paid.

**Basis of Payment:**

The quantity of pavement milling will be paid for at the Contract unit price per square yard per inch of depth. Price and payment will constitute full compensation for furnishing an accepted pavement-milling machine and operator, for removal and disposal of the milled material or delivery to a designated site, for transporting equipment, for all labor, tools equipment and incidentals necessary to complete the item.

5/02/02

**763501 - CONSTRUCTION ENGINEERING**

**1) Description:**

This work consists of construction lay out including; stakes, lines and grades as specified below. Subsection 105.10 Construction Stakes, Lines and Grades of the Standard Specifications is voided.

Based on contract plans and information provided by the Engineer, the Contractor shall stake out right-of-way and easements lines, limits of construction and wetlands, slopes, profile grades, drainage system, centerline or offset lines, benchmarks, structure working points and any additional points to complete the project.

The Engineer will only establish the following:

- (a) Original and final cross-sections for borrow pits.
- (b) Final cross-sections: Top and bottom pay limit elevations for all excavation bid items that are not field measured by Construction inspection personnel. The Contractor shall notify the Engineer when these pay limit elevations are ready and allow for a minimum of two calendar days for the Engineer to obtain the information.
- (c) Line and grade for extra work added on to the project plans.

**2) Equipment.** The Contractor shall use adequate equipment/instruments in a good working order. He/she shall provide written certification that the equipment/instrument has been calibrated and is within manufacturer's tolerance. The certification shall be dated a maximum of 9 months before the start of construction. The Contractor shall renew the certification a minimum of every 9 months. The equipment/instrument shall have a minimum measuring accuracy of [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 DeIDOT to verify the work, shall be provided by the Contractor and shall be able to generate end results that are in accordance with the requirements of Division 200 - EARTHWORK of the Standard Specifications.

#### **Construction:**

##### **a. DeIDOT Responsibilities:**

1. The Department will set initial vertical and horizontal control points in the field for the project as indicated in the contract documents, (plans set). If the Contractor needs to establish new control points they shall be traversed from existing control points and verified to be accurate by conventional surveying techniques.
2. The Department will provide the project specific localized coordinate system.

3. The Department will provide data in an electronic format to the Contractor as indicated in the General Notes.
  - a. The information provided shall not be considered a representation of actual conditions to be encountered during construction. Furnishing this information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered including, but not limited to site visits, and basing the bid on information obtained from these investigations, and the professional interpretations and judgments of the Contractor. The Contractor shall assume the risk of error if the information is used for any purpose for which the information is not intended.
  - b. Any assumption the Contractor makes from this electronic information shall be at their risk. If the Contractor chooses to develop their own digital terrain model the Contractor shall be fully responsible for all cost, liability, accuracy and delays.
  - c. The Department will develop and provide electronic data to the Contractor for their use as part of the contract documents in a format as indicated in the General Notes. The Contractor shall independently ensure that the electronic data will function in their machine control grading system.
4. The Files that are provided were originally created with the computer software applications MicroStation (CADD software) and INROADS (civil engineering software). The data files will be provided in the native formats and other software formats described below. The contractor shall perform necessary conversion of the files for their selected grade control equipment. The Department will furnish the Contractor with the following electronic files:
  - a. CAD files
    - i. Inroads -Existing digital terrain model (.DTM)
    - ii. Inroads -Proposed digital terrain model (.DTM)
    - iii. Microstation -Proposed surface elements - triangles
  - b. Alignment Data Files:
    - i. ASCII Format
5. The Engineer shall perform spot checks of the Contractor's machine control grading results, surveying calculations, records, field procedures, and actual staking. If the Engineer determines that the work is not being performed in a manner that will assure accurate results, the Engineer may order the Contractor to redo such work to the requirements of the contract documents, and in addition, may require the Contractor to use conventional surveying and staking, both at no additional cost to the Department.

#### B. Contractor's Responsibilities

1. The Contractor shall provide the Engineer with a GPS rover and Automatic Level, for use during the duration of the contract. At the end of the contract, the GPS rover and Automatic Level will be returned to the Contractor. The Contractor shall provide a total of 8 hours of formal training on the Contractor's GPS machine control system to the Engineer and up to three additional Department appointees per rover.
2. The Contractor shall review and apply the data provided by the Department to perform GPS machine control grading.
3. The Contractor shall bear all costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to application of GPS machine control grading techniques. Grade elevation errors and associated corrections including quantity adjustments resulting from the contractor's use of GPS machine control shall be at no cost to the Department.

4. The Contractor shall convert the electronic data provided by the Department into a format compatible with their system.
5. The Contractor's manipulation of the electronic data provided by the Department shall be performed at their own risk.
6. The Contractor shall check and if necessary, recalibrate their GPS machine control system at the beginning of each workday in accordance with the manufacturer's recommendations, or more frequently as needed to meet the requirements of the project.
7. The Contractor shall meet the accuracy requirements as detailed in the Standard Specifications.
8. The Contractor shall establish secondary control points at appropriate intervals and at locations along the length of the project. These points shall be outside the project limits and/or where work is performed. These points shall be at intervals not to exceed 1000 feet. The horizontal position of these points shall be determined by conventional survey traverse and adjustments from the original baseline control points. The conventional traverse shall meet or exceed the Department's Standards. The elevation of these control points shall be established using differential leveling from the project benchmarks, forming a closed loop. A copy of all new control point information including closure report shall be provided and approved by the Engineer prior to construction activities. The Contractor shall be responsible for all errors resulting from their efforts and shall correct deficiencies to the satisfaction of the Engineer and at no additional cost to the Department.
9. The Contractor shall provide stakes at all alignment control points, at every 500 foot stationing, and where required for coordination activities involving environmental agencies and utility companies at the Contractor's expense. Work that is done solely for utility companies and that is beyond the work performed under item 763501 - Construction shall follow and be paid for under item 763597 -Utility Construction Engineering.
10. The Contractor shall at a minimum set hubs at the top of finished grade at all hinge points on the cross section at 500 foot intervals on the main line and at least 4 cross sections on side roads and ramps as directed by the engineer or as shown on the plans. Placement of a minimum of 4 control points outside the limits of disturbance for the excavation of borrow pits, Stormwater Management Ponds, wetland mitigation sites etc. These control points shall be established using conventional survey methods for use by the Engineer to check the accuracy of the construction.
11. The Contractor shall preserve all reference points and monuments that are identified and established by the Engineer for the project. If the Contractor fails to preserve these items the Contractor shall reestablish them at no additional cost to the Department.
12. The Contractor shall provide control points and conventional grades stakes at critical points such as, but not limited to, PC's, PT's, superelevation points, and other critical points required for the construction of drainage and roadway structures.
13. No less than 2 weeks before the scheduled preconstruction meeting, the Contractor shall submit to the Engineer for review a written machine control grading work plan which shall include the equipment type, control software manufacturer and version, and proposed location of the local GPS base station used for broadcasting differential correction data to rover units.
14. The Contractor shall follow the guidelines set forth in the "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques" and follow a minimum of Second Order Class 1, (2-1) 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 "2<sup>nd</sup> Draft", "3<sup>rd</sup> 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

**763573 - SIGN, MARYLAND**

**Description:**

This work consists of furnishing the post and materials necessary to install the Blue Star Memorial Marker and post as specified on the Plans, and as directed. The marker will be furnished by SHA. The single post historical markers are manufactured to sit down on top of an octagonal extruded aluminum post. The marker is secured to the post by eight (8) set screws that will be provided with the marker.

**Materials:**

Post and Foundation: Materials used in the construction of the post and foundation shall meet the minimum materials as shown on the project plans and contract documents.

Marker: Sign with set screws to be furnished and delivered to the project site by SHA, Contractor to contact:

Mark Howard  
Landscape Operations Division  
SHA Cambridge Shop  
Cambridge, MD 21613

**Construction Methods:**

Construction methods shall conform to the project plans, and as directed. Upon acceptance by the Engineer, the marker should be made theft proof by drilling the flats off the set screws after the marker is secured to the post.

**Method of Measurement:**

The quantity of Sign, Maryland will be measured as the actual number of markers installed in accordance with these special provisions, complete in place and accepted.

**Basis of Payment:**

The quantity of Sign, Maryland will be paid for at the Contract unit price for each. Price and payment shall constitute full compensation for furnishing and placing all materials, the marker will be furnished by SHA; for all excavation and backfilling around the pole, for the disposal of surplus materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

11/3/15



**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

**763619 – WEIGH IN MOTION SYSTEM (WIM)**

**Description:**

This work consists of furnishing materials and performing all necessary modifications to the existing Weigh in Motion System (WIM) as indicated in the Contract Documents.

**Materials and Construction Methods:**

All materials and construction shall conform to the requirements of the contract documents and the technical specifications in Appendix A.

**Method of Measurement:**

Payment for this item will be made on a lump sum basis wherein no measurement will be made.

**Basis of Payment:**

Payment will be made at the Lump Sum price bid for this item. The price bid shall include the cost for performing the work specified and furnishing all labor, materials, tools, equipment, and incidentals necessary to provide a complete, working and usable WIM system acceptable to the Engineer.

7/25/12

**763626 - DIESEL FUEL COST PRICE ADJUSTMENT**

I. Description: This section defines the criteria for payments to the Contractor to reflect increases or decreases in the cost of diesel fuel consumed in the performance of applicable construction work. To have the Diesel Fuel Cost Price Adjustment provisions apply to this project, a properly completed Diesel Fuel Cost Price Adjustment Option form must be submitted to the Department with the Bidder's bid proposal. If a properly completed Diesel Fuel Cost Price Adjustment Option form is not provided by the bidder, the Department will consider the option to apply the Diesel Fuel Cost Price Adjustment provisions for the project to be declined. No further opportunity to elect Diesel Fuel Cost Price Adjustment for the project will be made available.

a. General. These price adjustment provisions apply to contract items in the contract schedule of prices as grouped by category. Specific pay items to be adjusted are attached as an appendix to this Special Provision. General category descriptions and the fuel usage factors which are applicable to each are as follows:

**1. Categories**

- 1.a. Category A:** Earthwork. The combined total of the applicable item plan quantities must exceed 5,000 CY.
- 1.b. Category B:** Subbase and Aggregate Base Courses. The combined total of the applicable item plan quantities must exceed 500 tons.
- 1.c. Category C:** Flexible Bases and Pavements. The combined total of the applicable item plan quantities must exceed 500 tons.
- 1.d. Category D:** Rigid Bases and Pavements. The combined total of the applicable item plan quantities must exceed 5,000 CY.
- 1.e. Category E:** Structures. Contract items will be based upon the total square foot price for each structure including any associated items of work, i.e. items not grouped under Categories A thru D.

**2. Diesel Fuel Usage Factors – ENGLISH UNITS**

Category	Factor	Units
A – Earthwork	0.34	Gallons per CY
B – Subbase and Aggregate Base Courses	0.62	Gallons per ton
C – Flexible Bases & Pavements	2.98	Gallons per ton
D – Rigid Bases & Pavements	0.98	Gallons per CY
E – Structures	8.00	Gallons per \$1,000 of work performed

**3. Quantity Conversion Factors – ENGLISH UNITS**

Category	Conversion	Factor
B	SY to ton	90 lbs/Inch of depth/SY
C	SY to ton	112.5 lbs/Inch of depth/SY
D	SY to CY	Inches of depth/36

II. The posted index price will be the monthly price most recent data published by the U.S. Department of Energy, U.S. Energy Information Administration. The source information for the posted price for Central

Atlantic (PADD 1B) No 2 Diesel Ultra Low Sulfur (0-15 ppm) Retail Prices (Dollars per Gallon) may be viewed at the following website:

[http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD\\_EPD2DXL0\\_PTE\\_R1Y\\_DPG&f=M](http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2DXL0_PTE_R1Y_DPG&f=M)

The release date for the U.S. Department of Energy, U.S. Energy Information Administration average price data occurs the first Monday of the following month, i.e. October prices are released the first Monday of November and used as the November Price Index.

The price index, FB, is the index price posted by the Department, determined as specified above, on the project advertisement date.

PRICE INDEX (FB) FOR DIESEL FUEL

PER GALLON = \$

The price index, FP, will be the index price posted by the Department, determined as specified above, for the month during which the Notice to Proceed (NTP) is issued, and every 90 calendar days thereafter.

III. Price Adjustment Criteria and Conditions. The following criteria and conditions will be considered in determining a price adjustment for diesel fuel cost fluctuations.

- a. Price Adjustment Calculation. When the ratio FP/FB is calculated to be less than 0.95 or calculated to be greater than 1.05, the Department will adjust unit bid price prices in accordance with the following formula:

$$AUP = (FP-FB)(F)+(UBP)$$

where:

AUP = Adjusted Unit Price

FP = Fuel Price Index for the month in which prices are adjusted for applicable construction work.

FB = Fuel Price Index in the Bid Proposal

F = Diesel Fuel Usage Factor

UBP = Unit Bid Price specified in the Contractor's Bid Proposal

- b. Payment of Adjusted Unit Prices. The unit bid prices of work items affected by the fuel escalation will be adjusted by work order, either up or down, at Notice to Proceed and every 90 Calendar Days thereafter.
- c. Expiration of Contract Time. If the Contractor exceeds the authorized allotted completion time, the adjusted item prices on the last authorized allotted work day shall be the prices used during the time liquidated damages are assessed. However, if the posted price for diesel fuel goes down, the item prices shall be adjusted downward accordingly.
- d. Final Quantities. Upon completion of the work and determination of final pay quantities, an adjusting work order will be prepared to reconcile any difference between estimated quantities previously paid and the final quantities. In this situation, the value for FP used in the price adjustment formula will be the average of all FP's previously used for computing price adjustments.
- e. Inspection of Records. The Department reserves the right to inspect the records of the prime contractor and its subcontractors and material suppliers to ascertain actual pricing and cost information for the diesel fuel used in the performance of applicable items of work.

- f. Extra Work. When applicable items of work, as specified herein, are added to the contract as Extra Work in accordance with the provisions of Section 110.03, no price adjustment will be made for fluctuations in the cost of diesel fuel consumed in the performance of the extra work, unless otherwise approved by the Engineer. The current price for diesel fuel is to be used when preparing required backup data for extra work to be performed at a negotiated price. For extra work performed on force account basis, reimbursement for material and equipment along with specified overhead and profit markups will be considered to include full compensation for the current cost of diesel fuel.
  
- g. Subcontractors. Any Price Increases or Price Rebates that are calculated based on items of work performed by subcontractors will be added to or deducted from payments due to the Contractor in the appropriate pay period. The Contractor shall then accurately record on the appropriate CN-91 or CN-103 form the additions or deductions into adjusted contract value. The Contractor shall make payment to the subcontractor(s) who actually performed the work in accordance with DelCode Title 17, Chapter 8.

11/10/11

## Appendix---Item 763626 Diesel Fuel Cost Adjustment

**Contract: T200811301.01 US 301, Maryland State Line to Levels Road**

	<u>Item No./s</u>
<b>Category A: Earthwork</b>	202000, 203000, 207000, 208000, 209002
Excavation & Embankment, Borrow (total qty must exceed 5000 CY)	
<b>Category B: Subbase and Agg.</b>	302007, 608000
GABC, PTB, Soil Cement Base (total qty must exceed 500 T)	
<b>Category C: Flexible Bases and Pavements</b>	401801, 401810, 401819, 401825, 401827
Warm Mix Asphalts (total qty must exceed 500 T)	
<b>Category D: Rigid Bases and Pavements</b>	501006
Concrete, P.C.C. Patching (total qty must exceed 5000 CY)	
<b>Category E: Structures</b>	602006, 602007, 602013, 602014, 602015, 602017, 604000, 618050, 618051, 618062, 618065, 619042, 619045, 619055, 619056, 623003
Bridges, Large P.C.C. Structures	

**763656 – AS-BUILT CERTIFICATION, MARYLAND**

**Description:**

This work shall consist of inspecting stormwater management (SWM) facilities located in Maryland during various stages of construction and providing documentation to the Administration that certifies that the SWM facilities have been constructed as specified in the Contract Documents, including certification that the constructed SWM facilities meet the functionality as designed.

**As-Built (AB) Inspector.** The AB Inspector shall be a licensed Professional Engineer or Land Surveyor in the State of Maryland with experience in stormwater management design and construction.

Inspections of planting installations and survival and final turf establishment shall be performed by either a licensed Landscape Architect in the State of Maryland or an Administration approved Environmental Specialist. The inspector shall have experience in stormwater management planting design and construction.

**As-Built Certification Package.** The as-built certification package shall consist of photographs, completed as-built checklists for each SWM facility, completed as-built certification forms for each SWM facility, material testing reports for any soil, a copy of green-line revision plans for SWM facilities that include as-built survey information, a copy of completed planting checklists, and turf inspection data for SWM facilities and drainage conveyances areas (such as ditches and swales). The as-built survey information shall be superimposed on the final design (including addendums or redlines) contours and a separate plan shall be prepared depicting the as-built information alone.

Information about the person(s) that perform the plant and turf inspections shall be part of the as-built certification package and shall include, but not be limited to name of the person(s), employer name, brief description of related work history, contact information, and anticipated dates for plant and turf establishment inspections.

The Contractor shall provide to the Engineer two hard-copies and one digital copy in PDF format of the as-built certification package.

**Plant and Turf Establishment Certification Package.** The plant and turf establishment certification package shall consist of field photos, completed turf inspection checklists, completed planting checklists, and the contract planting plans and details with green-line revisions. If survivability percentages are not achieved, notation shall be made on the plans and report designating the plants or areas that are dead or exhibit patchy growth. A description of efforts taken to bring the plantings or turf up to the required survivability shall be included in the report. A schedule for implementing the remediation efforts and documentation of completion of the remediation efforts shall also be included.

The plant and turf establishment certification process must be completed and approved prior to the Administration accepting the establishment phase for maintenance (see Section 710.03.06).

**Materials:**

Not applicable.

**Construction Methods:**

**Stages for As-Built Inspections.** The AB Inspector shall perform minimum inspections for SWM facilities as follows:

**(a) Ponds.**

- (1) Upon completion of excavation to sub-foundation and when required, installation of structural supports or reinforcement for structures, including, but not limited to:

- (i) Core trenches for structural embankments.
  - (ii) Inlet and outlet structures, anti-seep collars or diaphragms, and watertight connections on pipes.
  - (iii) Trenches for enclosed storm drainage facilities.
- (2) During placement of structural fill, concrete, and installation of piping and catchbasins.
  - (3) During backfill of foundations and trenches.
  - (4) During embankment construction.
  - (5) Upon completion of final grading and establishment of permanent stabilization.
- (b) Wetlands.** Refer to stages specified for pond construction. Additional inspections include:
- (1) During and after wetland area planting.
  - (2) During the second growing season to verify a vegetation survival rate of no less than fifty percent (50%).
- (c) Infiltration Trenches.**
- (1) During excavation to subgrade.
  - (2) During placement and backfill of underdrain systems and observations wells.
  - (3) During placement of geotextiles and all filter media.
  - (4) During construction of appurtenant conveyance systems such as diversion structures, pre-filters and filters, inlets, outlets, and flow distribution structures.
  - (5) Upon completion of final grading and establishment of permanent stabilization.
- (d) Infiltration Basins.** Refer to stages specified for pond construction and add:
- (1) During placement and backfill of underdrain systems.
- (e) Filtering Systems.** Filtering systems include bioretention, sand filters, organic filters, bio-filters, and dry swales.
- (1) During excavation to subgrade.
  - (2) During placement and backfill of underdrain systems.
  - (3) During placement of geotextiles and all filter media.
  - (4) During construction of appurtenant conveyance systems such as flow diversion structures, pre-filters and filters, inlets, outlets, orifices, and flow distribution structures.
  - (5) Upon completion of final grading and establishment of permanent stabilization.
- (f) Open Channel Systems.** Open channel systems include wet swales and grass channels.



- (1) During excavation to subgrade.
  - (2) During installation of diaphragms, check dams, or weirs.
  - (3) Upon completion of final grading and establishment of permanent stabilization.
- (g) **Non-Structural Practices.** Upon completion of final grading and after the establishment of permanent stabilization.

The checklist for each SWM facility shall be completed in its entirety at the appropriate stages of construction as specified in the Contract Documents. The as-built certification shall be signed and dated by the AB Inspector upon completion of all SWM facility checklists.

**Stages for Plant and Turf Establishment Inspections.** At the plant establishment phase (710.03.06) inspection, the plant and turf establishment inspection shall also be conducted and documented. Turf establishment inspection shall be conducted according to the Administration's turf inspection standards. Plants shall be inspected for species, size, quantity, health and location. Plants that measure smaller than the installed size are considered to be dead. Dead plants shall be replaced according to the design specifications. Plant and turf establishment inspections shall be conducted from June 15 to November 15.

The following planting and turf shall be inspected and documented:

- (a) Ponds and Wetlands
  - (1) SWM embankment (including roadway embankment if applicable) and clear zone 15 feet beyond toe of embankment cleared of woody vegetation and established with turf or native meadow.
  - (2) During second growing (plant establishment phase inspection) season to verify a vegetation survival rate at submerged benches and wetlands of 50 percent.
- (b) Infiltration Trenches

Turf establishment with 95% coverage inspected in conveyances, filter strips and other features draining to the trench that are within the Administration right-of-way and within the project site. Off-site areas shall be visually observed and the location of off-site eroded or bare areas included in the report and photographed.
- (c) Infiltration Basins
  - (1) Woody plant clear zones listed for Ponds above.
  - (2) Plant, turf or native meadow establishment inspected at basin bottom and side slopes.
  - (3) Establishment of turf with 95% coverage on all conveyances draining to the facility that are within the MdSHA right-of-way and within the project site. Off-site areas shall be visually observed and the location of off-site eroded or bare areas included in the report and photographed.
- (d) Filtering Systems
  - (1) Establishment of turf on weir, bottom and sides of facility, and all conveyances draining to the facility.
  - (2) At Bioretention Facilities, to verify a plant survival rate of at least 90 percent. The mulch bed shall be inspected and replenished to constructed depth and condition.

- (e) Open Channel Systems.
  - (1) For Dry Swales, inspect establishment of turf on weir, bottom, side slopes and conveyances draining to the facility.
  - (2) For Wet Swales, inspect establishment of turf on weirs, sides and all conveyances draining to the facility. Inspect planting at bottom of facility for 50 percent survival rate.

**As-Built Survey, Computations and Green-Line Drawings.** Upon completion of the final grade and stabilization at each SWM facility, the Contractor shall survey each SWM facility, including contours, inflow and outflow ditches, limits of riprap, emergency spillway(s), outfall structure(s) (including elevations and dimensions at top, all orifices, weirs and openings), and all other pertinent features in and around the facility.

The constructed elevations shall be within 3 in of design elevations. Elevation variance greater than 3 in shall be corrected by the Contractor to meet the acceptable tolerance limits or the Contractor shall provide computations for the volumes, discharges, stage-storages and detention times that demonstrate that the SWM facility meets the designed parameters. The Contractor shall resurvey any corrected areas.

The Engineer will provide to the Contractor a copy of the final approved design Stormwater Management Report and copies of the plan CADD files that shall be used in producing the green-line revision plans. The AB Inspector shall follow SHA CADD standards in producing the green-line documents.

**Submission to and Approval by the Administration.** The Contractor shall submit the completed as-built certification package to:

Maryland State Highway Administration  
Highway Hydraulics Division Chief  
707 North Calvert Street, Mailstop C-201  
Baltimore, MD 21202

**Method of Measurement:**

Stormwater Management Facility As-Built Certification will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for the completion and submission of the as-built certification package, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Re-inspection of corrections to stormwater management facilities and re-certification of any deficiencies to be corrected by the Contractor shall be at no additional cost to the Department. Engineering and analysis for Contractor-modified SWM facilities shall be at no additional cost to the Department.

Deficiencies to the as-built certification package shall be corrected by the Contractor at no additional cost to the Department. Additional construction, planting and stabilization necessary to meet the certification standards shall be completed at no additional cost to the Department.

**Basis of Payment:**

Payment will conform to the following:

No greater than thirty-five percent (35%) of the total payment will be paid upon completion and submission of the As-Built Certification Package.

No greater than thirty-five percent (35%) of the total payment will be paid upon approval from the Administration for the As-Built Certification Package. Final payment will be paid upon approval from the Department for the Plant and Turf Inspection Certification Package.

11/23/11

**763686 – TRAFFIC OFFICER, MARYLAND**

**Description:**

This item shall consist of providing off duty police officers for law enforcement presence in the work zone, enforcing traffic laws within the work zone, providing emergency assistance within the work zone, or controlling traffic at any locations as designated by the Engineer.

Officers will be expected to assist with stopping, controlling and/or maintaining the flow of traffic outside of their vehicle when necessary. Officers are expected to use authority to control the traffic to assure not just the safety of the construction personnel but the safety of the traveling public as well. If necessary the Engineer may authorize additional officers to be used for speed enforcement. The use of Traffic Officers in a highway work zone shall be in accordance with the latest version of MdMUTCD, Part 6.

Such officers shall wear police officer uniforms. They shall have a marked police vehicle with full emergency lights. The vehicle shall be equipped with a radar unit or any other speed-measuring device that will be detectable as radar to assist with slowing traffic. Officers must at all times have radio communication available to inform 911 and DelDOT's Transportation Management Center (TMC) of traffic backups or other emergencies. The traffic officers shall be Maryland State Police in accordance with the location of the project. Traffic officers outside of their vehicle are required to wear high-visibility safety apparel as required in the MdMUTCD.

The Contractor will discuss with the Engineer in advance for approval of the schedule of hours and number of traffic officers anticipated for each site or operation. It will be the responsibility of the Contractor to explain to the officer the project activities pertaining to where the officer's services are needed.

Traffic officers shall not be used to close lanes without additional temporary traffic control except for rolling road blocks or emergencies. Rolling road blocks require advance approval from the Engineer through DelDOT's Traffic Section.

The Contractor shall be responsible for paying the Maryland State Police for their work performed in conjunction with this project, completing MSP 198A Contract for Extraordinary Law Enforcement Services and presenting it to the Maryland State Police Barrack that has jurisdiction in the area. For Cecil County: Barrack F - North East; 2433 West Pulaski Highway, North East, Maryland 21901; 410-996-7800; contact 1st/SGT Hamm or the duty officer. The Contractor shall be responsible for contacting and coordinating with the Maryland State Police to schedule the traffic officers.

**Method of Measurement and Basis of Payment:**

For bidding purposes, the unit price shall be fixed at \$98.16 per hour. Actual payment shall be based on the submitted invoice from the police department plus ten (10) percent. Payment shall constitute full compensation for the police officer's wages, vehicle and equipment, the Contractor's allowable administrative cost and any necessary incidentals.

11/01/12

**763689 - STRUCTURAL WORK, GANTRY**

**Description:**

The Contractor shall furnish and install all materials necessary for and incidental to the complete construction of gantry foundations in accordance with the Plans or as directed by the Engineer.

**Materials and Construction Methods:**

Division 100 General Provisions of the Delaware Department of Transportation "Standard Specifications", dated August 2001 and the Delaware Department of Transportation "Standard Construction Details", dated 2001, including all revisions up to the date of advertisement, apply to this section.

Working drawings including materials shall be submitted to the Engineer for approval.

**Method of Measurement:**

Measurement of this item, "Structural Work, Gantry" will not be made.

**Basis of Payment:**

Payment will be made at the lump sum price bid for this item. The price bid shall include the cost for all cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, finishes, conduits and incidentals shall be in accordance with Delaware Department of Transportation "Standard Specifications", dated August 2001 and the Delaware Department of Transportation "Standard Construction Details", dated 2001, including all revisions up to the date of advertisement necessary to provide a complete, working and usable facility acceptable to the Engineer.

09/29/15

**763691 - FLAGGER, MARYLAND, STATE**  
**763692 - FLAGGER, MARYLAND, STATE, OVERTIME**

**Description:**

This item shall consist of providing flaggers when specified or directed when the flagger is positioned outside of the State of Delaware and within the State of Maryland due to construction being performed under a DelDOT contract.

Flaggers positioned in Maryland shall have completed a MDSHA approved flagger training course within the last four years. The Contractor shall provide appropriate training documentation for each flagger throughout the duration of the contract. Flaggers are required to have their approved training documentation and a photo identification card on their person at all times while flagging. The Engineer will require the replacement of any flagger that immediately fails to produce approved training documentation and photo identification when requested. The Contractor shall have available a person with approved training documentation, photo identification and equipment that can relieve the flagger for any necessary breaks.

Working flaggers shall be equipped with two-way radios or other approved communication devices. Cellular telephones with or without push-to-talk features, MP3 players or other similar electronic devices are not approved communication devices. Use of a cellular telephone or other unapproved electronic communication device while performing flagging operations is justification for immediate removal of a flagger.

Working flaggers shall be equipped with an audible warning device to alert workers of an errant vehicle.

Any flagger not performing duties in accordance with the specifications is justification for suspension of work as specified in DelDOT's Standard Specification Section 104.07, Suspension of Work. Once the offending flagger is replaced and all flaggers are in compliance with the requirements of this specification, the work may resume.

Flagging shall conform to the requirements of the MdMUTCD. All outfits and equipment will be subject to approval. Use STOP/SLOW paddles unless otherwise permitted.

**Method of Measurement and Basis of Payment:**

The quantity of Flaggers will be measured as the actual number of hours an approved flagger is in place on the roadway and protecting active construction operations. Payment will only be made for those flaggers in place on the roadway and protecting active construction operations that have the required training documentation and photo identification available and that have the required equipment in use. No payment will be made for flaggers that are on-site and available but not in use. Price and payment constitutes full compensation for all labor, benefits, tools, equipment and necessary incidentals to complete the work. Overtime payment will only be made when approved by the Engineer and in accordance with applicable labor laws.

The unit price for Item 763691 - FLAGGER, MARYLAND, STATE shall be at the per hour rate based on the prevailing wage rates as determined by the Department of Labor for the State of Maryland.

The unit price for Item 763692 - FLAGGER, MARYLAND, STATE, OVERTIME shall be at the per hour rate based on the prevailing wage rates as determined by the Department of Labor for the State of Maryland.

1. Flaggers must be bid at a minimum equal to the Laborer wage rate and may be bid up to, but not to exceed, 3 times the Laborer wage rate in accordance with Cecil County, where the work is being performed.

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2. Flagger overtime must be bid at minimum of 1.45 times, and may be bid up to 4.35 times maximum, the Laborer wage rate in accordance with Cecil County, where the work is being performed.
3. When a contract for a project contains both Federal Davis-Bacon and State of Maryland prevailing wage standards, the employer's minimum wage obligations are determined by whichever standards are higher.
4. If the Contractor's bid price is not within the limits set forth in 1 and 2, the Department will adjust the bid to the minimum for prices bid below the minimum acceptable bid and to the maximum for prices bid above the maximum allowable bid prior to award.

11/4/15

**900500 - ENVIRONMENTAL PERFORMANCE INCENTIVE (DISINCENTIVE)**

**Description:**

This work consists of maintaining the project's erosion and sediment control items and provides an incentive payment for that Work.

**Materials:**

There are no materials included in this specification.

**Construction Methods:**

Continuously maintain all erosion and sediment control items per the approved plan throughout the duration of the Project. Repair, replace, and/or maintain any erosion and sediment control measures as noted on the ES2M Inspection Rating Reports

[http://www.deldot.gov/information/business/drc/pd\\_files/plan\\_development/es2m\\_inspection\\_rating\\_for\\_m.pdf?050415](http://www.deldot.gov/information/business/drc/pd_files/plan_development/es2m_inspection_rating_for_m.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 **\$ 488,000.00**. 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 **\$488,000.00** or (3) the expiration of Contract time (including approved time extensions), whichever occurs first.

<b>Environmental Performance Incentive Schedule</b>	
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



**905500 - SUPER SILT FENCE**

**Description:**

This work consists of furnishing, installing, constructing, maintaining, and ultimately removing super silt filter fences as a temporary measure to control sedimentation within the limits of construction. Super silt fence shall be constructed as shown on the details in the Plans, at the locations shown on the Plans, and as directed by the Engineer.

**Materials:**

**General.** All materials shall be approved prior to use by the Department's Materials and Research Section.

**Chain Link Fence.** The construction requirements for the placement of the chain link fence shall be as specified in **SECTION 727 FENCES AND GATES** with the following exceptions:

(a) Concrete footings (727.07), Top Rail, Tension Wire, Horizontal Braces shall not be used.

**Fasteners.** Aluminized steel tie wires long enough to securely attach the fabric to the posts.

**Seed.** Seed shall conform to the requirements of Section 908.

**Mulch.** Mulch shall conform to the requirements of Section 908.

**Geotextile.** Geotextile shall conform to the requirements of Section 827. It shall be a minimum of 36" (900 mm) wide.

**Construction Methods:**

**Construction of Super Silt Fence.**

The Contractor shall excavate the trench along the upstream side of the post line as shown on Standard Construction Detail, Super Silt Fence. Posts shall be installed on the Downstream edge of the trench, along the established fence line. The geotextile shall be fastened to the upstream side of the chain link. The geotextile and chain link must extend a minimum of 33" above the ground. The chain link fabric and geotextile shall be embedded 8 inches into the excavated trench. The trench shall be backfilled and compacted over the chain link and geotextile to prevent water from flowing under the chain link and geotextile.

The super silt fence shall not be constructed across a ditch, or swale, or area of concentrated flow. On slopes, the terminal ends of super silt fence shall be turned upslope a sufficient distance to eliminate flow around the ends of the super silt fence. All geotextile damaged prior to installation, during installation, or during the life of the Contract shall be repaired or replaced to the satisfaction of the Engineer.

**Maintenance of Super Silt Fence.**

Throughout the Project construction period, the super silt fence shall be maintained by removing trapped sediment. The Contractor shall clean the geotextile of trapped sediment by tapping the geotextile when dry. No trash shall be allowed to accumulate to the height of the fence. Any geotextile that does not function due to clogging or deterioration shall be replaced.

**Sediment Removal.**

After every heavy rainfall, the Contractor shall check for excessive buildups of sediment which must be removed so that the super silt fence can continue to function as intended. Remove accumulated sediment when it reaches 50% of the height of the super silt fence.

**Removal of Super Silt Fence.**

The super silt fence shall be removed when the Engineer determines that it is no longer required. The super silt fence and all materials incidental to the super silt fence construction shall be removed. All areas affected by the construction of the super silt fence shall be restored to the original or plan contours and stabilized with seed and mulch.

**Method of Measurement:**

The quantity of super silt fence will be measured as the actual number of linear feet (linear meters) of super silt fence placed and accepted.

**Basis of Payment:**

The quantity of super silt fence will be paid for at the Contract unit price per linear foot (linear meter) for each type of fence. Price and payment will constitute full compensation for furnishing all materials; for excavating and backfilling associated with the construction of the super silt fence; for maintaining the super silt fence during the Project construction period; sediment removal, for removing the super silt fence with all related hardware after completion of the Project; for restoring the site; for seeding and mulching; and for all labor, equipment, tools and incidentals required to complete the work. No payment will be made for any replacement of or repairs to the super silt fence damaged prior to installation, during installation, or during the life of the Contract. No payment will be made for the replacement of the super silt fence.

11/18/2014

**908503 - WETLAND MITIGATION GRASS SEEDING**

**Description:**

As per Section 734 – Seeding.

**Materials:**

Add the following after the end of 734.04 of the Standard Specifications:

Wetland Mitigation Grass Seeding:

<b>Species Name Common / (Latin)</b>	<b>Max. % Weed Seeds</b>	<b>Min % Purity</b>	<b>Min % Germination</b>	<b>Seeding Rate lb/Ac</b>
Redtop ( <i>Agrostis alba</i> / <i>Agrostis gigantea</i> )	0.15	95	90	30
Indian Grass ( <i>Sorghastrum nutans</i> )	1.00	85	75	20
Deertongue ( <i>Dichanthelium clandestinum</i> - formerly <i>Panicum clandestinum</i> )	1.00	95	60	20
Switchgrass ( <i>Panicum virgatum</i> )	1.00	95	70	40
<b>Total Seed Quantity (lb/Ac)</b>				<b>110</b>

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.

**Construction Methods:**

As per Section 734 Seeding with changes to methods as shown on the Plans.

Application of the Wetland Mitigation Grass Seeding shall only occur between the following dates:

September 1<sup>st</sup> to November 15<sup>th</sup>.

Low-pressure tires or equipment shall be used in preparation of the seed bed and on seeding equipment.

No Lime or Fertilizer shall be added to the Wetland Mitigation Grass Seeding.

Add the following at the end of Section 734.06:

Acceptance of 734553 – Wetland Mitigation Grass Seeding shall be made at time of placement, provided the seed is mixed and placed as specified and as directed on the Plans.

Add the following at the end of Section 734.07:

No Maintenance Bond is required for this work.

All other aspects and conditions of Section 734 – Seeding shall apply.

**Method of Measurement:**

As per Section 734 – Seeding.

**Basis of Payment:**

As per Section 734 – Seeding.

10/26/15

**910500 - BIO-RETENTION SOIL, MIX I**

**Description:**

The item shall consist of furnishing and placing a soil mixture of peat, shredded mulch, and sand for planting. The soil mixture shall be a rich, friable material conforming to the requirements of these specifications and shall be placed within the bio-retention areas at locations as shown on the Plans, and as directed by the Engineer.

**Materials:**

The Bioretention Soil, Mix 1 (BSM) is a mixture of peat, mulch, and sand consisting of the following:

<b>Item</b>	<b>Composition by Volume</b>	<b>Reference</b>
Peat	33%	See below.
Shredded 3x Hardwood Mulch	33%	See below.
Sand	33%	ASTM C33 Fine Aggregate

Peat shall conform to the requirements of Section 737.07(a). All mulch shall be 3x shredded hardwood bark from a deciduous hardwood source and be relatively free of bark fines dust and shall exclude all foreign and toxic substances.

At least 45 days prior to the start of construction of bio-retention facilities, the Contractor shall submit the BSM to the Engineer for approval. No time extensions will be granted should the proposed BSM fail to meet the minimum requirements stated above. Once a stockpile of the BSM has been sampled, no material shall be added to the stockpile.

The BSM shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches excluding mulch. No other materials or substances shall be mixed or dumped within the bio-retention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The BSM shall be free of Bermuda grass, Quackgrass, Johnson grass, Mugwort, Nutsedge, Poison Ivy, Canadian Thistle, or Teathumb.

The Bio-retention Soil Mixture shall be tested and meet the following criteria:

<u>Item</u>	<u>Criteria</u>	<u>Test Method</u>
Corrected pH	5.5-7.5	D4972
Magnesium	Minimum 32 ppm	*
Phosphorus (Phosphate-P <sub>2</sub> O <sub>5</sub> )	Not to exceed 69 ppm	*
Potassium (K <sub>2</sub> O)	Minimum 78 ppm	*
Soluble Salts	Not to exceed 500 ppm	*

\* A certificate of chemical analysis shall be provided to the Engineer.

Should the pH fall outside of the acceptable range, it may be modified with lime (to raise) or iron sulfate plus sulfur (to lower). The lime or iron sulfate must be mixed uniformly into the BSM prior to use in bio-retention facilities.

Should the BSM not meet the minimum requirement for magnesium, it may be modified with magnesium sulfate. Likewise, should the BSM not meet the minimum requirement for potassium, it may be modified with potash. Magnesium sulfate and potash must be mixed uniformly into the BSM prior to use in bioretention facilities.

Planting soil and/or BSM that fails to meet the minimum requirements shall be replaced at no additional cost. Mixing of the corrective additives to the BSM is incidental and shall be at no additional cost.

Mixing of the BSM to a homogeneous consistency shall be done to the satisfaction of the Engineer.

**Construction Methods:**

Bio-retention facilities shall not be constructed until all contributing drainage areas are stabilized with at least 3" (75 mm) tall grass of the specified mix as shown on the Contract Plans and to the satisfaction of the Engineer. Bio-retention facilities shall not be used as sediment control facilities. No heavy equipment shall operate within the perimeter of a bio-retention facility during excavation, underdrain placement, backfilling, planting, or mulching of the facility.

The bioretention facility shall be excavated to the dimensions, side slopes, and elevations shown on the Contract Plans. The method of excavation shall minimize the compaction of the bottom of the bioretention facility. Excavators and backhoes, operating on the ground adjacent to the bioretention facility, shall be used to excavate the facility if possible. Low ground-contact pressure equipment may also be used for excavation. No heavy equipment shall be allowed on the bottom of the bioretention facility.

The BSM shall be placed and graded using low ground-contact pressure equipment or by excavators and/or backhoes operating on the ground adjacent to the bio-retention facility. No heavy equipment shall be used within the perimeter of the bio-retention facility before, during, or after the placement of the BSM. The BSM shall be placed in horizontal layers not to exceed 12" (300 mm) for the entire area of the bio-retention facility. The BSM shall be compacted by saturating the entire area of the bio-retention facility after each lift of BSM is placed until water flows from the underdrain. Water for saturation shall be applied by spraying or sprinkling. Saturation of each lift shall be performed in the presence of the Engineer. An appropriate sediment control device shall be used to treat any sediment-laden water discharged from the underdrain. If the BSM becomes contaminated during the construction of the facility, the contaminated material shall be removed and replaced with uncontaminated material at no additional cost to the Department. Final grading of the BSM shall be performed after a 24-hour settling period. Final elevations shall be within 2" (50 mm) of elevations shown on the Contract Plans.

**Method of Measurement and Basis of Payment:**

The quantity of Bio-retention Soil, Mix I will be paid for at the Contract unit price per cubic yard (meter). Price and payment will constitute full compensation for furnishing, mixing, pH correction, potassium correction, magnesium correction, hauling, storing, re-handling of material and placement of the BSM backfill, compaction of the BSM backfill by saturation, grading and slope adjustments, and for all material, labor, equipment, tools, and incidentals necessary satisfactorily complete the work.

11/17/2014

**UTILITY STATEMENT**  
**State Contract No. T200811301**  
**Project ID No. 08-03015**  
**US 301 Section 3, Maryland State Line to Levels Road**  
**New Castle County, Delaware**  
**January 16, 2015**

The following utility companies maintain facilities within the project limits:

<b>Artesian Water Company, Inc.</b>	<b>Water</b>
<b>Atlantic Broadband</b>	<b>Communications</b>
<b>Chesapeake Utilities Corp.</b>	<b>Gas</b>
<b>Delmarva Power Transmission</b>	<b>Electric</b>
<b>Delmarva Power Distribution</b>	<b>Electric</b>
<b>DeIDOT ITMS</b>	<b>Communications</b>
<b>DeIDOT Weigh In Motion (WIM)</b>	<b>Communications/Electric</b>
<b>PrePass/ACS (CVISN)</b>	<b>Communications</b>
<b>Town of Middletown</b>	<b>Electric</b>
<b>Town of Middletown</b>	<b>Sanitary Sewer</b>
<b>Verizon of Delaware Inc.</b>	<b>Telephone</b>

The following is a breakdown of the utilities involved, adjustments and/or relocations as required (all station counts, offsets, lengths, working days and calendar days are approximate):

**Artesian Water Company, Inc.**

Artesian Water Company, Inc. (Artesian) maintains a 12-in DIP transmission main within the project limits. The main begins on the east side of Middletown Warwick Road at Station 737+75 and continues to Station 741+20, where it crosses under Middletown Warwick Road. A 12" waterline is also located along the north side of Levels Road from Sta. 661+00 and east to beyond the project limits. The main was installed in 2007 during State Contract 25-128-03: Levels Rd., MOT Charter School to Rt. 301 and is in excellent condition. There is one (1) existing fire hydrant located right of Levels Road, at Station 660+90 Right, and the existing 12" water line is encased in steel beneath Levels Road at Station 661+00 and beneath Middletown Warwick Road at Station 741+20.

Artesian completed adjustments and relocations to its existing facilities in advance of construction. At Levels Road Station 661+00 left, Artesian removed existing facilities and installed pipe and appurtenances required to extend the existing steel casing beyond the proposed edge of pavement. At Levels Road Station 661+00 to 661+50 right, Artesian installed a new 12 inch DIP and appurtenances required to establish a connection between their water facilities on Middletown Warwick Road and Levels Road. From Middletown Warwick Road Station 740+85 to 741+50 left, Artesian removed existing facilities and installed pipe and appurtenances required to extend the existing steel casing beyond the edge of pavement and shift the water main alignment beyond the proposed sidewalk. The 12 inch DIP was extended to the east at Station 741+50 left, to connect to a privately maintained 12 inch water line at Station 742+50 left. A fire hydrant was installed at Station 742+00 left.

## UTILITY STATEMENT

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.

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### **Atlantic Broadband**

Atlantic Broadband maintains aerial fiber optic communication facilities on Delmarva Poles along the west side of Levels Road beginning at Middletown Warwick Road and continuing south beyond the project limits. In addition, Atlantic Broadband maintains existing underground conduit that begins at an existing Delmarva pole on Levels Road at Station 663+47 right and crossing under Levels Road at Station 663+50 continuing east onto private property. There are no anticipated relocations required for the existing aerial or underground fiber optic lines that Atlantic Broadband maintains on Levels Road.

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.

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### **Chesapeake Utilities Corporation**

Chesapeake Utilities Corporation maintains one existing 6" PVC gas main on Levels Road at the intersection with Patriot Drive. There are no anticipated relocations required for the existing 6" PVC gas line that Chesapeake Utilities Corporation maintains on Levels Road and Patriot Drive.

Chesapeake Utilities Corporation proposes the following proposed facilities at the following locations:

1. Chesapeake will install 10" HDPE casing, line markers and casing vent pipe infrastructure as shown on the utility relocation plans, crossing proposed US 301 at Station 216+50 and Warwick Road at Station 1246+65.
2. Chesapeake will install 10" HDPE casing and casing vent pipe infrastructure as shown on the utility relocation plans, crossing Middleneck Road at Station 30+95.

Chesapeake Utilities will install the proposed facilities within 14 calendar days after receiving a minimum 30 calendar day notice that the work is to begin, Middleneck Road has been closed, the right-of-way and proposed improvements have been staked out and access is provided to the work area.

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.

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## UTILITY STATEMENT

### Delmarva Power Transmission (Electric)

Delmarva Power Transmission maintains the following facilities within the project limits:

1. Delmarva Power Transmission maintains two (2) separate high power transmission lines, one 138kV line located on mono poles and one 230kV line located on steel lattice towers. Both lines begin outside of the project limits on the east side of US 301 heading north crossing Strawberry Lane and crossing US 301 at Station 139+50 and Station 141+50 to the west side.

The existing 138kV line has been relocated to prepare for construction of the proposed bridge carrying Strawberry Lane over Mainline US 301. Revised tower relocations that were completed within the project limits are listed below:

- Tower #56 – Relocated to Station 184+43, Offset 1032' Left
- Tower #57 – Relocated to Station 176+81, Offset 877' Left
- Tower #58 – Relocated to Station 169+48, Offset 731' Left
- Tower #59 – Relocated to Station 161+90, Offset 579' Left
- Tower #60 – Relocated to Station 155+69, Offset 456' Left
- Tower #61 – Relocated to Station 149+28, Offset 325' Left
- Tower #62 – Relocated to Station 142+80, Offset 137' Left
- Tower #63 – Relocated to Station 135+88, Offset 164' Right
- Tower #64 – Relocated to Station 130+45, Offset 485' Right
- Tower #65 – Relocated to Station 125+08, Offset 890' Right
- Tower #66 – Relocated to Station 119+28, Offset 1318, Right
- Tower #67 – Relocated to Station 113+28, Offset 1765' Right

The 138kV and 230kV lines continue heading north on the west side of the project crossing Warwick Road and continue heading north to beyond the project limits.

2. A second 138kV line taps off the 138kV line mentioned in number one above and heads east (Middletown Feed) crossing Warwick Road at Station 1277+40, Levels Interchange Ramp E at Station 409+70, proposed US 301 at Station 247+15 and Levels Interchange Ramp D at Station 304+60 and continues heading east to beyond the project limits.

The existing 138kV Middletown Feed has been relocated between proposed US 301 Stations 242+78 and 247+00. Pole #42739-32414 and a pole with no number at Ramp D Sta. 304+60 right were removed and new poles were installed at the following locations (As referenced on the Middletown PEPCO Relocation As Built):

- Pole #32 – Station 245+26, Offset 581' Left (Warwick Road Station 1277+63, 153' Left)
- Pole #31A – Station 242+68, Offset 433' Left (Warwick Road Station 1274+14, 138' Left)
- Pole #31 – Station 242+71, Offset 118' Left
- Pole #30B – Station 242+64, Offset 205' Right
- Pole #30A – Station 244+86, Offset 239' Right

## UTILITY STATEMENT

- Pole #30 – Station 246+97, Offset 281' Right (Ramp D Station 305+14, 138' Right)

There are no anticipated relocations required for either the 138kV or the 230kV aerial lines, or the 138kV Middletown Feed. The Contractor shall exercise extreme caution when performing construction activities in the vicinity of these lines as noted in the contract documents.

Delmarva Power proposes the installation of clearance indicators to its existing facilities, to be installed prior to and for the duration of construction as follows:

Delmarva will install eight clearance indicators on these lines before any construction work begins and will remove the clearance indicators after all work has been completed. Delmarva will require approximately one (1) working day to install and one (1) working day to remove the clearance indicators after they have been given a minimum of fourteen (14) calendar days advance notice that the work is to be performed. This work has been identified as reimbursable work. Delmarva must be provided a notice to proceed by DelDOT prior to performing any work. The State's Contractor shall be responsible for all costs for damage to the clearance indicators resulting from the Contractor's work.

**For the location of the underground facilities, please contact Miss Utility at (800) 282-8555. House Bill # 326 requires contractors/other utilities to call Delmarva Power or other parent electric company for any work surrounding aerial lines that are 600 volts and higher. All contractors/other utilities must also maintain a distance of at least 20'-0" from the energized 138kV or 230kV lines. The Contractor shall note that 16 Delaware Code, Chapter 74B §7405B requires notification to and mutually agreeable measures from the public utility from any person intending to carry on any function, activity, work or operation within dangerous proximity of any high voltage overhead lines.**

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.

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### **Delmarva Power Distribution (Electric)**

Delmarva Power Distribution maintains the following single and three phase 25 kV distribution electric facilities within the project limits:

1. A single phase 25kV line begins on the east side of US 301 at Station 130+80 and continues north along the east side of Middletown Warwick Road to US 301 Station 175+30.
2. In advance of the project, new overhead cables were installed along the east side of Middletown Warwick Road from US 301 Station 175+30, DPL pole #42509-31728 to US 301 Station 185+80, DPL pole #42547. The overhead line then crosses to the west side of Middletown Warwick Road at US 301 Station 186+00 and continues north along the west side of Middletown Warwick Road from Station 186+00 to Station 191+50, Pole # 42557.

## UTILITY STATEMENT

3. From Station 191+50 (Delmarva Pole #42557) a three-phase service continues to the north along the west side of Middletown Warwick Road to US 301 Station 215+00. The three phase service line continues west from Middleneck Road to the east side of US 301 at Station 216+00 (Delmarva Pole #42636), where it then continues underground crossing US 301 at Station 217+30 to an existing pole on the north side of Middleneck Road, where it continues overhead along the north side of Middleneck Road to the project limit.
4. An overhead line crosses Middletown Warwick Road at US 301 Station 188+00.
5. An overhead line crosses Middletown Warwick Road at US 301 Station 195+00.
6. There is a pole line that begins on the east side of US 301 at Station 138+00 crossing US 301 to a pole at Station 138+40 and continuing west on the south side of Strawberry Lane to Station 1004+50.
7. In advance of the project, Delmarva Power installed a new overhead line on the south side of Strawberry Lane between Station 1016+60 and Station 1021+00. The overhead line connected to a previously existing overhead line that continues east along Strawberry Lane to beyond the project limit. Delmarva Power abandoned a portion of the underground electric private service line as part of this work at Station 1016+60 Right.
8. There is a pole line that begins on the west side of US 301 at Station 138+40 crossing US 301 and continuing east to a pole at Station 139+80 on the east side of US 301.
9. There is an existing underground line that begins at US 301 Station 179+50 right and continues along the east side of Middletown Warwick Road to US 301 Station 207+00 where it crosses under Middletown Warwick Road to an existing pole on the west side of Middletown Warwick Road.
10. There is an existing underground line that begins at US 301 Station 179+50 right and continues along the east side of Middletown Warwick Road to US 301 Station 185+80 at an existing pole on the east side of Middletown Warwick Road.
11. A three phase line exists on the south side of Levels Road from Station 661+15 to Station 668+00 and also continues west crossing Middletown Warwick Road at Station 738+00 and then heading north and south along the west side of Middletown Warwick Road to beyond the project limit.
12. In advance of the project, Delmarva installed an underground 25kV line under proposed US 301 at Station 187+20 in two (2) 8", concrete encased conduit systems.
13. In advance of the project, Delmarva Power placed underground conduit under proposed US 301 and along Middleneck Road in four (4) 8" concrete encased conduit system from Station 216+50 Right to Station 219+00 left. The overhead crossing at this location was relocated in the underground conduit system.
14. In advance of the project, Delmarva Power installed new poles and overhead cable on Warwick Road from Station 1202+60 right, crossing to the north side of Warwick Road to a new pole at Station 1201+95 left, then north along Warwick Road to Station 1217+30 left, where it then continues east crossing under US 301 at Station 187+20. Delmarva Power also installed new overhead cable on Warwick Road from Station 1211+20 left, north to an existing private pole.
15. There is a private 3-phase, 25kV overhead pole line and underground service that is not owned by Delmarva Power (privately owned) along the farm property (Poole Ventures, LLC) crossing Ramp D at Station 311+85. Service to this pole line has been terminated and removed at existing Middletown Warwick Road, and the existing underground portion of the line has been abandoned in place.

## UTILITY STATEMENT

Delmarva Power proposes the following adjustments and/or relocations to its existing facilities. All adjustments or relocations shall be performed so that there are no unnecessary disruptions of services.

1. Remove the existing single phase 25kV line and associated poles, guys and meters on the east side of US 301 from Station 130+80 heading north to Station 156+85 and between Station 158+35 and Station 165+00. DP&L and Verizon poles and lines to remain between Station 156+85 and Station 158+35.

Delmarva Power will complete this work. Costs associated with this work will be billed under WR 6108297. These relocations/adjustments are expected to take approximately 5 calendar days to complete after Delmarva Power has been given a minimum of 30 days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's Contractor, clearing and grubbing has been performed, cuts and fills have been completed to within one foot of final grades and the relocations have been made accessible. Delmarva Power's lead time for cable and associated materials is approximately 16-23 weeks.

2. Remove the existing single phase 25kV line and associated poles, guys and meters at Station 138+00 on the east side of US 301 and crossing US 301 and continuing west on the south side of Strawberry Lane to Station 1004+50.

Delmarva Power will complete this work. Costs associated with this work will be billed under WR 6108297. These relocations/adjustments are expected to take approximately 10 calendar days to complete after Delmarva Power has been given a minimum of 30 days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's Contractor, clearing and grubbing has been performed, cuts and fills have been completed to within one foot of final grades and the relocations have been made accessible. Delmarva Power's lead time for cable and associated materials is approximately 16-23 weeks.

3. The pole line that begins on the west side of US 301 at Station 138+40 crossing US 301 and continuing east to a pole at Station 139+80 on the east side of US 301 and Strawberry Lane will be removed as a part of the project.

Delmarva Power will complete this work. Costs associated with this work will be billed under WR 6108297. These relocations/adjustments are expected to take approximately 10 calendar days to complete after Delmarva Power has been given a minimum of 30 days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's Contractor, clearing and grubbing has been performed, cuts and fills have been completed to within one foot of final grades and the relocations have been made accessible. Delmarva Power's lead time for cable and associated materials is approximately 16-23 weeks.

## UTILITY STATEMENT

4. DPL pole #42592 31999, located at Station 203+15 right, shall remain in the location as shown on the plans, but the Contractor shall contact Delmarva Power during construction to determine if a temporary brace is needed to support the pole during excavation activities. There are no anticipated relocations or adjustments needed for the existing underground line along the east side of Middletown Warwick Road between Station 179+50 and Station 207+00.
5. Delmarva Power's Point of Service #3 for two (2) DelDOT Electric services to feed proposed roadway lighting, ITMS, and ramp tolling facilities will be provided from DPL pole #42953-32339 located at Station 740+25 left.

In addition to the above adjustments and/or relocation of its existing facilities, Delmarva Power proposes the following new facilities for the project. All tie-ins to existing services shall be performed so that there are no unnecessary disruptions of services.

### **US 301 at Strawberry Lane (DelDOT Private Service from Pole #42340 to Equipment in MD):**

An existing 200A service was installed as a part of State Contract 23-500-38 and is located on northbound US 301, approximately 3000' south of the Delaware/Maryland state line in Cecil County, Maryland. This State owned and maintained underground single phase, 25kV service extends between utility pole #42340 located just north of the state line at US 301 Station 130+80 Right, to WIM/CVISN equipment site located along northbound US 301 near Station 94+30. Delmarva will be removing the existing wires on Verizon owned poles due to the proposed DA (Denial of Access) line. This will require DelDOT to relocate their private service to a new underground service location crossing US 301 at STA. 137+30. This service continues along Strawberry Lane to an existing pole at Station 1016+60, #42424/31358 (Delmarva Power's Point of Service #1). See WIM and CVISN Plans in the contract documents.

Delmarva Power will complete these changes to the new pole and point of service. Costs associated with this work will be billed under WR 6093036. These proposed facilities are expected to take approximately 15 calendar days to complete after Delmarva Power has been given a minimum of 30 days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's Contractor, clearing and grubbing has been performed, cuts and fills have been completed to within one foot of final grades and the relocations have been made accessible. The lead time for cable and associated materials is approximately 16-23 weeks. The lead time to procure these materials could possibly increase due to the economic situation and suppliers eliminating shifts. These changes have been identified as reimbursable work. Delmarva must be provided a notice to proceed by DelDOT prior to ordering materials or performing any work. Work beyond the point of service pole shall be performed by the State's Contractor as described in the contract documents.

## UTILITY STATEMENT

### **Middletown Warwick Road – Weigh Station**

DelDOT owns a private underground service that feeds the existing Weigh Station. Delmarva will be removing the existing line from US 301 Station 158+35 to Station 165+00 due to the proposed DA (Denial of Access) line, which will require DelDOT to relocate their private service from the Weigh Station Building to a proposed pole at Middletown Warwick Road Station 1121+40 left, as shown on the utility relocation plans. Delmarva will install a new underground cable from Pole #42460 at US 301 Station 158+35 right and continuing east under Ramp B in a 4" conduit and continue to a new pole at Middletown Warwick Road Station 1121+40 left. From this pole, aerial lines will cross over Middletown Warwick Road to a pole at Station 1121+70 right and continue north along the east side of Middletown Warwick Road to a pole at Station 1127+75.

Delmarva Power will complete this work. Costs associated with this work will be billed under WR 6108224. These proposed facilities are expected to take approximately 40 calendar days to complete after Delmarva Power has been given a minimum of 30 days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's Contractor, clearing and grubbing has been performed, cuts and fills have been completed to within one foot of final grades and the relocations have been made accessible. These changes have been identified as reimbursable work. Delmarva Power's lead time for cable and associated materials is approximately 16-23 weeks.

### **Middletown Warwick Road & Warwick Road Intersection**

Power for the Middletown Warwick Road/Warwick Road temporary traffic signal in Phase 2 will need to be provided from Delmarva pole #42509-31728 on Middletown Warwick Road at US 301 Station 175+05, right. Underground conduit will need to be installed to connect to the temporary signal cabinet on the southeast corner of the intersection.

Install new line on west side of Middletown Warwick Road at Station 206+10 to feed proposed Toll Plaza (Delmarva Power's Point of Service #2). New line will connect to existing Delmarva pole #42606-32036 on Middletown Warwick Road at US 301 Station 206+87, right.

Delmarva Power will complete this work. Costs associated with this work will be billed under WR 6107615. These proposed facilities are expected to take approximately 10 calendar days to complete after Delmarva Power has been given a minimum of 30 days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's Contractor, clearing and grubbing has been performed, cuts and fills have been completed to within one foot of final grades and the relocations have been made accessible. Delmarva Power's lead time for cable and associated materials is approximately 16-23 weeks.

**For the location of the underground facilities, please contact Miss Utility at (800) 282-8555. House Bill # 326 requires contractors/other utilities to call Delmarva Power or other parent electric company for any work surrounding aerial lines that are 600 volts and higher. All contractors/other utilities must also maintain a distance of at least 20'-0" from the energized 138 or 230 kV lines. The Contractor shall note that 16 Delaware Code, Chapter 74B §7405B requires notification to and mutually agreeable measures from the public**

## UTILITY STATEMENT

utility from any person intending to carry on any function, activity, work or operation within dangerous proximity of any high voltage overhead lines.

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.

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### **DelDOT Weigh in Motion (WIM)**

DelDOT maintains the following WIM facilities along NB US 301 from Station 94+00 in Maryland to Station 157+00 in Delaware for the US 301 truck weigh station system which is within the project limits:

- Over Height Detection
- WIM Scale and detection loops
- Variable Message Signs (VMS) with inductive loops at 3 sites
- Compliance and deceleration ramp loops
- Conduit and junction wells for power and communications

During construction it will be required that the existing WIM facilities be maintained until Phase 5 of Construction. Attached to the utility statement is a temporary WIM power scheme that will need to be maintained by Delmarva Power Distribution and the State's contractor during construction. See Delmarva Power Distribution for additional information.

The existing, new and relocated facilities are shown in the contract plans. The proposed work will be performed by the State's contractor using Standard and Special Provision Item Numbers as applicable.

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.

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### **DelDOT ITMS**

DelDOT maintains existing facilities along the west side of Middletown Warwick Road that begin at United Drive and extend north through the Levels Road intersection and beyond the limits of the project.

The existing, new and relocated facilities are shown in the contract plans. The proposed work will be performed by the State's contractor using Standard and Special Provision Item Numbers as applicable.

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.

## UTILITY STATEMENT

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### **PrePass/ACS (CVISN)**

In conjunction with the weigh station equipment owned and operated by DelDOT, Commercial Vehicle Identification System Network (CVISN) equipment is located along NB US 301 between Station 94+50 and Station 153+90. The notification antenna at Station 104+10, Right, and compliance antenna and mast arm at Station 153+90 shall be relocated as shown on the plans.

The existing, new and relocated facilities are shown in the contract plans. The proposed work will be performed by the State's contractor using Standard and Special Provision Item Numbers as applicable.

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.

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### **Town of Middletown (Electric)**

The Town of Middletown maintains the following facilities within the project limits:

1. Aerial lines on Delmarva Power poles crossing Middletown Warwick Road at Station 738+00 just south of Levels Road, and then continuing north on Delmarva Power poles along the west side of existing Middletown Warwick Road to beyond the project limits.
2. Aerial lines on Levels Road, Station 1317+00 right, and then continuing east on the south side of Levels Road to the project limits.

There are no anticipated relocations or adjustments required to the Town of Middletown – Electric facilities.

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.

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### **Town of Middletown (Sanitary Sewer)**

The Town of Middletown maintains a Sanitary Sewer line located on Levels Road and right of Station 1316+50 heading east and crossing under Middletown Warwick Road at Station 738+45 to the limits of work on Levels Road and then south onto Patriot Drive.

The following adjustments and/or relocations are proposed to the existing facilities:



## UTILITY STATEMENT

Install proposed sanitary manhole and 130 LF of 12" PVC Pipe on Levels Road from approximately Station 1316+55 left to Station 1317+07 right to a new sanitary manhole at Station 1317+07, right.

Install proposed sanitary manhole and 75 LF of 12" PVC Pipe on Levels Road from approximately Station 1316+65 right to the new sanitary manhole at Station 1317+07, right.

Install new sanitary manhole on Levels Road at approximately Station 660+60 right and 60 LF of 12" PVC Pipe to the existing manhole at Station 661+25, right.

Remove existing sanitary sewer pipe and manholes on Levels Road from approximately Station 1316+60 right to the proposed manhole at Station 1317+07, right.

All installations, adjustments and relocations to the Town's existing and proposed facilities will be done by the State's Contractor in accordance with the Standard Details and Standard Specifications of the Town of Middletown and as shown in the contract documents.

The sanitary sewer work shall be completed prior to or during the construction activities in this area. The Contractor shall determine the number of days required and show that in his CPM schedule. The Contractor shall provide a minimum of 14 calendar day advance notice to the Town prior to performing any of the sanitary sewer work. The work is not considered complete until accepted by the Town of Middletown.

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.

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### **Verizon of Delaware, Inc.**

Verizon maintains the following aerial facilities within the project limits:

- A1. Line begins on the east side US 301 at station 130+80 and heads north to a recently placed pole on the east side of Middletown Warwick Road, at US 301 Station 187+50 right. The line then crosses Middletown Warwick Road to the west side. The line continues overhead, heading north along the west side of Middletown Warwick Road to the project limits at US 301 Station 212+00. Fiber Optic Line was recently installed along a portion of this aerial line beginning at station 130+80 and heading north to pole #7 (Verizon) at US 301 Station 157+00 right.
- A2. Line begins outside of the project limits on the north side of Warwick Road at Station 1201+90 left. In advance of the project, Verizon installed new overhead conduit along Warwick Road from Delmarva Pole at Station 1202+60 right, crossing to north side of Warwick Road to a Delmarva pole at Station 1201+95 left, then north along Warwick Road to Station 1217+30 left, where it then continues east crossing under US 301 at Station 187+00 within the existing conduit recently placed and terminating at a pole on the south side of US 301 at Station 187+50 right.

## UTILITY STATEMENT

- A3. Line begins outside of the project limits on the north side of Middletown Warwick Road Station 732+00 left, and heads east and crosses over the intersection of Levels Road where the line continues east on the north side of Middletown Warwick Road to the project limits at Middletown Warwick Road station 748+00.

Verizon maintains the following underground facilities within the project limits:

- U1. Line begins right of Strawberry Lane Sta. 1004+50 at pedestal WH 132 B-2 and heads east along the south side of Strawberry Lane, crossing US 301 at Sta. 138+00 and continuing east to beyond the project limits.
- U2. Line begins on the east side of Middletown Warwick Road at US 301 Station 175+30 on pole #WH 134, and the line continues to head north along Middletown Warwick Road to pedestal WH 113 at Station 206+90.
- U3. Line located along the south side of Warwick Road beginning beyond the western project limits and heading east to pedestal WH 142 at Station 1202+40 right. The line was recently abandoned beginning at this location and to the east. The abandoned line continues heading east along the south side of Warwick Road, crossing US 301 at Station 177+60, and continues east, crossing Middletown-Warwick Road and then heading north along the east side of Middletown-Warwick Road to a pole right of US 301 Station 187+60. The line is abandoned in place.
- U4. Verizon recently relocated the existing underground conduit under proposed US 301 and along Middleneck Road from Station 216+00 Right to Station 219+00 left. The original adjacent line at this location has been abandoned in place, as shown on the plans.
- U5. Abandoned line begins on the south side of Warwick Road near Station 1206+50, right and heads north crossing Warwick Road and then east to US 301 at Station 180+00 and then heads west crossing Warwick Road at Station 1211+40. The abandoned line joins an active line at Station 1212+25 left, and continues to outside the project limits.
- U6. Abandoned line begins at the intersection of Levels Road and Middletown Warwick Road. Line heads north and south on the east side of Middletown Warwick Road and has been abandoned in place.
- U7. Verizon recently installed conduit for a line that crosses Warwick Road at Station 1217+00 and crosses proposed US 301 at Station 187+00 and continues to a pole on the west side of Middletown Warwick Road.

## UTILITY STATEMENT

Verizon proposes the following adjustments and/or relocations to its existing facilities:

***Relocations as discussed with Verizon are shown on the plans and described below:***

- A1. Remove the existing aerial lines and associated poles and guys on the east side of US 301 from Station 130+80 heading north to Station 156+85 and between Station 158+35 and Station 165+00. Fiber optic aerial lines beginning at station 130+80 and heading north to pole #7 (Verizon) at US 301 Station 157+00 right also to be relocated. DP&L and Verizon poles and lines to remain between Station 156+85 and Station 158+35. All poles and lines to the north of Station 165+00 to remain.

Verizon of Delaware will complete this work after the area behind the weigh station to Strawberry Lane has been cleared and brought to a rough grade within 6" of proposed grade. These relocations/adjustments are expected to take approximately 25 calendar days to complete after Verizon of Delaware has been given a minimum of 30 calendar days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's contractor and that Delmarva Power Distribution and Atlantic Broadband have completed their relocations.

- A2. There are no anticipated relocations or adjustments needed for the existing Verizon facilities along the west side of Warwick Road from Station 1201+95 left, then north along Warwick Road to Station 1217+30 left.
- A3. There are no anticipated relocations or adjustments needed for the existing Verizon facilities along the west side of Middletown Warwick Road between Station 732+00 and 748+00.

- U1. The existing line that begins on the south side of Strawberry Lane Sta. 1004+50 at pedestal WH 132 B-2 will be removed between Station 1004+50 and 1021+85. A new underground line will be installed from Delmarva Pole # 24475 at Station 1021+50, then continue west to Station 1015+15 where it will cross over Strawberry Lane and continue north along the east side of Middletown Warwick Road, where it will transition to an overhead line at station 1110+00 Right and continue overhead along the east side of Middletown Warwick Road until it rejoins the existing overhead line at Station 1127+50 Right.

Verizon of Delaware will complete this work. These relocations/adjustments are expected to take approximately 25 calendar days to complete after Verizon of Delaware has been given a minimum of 30 calendar days advance notice that work shall begin and the right-of-way and proposed work has been laid out in the field by the State's contractor and that Delmarva Power Distribution and Atlantic Broadband have completed their relocations.

- U2. There are no anticipated relocations or adjustments needed for the abandoned Verizon line that begins on the east side of Middletown Warwick Road at US 301 Station 175+30 and continues to head north along Middletown Warwick Road at Station 206+90.

## UTILITY STATEMENT

- U3. There are no anticipated relocations or adjustments needed for the abandoned Verizon line located along the south side of Warwick Road has been beginning at Station 1202+40 right and continuing east along the south side of Warwick Road. The abandoned line continues south crossing US 301 at Station 177+60, crossing Middletown-Warwick Road and then heading north along the east side of Middletown-Warwick Road to a pole right of US 301 Station 187+60. The line is abandoned in place.
- U4. Verizon recently relocated the existing underground conduit under proposed US 301 and along Middleneck from Station 216+00 Right to Station 219+00 left, and abandoned the adjacent line in place. No additional relocations are anticipated at this location.
- U5. There are no anticipated relocations or adjustments needed for the abandoned Verizon line along the south side of Warwick Road from Station 1206+50, right and heading north crossing Warwick Road and then east to US 301 at Station 180+00 and then heading west crossing Warwick Road at Station 1211+40. The abandoned line joins an active line at Station 1212+25 left, and continues to outside the project limits. No additional relocations are anticipated at this location.
- U6. There are no anticipated relocations or adjustments needed for the abandoned Verizon facilities along the east side of Middletown Warwick Road.
- U7. There are no anticipated relocations or adjustments needed for the recently placed conduit that crosses Warwick Road at Station 1217+00 and crosses proposed US 301 at Station 187+00 and continues to a pole on the west side of Middletown Warwick Road.

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.

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## UTILITY STATEMENT

### **GENERAL NOTES:**

1. The contractor's attention is directed to Section 105.09 Utilities, Delaware Standard Specifications, August 2001. The Contractor shall contact Miss Utility (1-800-282-8555) two working days prior to any excavation. The Contractor is responsible for the support and protection of all utilities when excavating. The Contractor is responsible for ensuring proper clearances, including safety clearances, from overhead utilities for construction equipment. The contractor is advised to check the site for access purposes for his equipment and, if necessary, make arrangements directly with utility companies for field adjustments for adequate clearances.
2. It is understood and agreed that the contractor has considered in their 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.
3. 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.
4. 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.
5. As outlined in Chapter 3 of the DelDOT Utilities Manual, utilities are responsible for obtaining all required permits from municipal, State and federal government agencies and railroads. This includes but is not limited to water quality permits/DNREC Water Quality Certification, DNREC Subaqueous Lands/Wetlands permits, DNREC Coastal Zone Consistency Certification, County Floodplain permits (New Castle County only), U.S. Coast Guard permits, US Army Corps 404 permits, sediment and erosion permits, and railroad crossing permits.
6. 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.

UTILITY STATEMENT

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.

**UTILITY CONTACT LIST:**

NAME	COMPANY	PHONE
Mr. Carmen Hunter	Artesian Water Company	302-453-7153
Mr. Wesley Page	Atlantic Broadband	410-827-6441
Mr. Mark Parker	Chesapeake Utilities Corp.	302-734-6797
Mr. Matthew Parkhurst	Delmarva Power Transmission	302-454-4850
Mr. Angel Collazo	Delmarva Power Distribution	302- 454-4370
Ms. Susan Martin	PrePass/ACS (CVISN)	602-412-2080
Mr. Shawn Lane	Town of Middletown (Electric)	302- 378-5143
Mr. George Zang	Verizon of Delaware	302-422-1238

**Prepared and Recommended by:**

  
Sean Hinze, P.E., JACOBS


29 JUNE 15  
DATE

**Approved as to form by:**

  
US301 GEC

6/29/15  
DATE

**Approved as to form by**

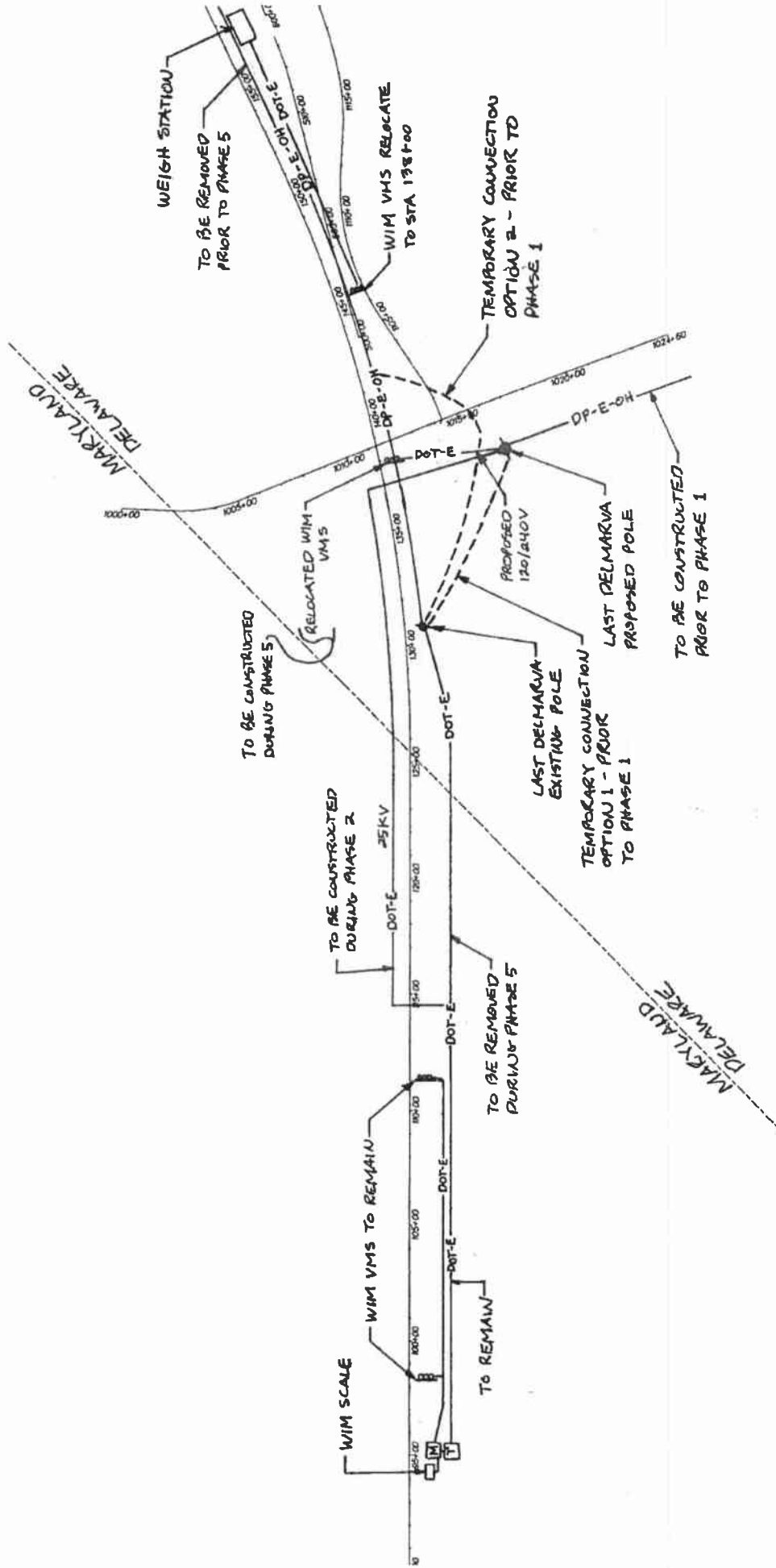
  
Utilities Section, DeIDOT

7/2/15  
DATE

UTILITY STATEMENT TIMING TO BE UPDATED UPON RECEIPT OF CONSTRUCTION START DATE FROM GEC - 01.16.2015

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24	Month 25	Month 26	Month 27	Month 28
Roadway Construction																												
Phase 1 (Maryland Crossover Construction)																												
Phase 2A (Earthwork Operations)																												
Phase 2B (Paving Operations)																												
Phase 3 (Warwick Road Construction)																												
Phase 4 (Maryland/Warwick Crossover Construction)																												
Phase 5 (Northbound Main Line Construction)																												
Phase 6 (Maryland Crossover Removal)																												
Concurrent Relocations																												
Atlantic Broadband																												
Chesapeake Utilities Corp.																												
Delmarva Power Transmission (Clearance Indicators)																												
Delmarva Power Distribution (Multiple Locations)																												
US 301 Mainline																												
Route 299																												
DeDOT ITMS																												
DeDOT Weigh In Motion (WIM)																												
PrePass/ACS (CVISN)																												
Town of Middletown (Electric)																												
Town of Middletown (Sanitary Sewer)																												
Venzon of Delaware Inc. (Strawberry Lane)																												

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."



**POWER SERVICE SOUTH OF STRAWBERRY LN.**

January 16, 2015; Page 18 of 18 State Contract No. T200811301 US 301 Section 3, Maryland State Line to Levels Road New Castle County



STATE OF DELAWARE  
DEPARTMENT OF TRANSPORTATION  
PO BOX 778  
DOVER, DELAWARE 19903

CERTIFICATE OF RIGHT-OF-WAY STATUS

STATE PROJECT NO. T200811301

F.A.P. NO. NNNH-2006(18)

US 301, MARYLAND STATE LINE TO LEVELS ROAD

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 Right-of-Way

October 9, 2015



STATE OF DELAWARE  
**DEPARTMENT OF TRANSPORTATION**  
800 BAY ROAD  
P.O. BOX 778  
DOVER, DELAWARE 19903

JENNIFER COHAN  
SECRETARY

June 18, 2015

**STIPULATED**

**ENVIRONMENTAL REQUIREMENTS**

for

U.S. 301, Maryland State Line to Levels Road (Contract #3)  
State Contract No.: T200811301  
Federal Aid Project Number: NH-2015(20)

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 01-30-2012**, SP-233/11, Expiration 01-30-2017
- DNREC – 401 Water Quality Certification – **Approved 01-30-2012**, WQ-276/11, Expiration 01-30-2017

- DNREC – Coastal Zone Consistency – **Approved 09-14-2007, modification of condition 3 – 04-04-2011** – No expiration
- New Castle County Floodplain Permit – **Approved 01-31-2012**, SLD# 20110732 – No expiration
- Maryland Department of the Environment (MDE) Water Management Administration Nontidal Wetlands and Waterways Permit- **Approved 12-13-2011 modification on 12-13-2014**, 10-NT-0112/2010603687, Expiration 12-13-2017
- Maryland Department of the Environment (MDE) Stormwater Management and Sediment & Erosion Control – **Pending**
- Maryland Department of the Environment (MDE) NPDES Discharge Permit – **Pending**

#### SPECIFIC REQUIREMENTS:

Compliance with all requirements of the permits is the responsibility of the contractor. The contractor will follow all special conditions or requirements as stated within those permits or as indicated below. The contractor will be subject to penalties, fines, and the risk of shut down as mandated by law if conditions of the permits or other additional requirements are violated or ignored.

Additional requirements by DelDOT not specified within the permits, but listed below, or on the Environmental Compliance Sheets are also the responsibility of the contractor and are subject to risk of shut down at the contractor's expense.

1. The contractor shall employ measures during construction to prevent spills of fuels, or lubricants, if a spill should occur, efforts shall be undertaken to prevent its entry into wetlands, aquatic, or drainage areas. Any spills entering wetlands, aquatic, or drainage areas shall be removed immediately. The Division of Water Resources (DNREC), Wetlands & Aquatic Protection Branch, 302-739-4691, shall be notified of any spill(s) within six (6) hours of their occurrence. That office will determine the effectiveness of spill and contamination removal and specify remediation efforts as necessary.
2. All construction debris, excavated material, brush, rocks, and refuse incidental to such work shall be placed either on shore above the influence of flood waters or on some suitable disposal site approved by the department.
3. The disposal of trees, brush, and other debris in any stream corridor, wetland surface water or any drainage ditch is prohibited.
4. There shall be no stockpiling of construction materials or temporary fills in wetlands or subaqueous lands unless otherwise specified on project plans and approved by permitting

agencies that govern them. It is the contractor's responsibility to coordinate and secure those additional permits/amendments in deviating from the plan.

5. The effort shall be made to keep construction debris from entering adjacent waterways, wetlands, ground cover, or drainage areas. Any debris that enters these areas shall be removed immediately. Netting, mats, or establishing confined work areas in stages may be necessary to address these issues.
6. If routine maintenance of worker equipment and heavy machinery is necessary during the construction period, refuse material is prohibited from being disposed or deposited onto or into the ground. All used oils and filters must be recycled or disposed of properly.
7. Harmful chemical wash water applied to clean equipment or machinery shall be discouraged. If undertaken, the residue water and/or material must be collected or contained such that it will be disposed of properly. By no means, shall it be deposited or disposed of in waterways, streams, wetlands, or drainage areas.
8. The contractor shall follow all requirements as indicated in the Environmental Compliance Sheet. It will be the contractor's responsibility, expense, & effort to ensure that workers also follow these requirements. As part of the restrictions, please note the timetables reflected in the contract for the in-stream/water work for endangered species protection.

9. **Environmental Monitor:**

DelDOT has designated an environmental monitoring team to help and ensure compliance with the Project's environmental commitments contained in NEPA documentation, Permits, and shown on the Environmental Compliance Sheets. The environmental monitoring team will attend relevant pre-construction and construction meetings and monitor construction activities adjacent to protected resources. The environmental monitoring team will track compliance with Project commitments and report regularly to DelDOT Environmental Studies. The environmental monitor will work closely with the Engineer to resolve any environmental issues, or concerns in a timely but environmentally suitable fashion.

10. **Resource Protection Fence:**

Resource protection fence is being used to prevent impacts to sensitive resources near the Project. Resource protection fence is shown in the Project's Environmental Compliance Sheets and shall be installed immediately after stakeout of the LOC. The Contractor shall ensure that all employees understand and comply with the purpose of the resource protection fence.

**CULTURAL RESOURCE REQUIREMENTS:**

1. The contractor will submit to the District, the location(s) of permanent disposal sites to be used for the disposition of clean wasted materials resulting from the construction contract. The contractor will submit at the Preconstruction meeting, a location map and a plot plan (sketch or diagram) of where on the property clean wasted material is to be placed. The limits of the site(s) will be physically staked or surveyed on the property. The District will submit the contractor's disposal site location(s) to the State Historic Preservation Office for approval.

The SHPO will determine if a cultural resource survey is required before the site can be approved. If additional survey work is required, it will be the contractor's responsibility to hire a qualified professional to assess the site(s) for the presence or absence of cultural resources (i.e. historic or prehistoric archeological sites). The contractor's consultant will be responsible for producing documentation of the survey results for submission to the SHPO.

If the contractor proposes the use of disposal sites outside the State of Delaware, the contractor must provide written approval from the State Historic Preservation Office of each respective state.

A project's disposal operation will not commence until the SHPO has notified the DelDOT District office that the site location(s) is approved for use.

The use of the disposal site will not result in discharge of materials into the Corps of Engineer or DNREC jurisdictional wetlands or waters. It is the responsibility of the contractor to provide any site surveys or wetland delineations needed to preclude wetland encroachment.

The contractor will be responsible for all sediment and erosion control measures and subsequent approvals required for the disposal site(s) operations.

It is the contractor's responsibility to obtain all other appropriate Federal, State, or local approvals required by law for use of the disposal site(s).

#### NATURAL RESOURCES SPECIFIC REQUIREMENTS :

The contractor shall pay special attention to specific construction requirements listed below [**MDE conditions unless noted**]:

The following requirements apply to activities taking place in Maryland.

1. Disposal of Excess: Unless otherwise shown on the Approved Plan, all excess fill, spoil material, debris, and construction material shall be disposed of outside of nontidal wetlands, nontidal wetlands buffers, and the 100-year floodplain, and in a location and manner which does not adversely impact surface or subsurface water flow into or out of nontidal wetlands.

2. Temporary Staging Areas: Temporary construction trailers or structures, staging areas and stockpiles shall not be located within nontidal wetlands, nontidal wetlands buffers, or the 100-year floodplain unless specifically included on the Approved Plan.
3. Instream Construction Prohibition: To protect important aquatic species, motor driven construction equipment shall not be allowed within stream channels unless on authorized ford crossings. Activities within stream channels are prohibited as determined by the classification of the stream (COMAR 26.08.02.08): Sassafra River is a Use 1 waterway; in-stream work may not be conducted from March 1 through June 15 inclusive, of any year.
4. Minimum Disturbance: Any disturbance of stream banks, channel bottom, wetlands, and wetlands buffer authorized by Permit or Approved Plan shall be the minimum necessary to conduct permitted activities. All disturbed areas shall be stabilized vegetatively no later than seven (7) days after construction is completed or in accordance with the approved grading or sediment and erosion control plan.

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. Culverts conveying the stream base flow, and capable of passing aquatic life, will be depressed so that a natural substrate will accumulate in the culvert. The Permittee shall design culverts to address the specific geomorphic characteristics of the stream to avoid downstream scour and channel degradation, and to maintain ecological functions such as aquatic habitat, flood attenuation, sediment transport, and stream channel stability.
8. In order to maintain stream channel connectivity at U.S. 301 Station 126+00, the following additional culvert designs shall be implemented at this station: a) The culvert invert shall be installed at a depth of at least 12 inches below the existing streambed in alignment with the thalweg of the stream, b) The riprap at the inlet and/or outlet of the culverts shall be placed in the stream so that the top of the riprap is at the same elevation as the invert of the culvert, c) The riprap placed at the inlet and/or outlet of the culvert shall then be choked with clean materials to fill voids, and d) The stream shall be backfilled with natural streambed materials to match the pre disturbance elevations of the stream. **[DNREC]**

9. 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.
10. 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]**
11. 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 DeIDOT.
12. Where utility lines are being relocated by DeIDOT and pass through or along the boundaries of wetland areas, measures must be taken to prevent the porous bedding and backfill material from acting as a French drain that would drain the wetland. Examples of acceptable measures would be clay collars or trench plugs installed, at a minimum, every 100 feet, with a collar located at the entrance point and exit point of the utility lines into and out of the wetland area.
13. 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.
14. 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.:**

**Federal Aid No.:**

**Project Title:**

**The following railroad companies maintain facilities within the contract limits:**

Amtrak	Maryland & Delaware
CSX	Norfolk Southern
Delaware Coast Line	Wilmington & Western
East Penn	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

DATE

**BID PROPOSAL FORMS**

CONTRACT   T200811301.01  

FEDERAL AID PROJECT   NH-2015 (20)

CONTRACT ID: T200811301.01 PROJECT(S): NH-2015 (20)

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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS

SECTION 0001 ROADWAY DE ONLY

0010	201000 CLEARING AND GRUBBING	LUMP		LUMP		
0020	202000 EXCAVATION AND EMBANKMENT	CY	1049186.000			
0030	202515 COMPACTING INSITU MATERIAL	SY	720.000			
0040	202572 BORROW AREA EROSION & SEDIMENT CONTROL & DEWATERING	LUMP		LUMP		
0050	203000 CHANNEL EXCAVATION	CY	110.000			
0060	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	CY	22.000			
0070	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	CY	10228.000			
0080	208001 FLOWABLE FILL	CY	17.000			
0090	209002 BORROW, TYPE B	CY	80814.000			

DELAWARE DEPARTMENT OF TRANSPORTATION  
SCHEDULE OF ITEMS

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0100	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP	LUMP			
0110	211521 ABANDONMENT OF WELLS	EACH	6.000			
0120	212000 UNDERCUT EXCAVATION	CY	1892.000			
0130	302007 GRADED AGGREGATE BASE COURSE, TYPE B	CY	22803.000			
0140	302011 DELAWARE NO. 3 STONE	TON	1380.000			
0150	304501 PERMEABLE TREATED BASE, 4"	SY	129994.000			
0160	304502 SOIL CEMENT BASE COURSE, 6"	SY	126083.000			
0170	304506 PORTLAND CEMENT	TON	2741.000			
0180	401801 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS PG 64-22 (CARBONATE STONE)	TON	4257.000			
0190	401810 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22	TON	15969.000			

DELAWARE DEPARTMENT OF TRANSPORTATION  
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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0200	401819 BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22	19086.000 TON				
0210	401825 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22, WEDGE	3.000 TON				
0220	401827 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22 (NON-CARBONATE STONE)	7916.000 TON				
0230	501006 PORTLAND CEMENT CONCRETE PAVEMENT, 12"	129978.000 SY				
0240	605755 OVERHEAD SIGN SUPPORTS AND FOUNDATIONS	LUMP	LUMP			
0250	612020 REINFORCED CONCRETE PIPE, 12", CLASS IV	696.000 LF				
0260	612022 REINFORCED CONCRETE PIPE, 18", CLASS IV	5973.000 LF				
0270	612023 REINFORCED CONCRETE PIPE, 24", CLASS IV	2800.000 LF				
0280	612025 REINFORCED CONCRETE PIPE, 30", CLASS IV	2426.000 LF				

DELAWARE DEPARTMENT OF TRANSPORTATION  
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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0290	612026 REINFORCED CONCRETE PIPE, 30", CLASS V	176.000 LF				
0300	612027 REINFORCED CONCRETE PIPE, 42", CLASS IV	945.000 LF				
0310	612028 REINFORCED CONCRETE PIPE, 48", CLASS IV	206.000 LF				
0320	612030 REINFORCED CONCRETE PIPE, 18", CLASS V	304.000 LF				
0330	612031 REINFORCED CONCRETE PIPE, 24", CLASS V	528.000 LF				
0340	612034 REINFORCED CONCRETE PIPE, 36", CLASS IV	777.000 LF				
0350	612038 REINFORCED CONCRETE PIPE, 60", CLASS IV	1065.000 LF				
0360	612049 REINFORCED CONCRETE PIPE, 12", CLASS V	140.000 LF				
0370	612205 REINFORCED CONCRETE ELLIPTICAL PIPE, 19"X30", CLASS IV	679.000 LF				
0380	612216 REINFORCED CONCRETE ELLIPTICAL PIPE, 14"X23", CLASS IV	816.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0390	612219 REINFORCED CONCRETE ELLIPTICAL PIPE, 24"X38", CLASS IV	394.000 LF				
0400	612535 CLEANING DRAINAGE PIPE, 15"-24" DIA	858.000 LF				
0410	612536 CLEANING DRAINAGE PIPE, GREATER THAN 24" DIA	296.000 LF				
0420	617001 REINFORCED CONCRETE FLARED END SECTION, 12"	15.000 EACH				
0430	617003 REINFORCED CONCRETE FLARED END SECTION, 18"	51.000 EACH				
0440	617005 REINFORCED CONCRETE FLARED END SECTION, 24"	19.000 EACH				
0450	617007 REINFORCED CONCRETE FLARED END SECTION, 30"	12.000 EACH				
0460	617164 REINFORCED CONCRETE FLARED END SECTION, 19" X 30"	4.000 EACH				
0470	617165 REINFORCED CONCRETE FLARED END SECTION, 14" X 23"	4.000 EACH				
0480	617174 REINFORCED CONCRETE FLARED END SECTION, 24" X 38"	2.000 EACH				



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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0490	617518 DRAINAGE HEADWALLS, MODIFIED	LUMP	LUMP			
0500	701011 PORTLAND CEMENT CONCRETE CURB, TYPE 2	6204.000 LF				
0510	701012 PORTLAND CEMENT CONCRETE CURB, TYPE 1-4	1877.000 LF				
0520	701016 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 1-4	1408.000 LF				
0530	701022 INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER, TYPE 3-8	3084.000 LF				
0540	705001 P.C.C. SIDEWALK, 4"	6738.000 SF				
0550	705002 P.C.C. SIDEWALK, 6"	29291.000 SF				
0560	705007 SIDEWALK SURFACE DETECTABLE WARNING SYSTEM	100.000 SF				
0570	707005 UNDERDRAIN OUTLET	134.000 EACH				
0580	708050 DRAINAGE INLET, 34" X 18"	17.000 EACH				

DELAWARE DEPARTMENT OF TRANSPORTATION  
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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0590	708051 DRAINAGE INLET, 34" X 24"	EACH 14.000				
0600	708052 DRAINAGE INLET, 48" X 30"	EACH 14.000				
0610	708053 DRAINAGE INLET, 48" X 48"	EACH 12.000				
0620	708055 DRAINAGE INLET, 66" X 48"	EACH 3.000				
0630	708057 DRAINAGE INLET, 72" X 24"	EACH 4.000				
0640	708058 DRAINAGE INLET, 72" X 48"	EACH 3.000				
0650	708105 MANHOLE (SANITARY)	EACH 4.000				
0660	708111 MANHOLE, 48" X 30"	EACH 18.000				
0670	708112 MANHOLE, 48" X 48"	EACH 1.000				
0680	708114 MANHOLE, 66" X 48"	EACH 3.000				

CONTRACT ID: T200811301.01 PROJECT(S): NH-2015 (20)

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0690	708583 PERSONNEL GRATE FOR PIPE INLET	6.000 EACH				
0700	708585 JUNCTION BOX, 48" X 30"	1.000 EACH				
0710	708658 DRAINAGE INLETS, MODIFIED	LUMP	LUMP			
0720	708659 DRAINAGE MANHOLES, MODIFIED	LUMP	LUMP			
0730	712005 RIPRAP, R-4	2154.000 SY				
0740	712006 RIPRAP, R-5	373.000 SY				
0750	712007 RIPRAP, R-6	31.000 SY				
0760	712531 CHANNEL BED FILL	15.000 CY				
0770	713002 GEOTEXTILES, SEPARATION	7306.000 SY				
0780	713003 GEOTEXTILES, RIPRAP	3776.000 SY				

DELAWARE DEPARTMENT OF TRANSPORTATION  
SCHEDULE OF ITEMS

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0790	715001 PERFORATED PIPE UNDERDRAINS, 6"	59887.000 LF				
0800	715500 UNDERDRAIN OUTLET PIPE, 6"	3642.000 LF				
0810	716000 CONVERTING EXISTING DRAINAGE INLET TO JUNCTION BOX	1.000 EACH				
0820	720050 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	6563.000 LF				
0830	720052 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 3-31	2275.000 LF				
0840	720055 CURVED GUARDRAIL SECTION	282.000 LF				
0850	720585 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1-31	5.000 EACH				
0860	720586 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2-31	11.000 EACH				
0870	720588 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 3-31	10.000 EACH				
0880	720611 FLEXIBLE DELINEATOR, PERMANENT	183.000 EACH				

DELAWARE DEPARTMENT OF TRANSPORTATION  
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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0890	720626 CONCRETE SINGLE FACE BARRIER, TYPE I	630.000 LF				
0900	725001 GUARDRAIL TO BARRIER CONNECTION (EXIT TYPE 31)	5.000 EACH				
0910	725002 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31	7.000 EACH				
0920	726001 END ANCHORAGE 31	21.000 EACH				
0930	727000 RIGHT-OF-WAY FENCE	27099.000 LF				
0940	727001 RIGHT-OF-WAY FENCE GATE	3.000 EACH				
0950	727014 CONSTRUCTION SAFETY FENCE	621.000 LF				
0960	727552 RESOURCE PROTECTION FENCE	5636.000 LF				
0970	735501 HERBICIDE APPLICATION, NOXIOUS WEEDS	50.000 ACRE				
0980	737523 PLANTINGS	LUMP		LUMP		

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0990	743000 MAINTENANCE OF TRAFFIC	LUMP	LUMP			
1000	743003 ARROWPANELS, TYPE C	189.000 EADY				
1010	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	317.000 EADY				
1020	743005 FURNISH AND MAINTAIN PORTABLE LIGHT ASSEMBLY	91.000 EADY				
1030	743006 PLASTIC DRUMS	290542.000 EADY				
1040	743007 TRAFFIC OFFICERS	924.000 HOUR	75.00000		69300.00	
1050	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	534.000 EADY				
1060	743015 FURNISH AND MAINTAIN PORTABLE PCC SAFETY BARRIER	1745.000 LF				
1070	743016 RELOCATION PORATBLE SAFETY BARRIER	1960.000 LF				
1080	743023 TEMPORARY BARRICADES, TYPE III	271614.000 LFDY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1090	743024 TEMPORARY WARNING SIGNS AND PLAQUES	65228.000 EADY				
1100	743025 INSTALL TEMPORARY IMPACT ATTENUATOR	11.000 EACH				
1110	743029 FURNISH TEMPORARY IMPACT ATTENUATOR - NON-GATING, REDIRECTIVE, TEST LEVEL 3	9.000 EACH				
1120	743030 RELOCATE TEMPORARY IMPACT ATTENUATOR	3.000 EACH				
1130	743031 ATSSA CERTIFIED TRAFFIC CONTROL SUPERVISOR	1574.000 HOUR				
1140	743056 FLAGGER, NEW CASTLE COUNTY, FEDERAL	5730.000 HOUR				
1150	743065 FLAGGER, NEW CASTLE COUNTY, FEDERAL, OVERTIME	1146.000 HOUR				
1160	744506 CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE	17.000 EACH				
1170	744519 RELOCATION OF EXISTING JUNCTION WELL	8.000 EACH				
1180	744520 CONDUIT JUNCTION WELL, TYPE 1, PRECAST CONCRETE	4.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1190	744523 CONDUIT JUNCTION WELL, TYPE 4, PRECAST CONCRETE	EACH 1.000				
1200	744530 CONDUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/ POLYMER LID-FRAME	EACH 125.000				
1210	744531 CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/ POLYMER LID-FRAME	EACH 56.000				
1220	744541 FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 11	EACH 3.000				
1230	744542 FURNISH & INSTALL FRAME AND LID FOR JUNCTION WELL, TYPE 14	EACH 1.000				
1240	744544 ADJUST OR REPAIR EXISTING CONDUIT JUNCTION WELL	EACH 6.000				
1250	745602 FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)	LF 651.000				
1260	745604 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)	LF 45263.000				
1270	745606 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (TRENCH)	LF 2087.000				



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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1280	745609 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (ON STRUCTURE)	20.000 LF				
1290	746509 RELOCATING LIGHT POLE	13.000 EACH				
1300	746511 CABLES, 1/#4 AWG	3986.000 LF				
1310	746512 CABLES, 1/#6 AWG	33809.000 LF				
1320	746513 CABLES, 1/#8 AWG	318.000 LF				
1330	746515 INSULATED GROUND CABLES, 1/#6	9603.000 LF				
1340	746517 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 30' POLE	19.000 EACH				
1350	746519 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 40' POLE	16.000 EACH				
1360	746527 CABLES, 1/#2 AWG	12711.000 LF				
1370	746541 INSTALLATION OF ELECTRICAL WIRE OR CABLE IN EMPTY CONDUITS	93945.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1380	746564 INSULATED GROUND CABLES, 1/#4	625.000 LF				
1390	746577 INSULATED GROUND CABLE, 1/#8	165.000 LF				
1400	746586 RELOCATE SIGN	140.000 SF				
1410	746590 FURNISH & INSTALL GROUND ROD	8.000 EACH				
1420	746594 LUMINAIRE (HPS), 250 WATT	45.000 EACH				
1430	746595 ALUMINUM LIGHTING STANDARD, 40' POLE	48.000 EACH				
1440	746598 INSULATED GROUND CABLE, 1/#2	3234.000 LF				
1450	746615 PVC SCHEDULE 40 DUCT, 6"	80.000 LF				
1460	746622 CABLES, 1/#4/0 AWG	6868.000 LF				
1470	746653 ELECTRICAL TESTING	LUMP	LUMP			

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1480	746669 LUMINAIRE (HPS), 150 WATTS	19.000 EACH				
1490	746717 ELECTRIC SERVICE ON RACK WITH SERVICE RISER	3.000 EACH				
1500	746817 CABLES, 1/#2/0 AWG	9953.000 LF				
1510	746847 POLE BASE, TYPE 3	4.000 EACH				
1520	746850 POLE BASE, TYPE 4A	4.000 EACH				
1530	746852 POLE BASE, TYPE 6	82.000 EACH				
1540	746861 INSULATED GROUND CABLES, 1/350 KCMIL	6621.000 LF				
1550	746872 LIGHTING CONTROL AND DISTRIBUTION ENCLOSURE	2.000 EACH				
1560	746903 INSULATED GROUND CABLES, 1/#2/0	4033.000 LF				
1570	746904 INSULATED GROUND CABLES, 1/#4/0	1871.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1580	746924 FURNISH & INSTALL LOOP WIRE 1-CONDUCTOR #14 AWG ENCASED IN 1/4" FLEXIBLE TUBING IN A LOOP SAWCUT	3504.000 LF				
1590	746951 RELOCATING POLE & MAST ARM	1.000 EACH				
1600	747515 CABINET BASE, TYPE M	4.000 EACH				
1610	747516 CABINET BASE, TYPE P	3.000 EACH				
1620	748015 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND ALKYD-THERMOPLAST IC	4301.000 SF				
1630	748019 TEMPORARY MARKINGS, PAINT, 4"	9351.000 LF				
1640	748026 TEMPORARY MARKINGS, PAINT SYMBOL/LEGEND	276.000 SF				
1650	748032 TEMPORARY MARKINGS, PAINT, 5"	258.000 LF				
1660	748033 PERMANENT PAVEMENT STRIPING, ALKYD-THERMOPLASTIC, 5"	62.000 LF				

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			DOLLARS	CTS	DOLLARS	CTS
1670	748502 RAISED/RECESSED PAVEMENT MARKER	533.000 EACH				
1680	748525 TEMPORARY MARKINGS, TAPE, 4"	37313.000 LF				
1690	748527 TEMPORARY MARKINGS, TAPE, WORDS/SYMBOLS	520.000 SF				
1700	748530 REMOVAL OF PAVEMENT STRIPING	10624.000 SF				
1710	748548 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"	146717.000 LF				
1720	748549 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"	3812.000 LF				
1730	748553 PREFORMED RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS, BIKE SYMBOL	49.000 EACH				
1740	748557 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"	23558.000 LF				
1750	748566 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 8"	5475.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1760	748567 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 13"	395.000 LF				
1770	749500 SIGN PANEL	2553.000 SF				
1780	749516 REINFORCED CONCRETE SIGN FOUNDATION, W-6	12.000 EACH				
1790	749517 REINFORCED CONCRETE SIGN FOUNDATION, W-8	2.000 EACH				
1800	749518 REINFORCED CONCRETE SIGN FOUNDATION, W-10	4.000 EACH				
1810	749521 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-6	190.000 LF				
1820	749522 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-8	40.000 LF				
1830	749523 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-10	95.000 LF				
1840	749532 SUPPLY OF FLAT SHEET ALUMINUM SIGN PANEL, TYPE IX RETROREFLECTIVE SHEETING	20.000 SF				
1850	749550 INSTALLATION OF BREAKAWAY I-BEAM SIGN POSTS	28.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1860	749581 REINFORCED CONCRETE SIGN FOUNDATION, W-18	10.000 EACH				
1870	749582 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-18	258.000 LF				
1880	749687 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	196.000 EACH				
1890	749688 INSTALLATION OF 4" DIAMETER HOLE, LESS THAN OR EQUAL TO 6" DEPTH	10.000 EACH				
1900	749689 INSTALLATION OF 4" DIAMETER HOLE, GREATER THAN 6" DEPTH	4.000 EACH				
1910	749690 INSTALLATION OR REMOVAL OF TRAFFIC SIGNS ON MULTIPLE SIGN POSTS	1069.000 SF				
1920	753503 INSTALLING SANITARY SEWER, PVC, 12"	262.000 LF				
1930	758000 REMOVAL OF EXISTING PORTLAND CEMENT CONCRETE PAVEMENT, CURB, SIDEWALK, ETC.	19253.000 SY				
1940	759506 FIELD OFFICE, TYPE II.22 SPECIAL COMPLEX	30.000 EAMO				
1950	760012 RUMBLE STRIPS, BIKE-FRIENDLY, HOT-MIX	22362.000 LF				

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			DOLLARS	CTS	DOLLARS	CTS
1960	760017 RUMBLE STRIPS, CONCRETE	59567.000 LF				
1970	760507 PROFILE MILLING, BITUMINOUS CONCRETE	6786.000 SYIN				
1980	762001 SAW CUTTING, BITUMINOUS CONCRETE	4764.000 LF				
1990	762002 SAW CUTTING, CONCRETE, FULL DEPTH	697.000 LF				
2000	763000 INITIAL EXPENSE	LUMP	LUMP			
2010	763501 CONSTRUCTION ENGINEERING	LUMP	LUMP			
2020	763503 TRAINEE	2000.000 HOUR		0.80000		1600.00
2030	763508 PROJECT CONTROL SYSTEM DEVELOPMENT PLAN	LUMP	LUMP			
2040	763509 CPM SCHEDULE UPDATES AND/OR REVISED UPDATES	30.000 EAMO				
2050	763597 UTILITY CONSTRUCTION ENGINEERING	100.000 HOUR				



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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2060	763619 WEIGH IN MOTION SYSTEM (WIM)	LUMP	LUMP			
2070	763689 STRUCTURAL WORK, GANTRY	LUMP	LUMP			
2080	900500 ENVIRONMENTAL PERFORMANCE INCENTIVE (DISINCENTIVE)	LUMP	LUMP			488000.00
2090	905001 SILT FENCE	12571.000 LF				
2100	905002 REINFORCED SILT FENCE	45734.000 LF				
2110	905003 SEDIMENT TRAP	1303.000 CY				
2120	905004 INLET SEDIMENT CONTROL, DRAINAGE INLET	16.000 EACH				
2130	905005 INLET SEDIMENT CONTROL, CURB INLET	11.000 EACH				
2140	906001 PORTABLE SEDIMENT TANK	1.000 EACH				
2150	906002 DEWATERING BAG	9.000 EACH				
2160	906003 SUMP PIT	1.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2170	906004 SKIMMER DEWATERING DEVICE	11.000 EACH				
2180	907011 STONE CHECK DAM	47.000 TON				
2190	908010 TOPSOILING, 6" DEPTH	500754.000 SY				
2200	908014 PERMANENT GRASS SEEDING, DRY GROUND	519169.000 SY				
2210	908015 PERMANENT GRASS SEEDING, WET GROUND	450305.000 SY				
2220	908017 TEMPORARY GRASS SEEDING	468154.000 SY				
2230	908019 STREAMBANK SEED MIX, SEEDING	50.000 SY				
2240	908020 EROSION CONTROL BLANKET MULCH	123047.000 SY				
2250	908021 TURF REINFORCEMENT MATTING, TYPE 1	1824.000 SY				
2260	908023 STABILIZED CONSTRUCTION ENTRANCE	1259.000 TON				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2270	908503 WETLAND MITIGATION GRASS SEEDING	25854.000 SY				
2280	909002 SANDBAG DIVERSION	54.000 CF				
2290	909005 STREAM DIVERSION	LUMP	LUMP			
2300	910004 CLAY BORROW, CUT-OFF TRENCH	2981.000 CY				
2310	910007 OUTLET STRUCTURE	LUMP	LUMP			
2320	910009 INFILTRATION TRENCH	200.000 LF				
	SECTION 0001 TOTAL					

SECTION 0002 BRIDGE 1-486 STANDARD ITEMS

2330	202505 SETTLEMENT PLATFORM	4.000 EACH				
2340	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	216.000 CY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2350	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	94.000 CY				
2360	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	70.000 CY				
2370	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	195.000 CY				
2380	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	110.000 CY				
2390	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	70.000 CY				
2400	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	50.000 CY				
2410	602772 MECHANICALLY STABILIZED EARTH WALLS	LUMP		LUMP		
2420	604000 BAR REINFORCEMENT, EPOXY COATED	135000.000 LB				
2430	608000 COARSE AGGREGATE FOR FOUNDATION STABILIZATION AND SUBFOUNDATION BACKFILL	20.000 TON				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2440	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP	LUMP			
2450	727507 BRIDGE SAFETY FENCE	290.000 LF				
	SECTION 0002 TOTAL					
SECTION 0003 BRIDGE 1-486 PILE ALTERNATE 1						
2460	618062 STEEL H PILES, HP 14 X 73	854.000 LF				
2470	618065 STEEL H TEST PILES, HP 14 X 73	142.000 LF				
2480	619042 INSTALL STEEL H PILES, HP 14 X 73	854.000 LF				
2490	619045 INSTALL STEEL H TEST PILES, HP 14 X 73	142.000 LF				
2500	619501 PRODUCTION PILE RESTRIKE	1.000 EACH	500.00000		500.00	
2510	619502 TEST PILE RESTRIKE	1.000 EADY	1000.00000		1000.00	
2520	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2530	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
	SECTION 0003 TOTAL					

SECTION 0004 BRIDGE 1-486 PILE ALTERNATE 2

2540	618552 FURNISH PIPE PILE, SCHEDULE 40, OPEN END, 14"	924.000 LF				
2550	618557 FURNISH TEST PIPE PILE, SCHEDULE 40, OPEN END, 14"	152.000 LF				
2560	619501 PRODUCTION PILE RESTRIKE	1.000 EACH	500.00000		500.00	
2570	619502 TEST PILE RESTRIKE	1.000 EADY	1000.00000		1000.00	
2580	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
2590	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
2600	619540 INSTALL PIPE PILE, SCHEDULE 40, OPEN END, 14"	924.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2610	619558 INSTALL TEST PIPE PILE, SCHEDULE 40, OPEN END, 14"	152.000 LF				
	SECTION 0004 TOTAL					

SECTION 0005 BRIDGE 1-482 STANDARD ITEMS

2620	202505 SETTLEMENT PLATFORM	EACH 4.000				
2630	207000 EXCAVATION AND BACKFILL FOR STRUCTURES	CY 313.000				
2640	602006 PORTLAND CEMENT CONCRETE MASONRY, PIER FOOTING, CLASS B	CY 178.000				
2650	602007 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS A	CY 111.000				
2660	602013 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	CY 443.000				
2670	602014 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS D	CY 237.000				
2680	602015 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT ABOVE FOOTING, CLASS A	CY 120.000				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2690	602017 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	51.000 CY				
2700	602772 MECHANICALLY STABILIZED EARTH WALLS	LUMP		LUMP		
2710	604000 BAR REINFORCEMENT, EPOXY COATED	258953.000 LB				
2720	608000 COARSE AGGREGATE FOR FOUNDATION STABILIZATION AND SUBFOUNDATION BACKFILL	18.000 TON				
2730	623003 PRESTRESSED REINFORCED CONCRETE MEMBERS, BULB T BEAM	LUMP		LUMP		
2740	727507 BRIDGE SAFETY FENCE	354.000 LF				
	SECTION 0005 TOTAL					

SECTION 0006 BRIDGE 1-482 PILE ALTERNATE 1

2750	618062 STEEL H PILES, HP 14 X 73	1836.000 LF				
2760	618065 STEEL H TEST PILES, HP 14 X 73	135.000 LF				



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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2770	619042 INSTALL STEEL H PILES, HP 14 X 73	1836.000 LF				
2780	619045 INSTALL STEEL H TEST PILES, HP 14 X 73	135.000 LF				
2790	619501 PRODUCTION PILE RESTRIKE	1.000 EACH	500.00000		500.00	
2800	619502 TEST PILE RESTRIKE	1.000 EADY	1000.00000		1000.00	
2810	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
2820	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
	SECTION 0006 TOTAL					

SECTION 0007 BRIDGE 1-482 PILE ALTERNATE 2

2830	618552 FURNISH PIPE PILE, SCHEDULE 40, OPEN END, 14"	2156.000 LF				
2840	618557 FURNISH TEST PIPE PILE, SCHEDULE 40, OPEN END, 14"	155.000 LF				
2850	619501 PRODUCTION PILE RESTRIKE	1.000 EACH	500.00000		500.00	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2860	619502 TEST PILE RESTRIKE	1.000 EADY	1000.00000		1000.00	
2870	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
2880	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
2890	619540 INSTALL PIPE PILE, SCHEDULE 40, OPEN END, 14"	2156.000 LF				
2900	619558 INSTALL TEST PIPE PILE, SCHEDULE 40, OPEN END, 14"	155.000 LF				
	SECTION 0007 TOTAL					

SECTION 0008 BRIDGE 1-482 PILE ALTERNATE 3

2910	618050 FURNISH STEEL SHELL PILES, 14"	1612.000 LF				
2920	618051 FURNISH TEST STEEL SHELL PILES, 14"	121.000 LF				
2930	619055 INSTALL STEEL SHELL PILES, 14"	1612.000 LF				
2940	619056 INSTALL TEST STEEL SHELL PILES, 14"	121.000 LF				

CONTRACT ID: T200811301.01 PROJECT(S): NH-2015 (20)

All figures must be typewritten.

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2950	619501 PRODUCTION PILE RESTRIKE	1.000 EACH	500.00000		500.00	
2960	619502 TEST PILE RESTRIKE	1.000 EADY	1000.00000		1000.00	
2970	619519 DYNAMIC PILE TESTING BY CONTRACTOR	4.000 EACH				
2980	619539 SIGNAL MATCHING ANALYSIS BY CONTRACTOR	4.000 EACH				
SECTION 0008 TOTAL						
SECTION 0009 MARYLAND QUANTITIES						
2990	202000 EXCAVATION AND EMBANKMENT	56440.000 CY				
3000	202569 POND ACCESS ROAD, MARYLAND	2602.000 SY				
3010	208000 EXCAVATION AND BACKFILLING FOR PIPE TRENCHES	333.000 CY				
3020	208001 FLOWABLE FILL	6.000 CY				
3030	209002 BORROW, TYPE B	2837.000 CY				

DELAWARE DEPARTMENT OF TRANSPORTATION  
SCHEDULE OF ITEMS

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All figures must be typewritten.

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3040	211002 REMOVAL OF STRUCTURES AND OBSTRUCTIONS (GUARDRAIL)	63.000 LF				
3050	255502 GABION OUTLET STRUCTURE, MARYLAND	3.000 TON				
3060	272511 POND OUTLET STRUCTURE, CONCRETE, MARYLAND	LUMP	LUMP			
3070	302007 GRADED AGGREGATE BASE COURSE, TYPE B	966.000 CY				
3080	302012 DELAWARE NO. 57 STONE	2923.000 TON				
3090	304501 PERMEABLE TREATED BASE, 4"	14264.000 SY				
3100	304502 SOIL CEMENT BASE COURSE, 6"	13852.000 SY				
3110	304506 PORTLAND CEMENT	247.000 TON				
3120	401801 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS PG 64-22 (CARBONATE STONE)	547.000 TON				

CONTRACT ID: T200811301.01 PROJECT(S): NH-2015 (20)

All figures must be typewritten.

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3130	401810 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22	63.000 TON				
3140	401819 BITUMINOUS CONCRETE, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22	2232.000 TON				
3150	401825 BITUMINOUS CONCRETE, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22, WEDGE	33.000 TON				
3160	401827 BITUMINOUS CONCRETE, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22 (NON-CARBONATE STONE)	2772.000 TON				
3170	501006 PORTLAND CEMENT CONCRETE PAVEMENT, 12"	14264.000 SY				
3180	612022 REINFORCED CONCRETE PIPE, 18", CLASS IV	70.000 LF				
3190	612023 REINFORCED CONCRETE PIPE, 24", CLASS IV	362.000 LF				
3200	612205 REINFORCED CONCRETE ELLIPTICAL PIPE, 19"X30", CLASS IV	88.000 LF				
3210	612210 REINFORCED CONCRETE ELLIPTICAL PIPE, 22"X34", CLASS IV	66.000 LF				

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All figures must be typewritten.

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3220	612505 PVC PIPE, 12"	291.000 LF				
3230	612526 CORRUGATED POLYETHYLENE PIPE, TYPE S, 36"	100.000 LF				
3240	612535 CLEANING DRAINAGE PIPE, 15"-24" DIA	70.000 LF				
3250	612536 CLEANING DRAINAGE PIPE, GREATER THAN 24" DIA	255.000 LF				
3260	617519 CONCRETE END SECTION, 24", MARYLAND	4.000 EACH				
3270	617520 CONCRETE END SECTION, 19"X 30", MARYLAND	1.000 EACH				
3280	617521 CONCRETE END SECTION, 22"X34", MARYLAND	1.000 EACH				
3290	708660 DRAINAGE INLET, TYPE K, SINGLE, MARYLAND	6.000 EACH				
3300	712005 RIPRAP, R-4	783.000 SY				
3310	712552 RIPRAP SLOPE PROTECTION, MARYLAND	476.000 SY				

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All figures must be typewritten.

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3320	713003 GEOTEXTILES, RIPRAP	3713.000 SY				
3330	715001 PERFORATED PIPE UNDERDRAINS, 6"	3238.000 LF				
3340	715004 PERFORATED PIPE UNDERDRAINS, 12"	520.000 LF				
3350	715500 UNDERDRAIN OUTLET PIPE, 6"	273.000 LF				
3360	720043 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-27	653.000 LF				
3370	720044 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 2-27	63.000 LF				
3380	720050 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	300.000 LF				
3390	720051 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 2-31	50.000 LF				
3400	720585 GUARDRAIL END TREATMENT ATTENUATOR, TYPE 1-31	1.000 EACH				
3410	720611 FLEXIBLE DELINEATOR, PERMANENT	17.000 EACH				

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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3420	727552 RESOURCE PROTECTION FENCE	1785.000 LF				
3430	727553 DIVERSION FENCE, MARYLAND	335.000 LF				
3440	734555 TEMPORARY VEGETATIVE STABILIZATION, MARYLAND	91022.000 SY				
3450	734556 PERMANENT VEGETATIVE STABILIZATION, MARYLAND	82149.000 SY				
3460	737531 PLANTINGS, MARYLAND	LUMP		LUMP		
3470	743003 ARROWPANELS, TYPE C	4.000 EADY				
3480	743004 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	72.000 EADY				
3490	743006 PLASTIC DRUMS	57020.000 EADY				
3500	743010 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE II	223.000 EADY				
3510	743015 FURNISH AND MAINTAIN PORTABLE PCC SAFETY BARRIER	2205.000 LF				



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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3520	743016 RELOCATION PORATBLE SAFETY BARRIER	1190.000 LF				
3530	743023 TEMPORARY BARRICADES, TYPE III	10650.000 LFDY				
3540	743024 TEMPORARY WARNING SIGNS AND PLAQUES	32564.000 EADY				
3550	743025 INSTALL TEMPORARY IMPACT ATTENUATOR	5.000 EACH				
3560	743029 FURNISH TEMPORARY IMPACT ATTENUATOR - NON-GATING, REDIRECTIVE, TEST LEVEL 3	2.000 EACH				
3570	743030 RELOCATE TEMPORARY IMPACT ATTENUATOR	2.000 EACH				
3580	744506 CONDUIT JUNCTION WELL, TYPE 7, PRECAST POLYMER CONCRETE	2.000 EACH				
3590	744530 CONDUIT JUNCTION WELL, TYPE 11, PRECAST CONCRETE/ POLYMER LID-FRAME	9.000 EACH				
3600	744531 CONDUIT JUNCTION WELL, TYPE 14, PRECAST CONCRETE/ POLYMER LID-FRAME	4.000 EACH				

DELAWARE DEPARTMENT OF TRANSPORTATION  
SCHEDULE OF ITEMS

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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3610	745602 FURNISH & INSTALL UP TO 4" SCHEDULE 80 HDPE CONDUIT (BORE)	295.000 LF				
3620	745604 FURNISH & INSTALL UP TO 4" SCHEDULE 80 PVC CONDUIT (TRENCH)	2880.000 LF				
3630	745606 FURNISH & INSTALL UP TO 4" GALVANIZED STEEL CONDUIT (TRENCH)	5.000 LF				
3640	746586 RELOCATE SIGN	52.000 SF				
3650	746852 POLE BASE, TYPE 6	2.000 EACH				
3660	748032 TEMPORARY MARKINGS, PAINT, 5"	9079.000 LF				
3670	748034 TEMPORARY MARKINGS, PAINT, 10"	810.000 LF				
3680	748525 TEMPORARY MARKINGS, TAPE, 4"	10915.000 LF				
3690	748527 TEMPORARY MARKINGS, TAPE, WORDS/SYMBOLS	120.000 SF				
3700	748530 REMOVAL OF PAVEMENT STRIPING	3551.000 SF				

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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3710	748560 5" WHITE PERMANENT PATTERNED REFLECTIVE PAVEMENT MARKING TAPE, MARYLAND	20532.000 LF				
3720	748563 SNOWPLOWABLE RAISED PAVEMENT MARKERS, MARYLAND	115.000 EACH				
3730	749500 SIGN PANEL	320.000 SF				
3740	749516 REINFORCED CONCRETE SIGN FOUNDATION, W-6	4.000 EACH				
3750	749521 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-6	67.000 LF				
3760	749550 INSTALLATION OF BREAKAWAY I-BEAM SIGN POSTS	6.000 EACH				
3770	749581 REINFORCED CONCRETE SIGN FOUNDATION, W-18	2.000 EACH				
3780	749582 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-18	52.000 LF				
3790	749687 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	26.000 EACH				
3800	749690 INSTALLATION OR REMOVAL OF TRAFFIC SIGNS ON MULTIPLE SIGN POSTS	477.000 SF				

DELAWARE DEPARTMENT OF TRANSPORTATION  
SCHEDULE OF ITEMS

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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3810	756000 SAND	143.000 TON				
3820	760006 PAVEMENT - MILLING, HOT-MIX, 2" DEPTH	21343.000 SY				
3830	760016 RUMBLE STRIPS, HOT-MIX	11700.000 LF				
3840	760017 RUMBLE STRIPS, CONCRETE	5800.000 LF				
3850	760507 PROFILE MILLING, BITUMINOUS CONCRETE	2887.000 SYIN				
3860	762001 SAW CUTTING, BITUMINOUS CONCRETE	2763.000 LF				
3870	763573 SIGN, MARYLAND	1.000 EACH				
3880	763656 ASBUILT CERTIFICATION, MARYLAND	LUMP	LUMP			
3890	763686 TRAFFIC OFFICER, MARYLAND	432.000 HOUR	98.16000		42405.12	
3900	763691 FLAGGER, MARYLAND, STATE	500.000 HOUR				

DELAWARE DEPARTMENT OF TRANSPORTATION  
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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
3910	763692 FLAGGER, MARYLAND, STATE, OVERTIME	100.000 HOUR				
3920	905001 SILT FENCE	216.000 LF				
3930	905003 SEDIMENT TRAP	2818.000 CY				
3940	905004 INLET SEDIMENT CONTROL, DRAINAGE INLET	7.000 EACH				
3950	905500 SUPER SILT FENCE	5311.000 LF				
3960	906002 DEWATERING BAG	1.000 EACH				
3970	907011 STONE CHECK DAM	9.000 TON				
3980	908010 TOPSOILING, 6" DEPTH	53274.000 SY				
3990	908020 EROSION CONTROL BLANKET MULCH	7828.000 SY				
4000	908023 STABILIZED CONSTRUCTION ENTRANCE	529.000 TON				

CONTRACT ID: T200811301.01 PROJECT(S): NH-2015 (20)

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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
4010	910002 INFILTRATION STONE, NO. 8	844.000 TON				
4020	910004 CLAY BORROW, CUT-OFF TRENCH	4926.000 CY				
4030	910500 BIORETENTION SOIL MIX	290.000 CY				
SECTION 0009 TOTAL						
TOTAL BID						

CANNOT BE USED FOR BIDDING

**Diesel Fuel Cost Price Adjustment Option**

The Bidder is required to submit this form with his/her Bid Proposal at the time of bid opening. When this form is not provided by the Bidder at the time of Bid, the Option-OUT will be automatically selected and no further option is available to the Contractor and no Diesel Fuel Cost Adjustments will be made.

OPTION-IN

Checking here selects the option to participate in the 763626 - Diesel Fuel Cost Price Adjustment.

OPTION-OUT

Checking here declines the option to participate in the 763626 - Diesel Fuel Cost Price Adjustment.

The undersigned hereby certifies that he/she is authorized to make this Option on behalf of the bidder in compliance with the special provision 763626 - Diesel Fuel Cost Price Adjustment.

Sealed and dated this \_\_\_\_\_ day of \_\_\_\_\_ in the year of our Lord two thousand and \_\_\_\_\_ (20\_\_).

\_\_\_\_\_  
Name of Bidder (Organization)

Corporate  
Seal

By: \_\_\_\_\_

Authorized Signature

Attest \_\_\_\_\_

Title

SWORN TO AND SUBSCRIBED BEFORE ME this \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Notary  
Seal

\_\_\_\_\_  
Notary

# BREAKOUT SHEET INSTRUCTIONS

**BREAKOUT SHEET(S) MUST BE SUBMITTED EITHER WITH YOUR BID DOCUMENTS;  
OR WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE BID DUE DATE BY THE  
LOWEST APPARENT BIDDER.**

BREAKOUT SHEETS ARE TO BE SUBMITTED TO DELDOT'S CONTRACT ADMINISTRATION AS SHOWN BELOW. BREAKOUT SHEETS CANNOT BE CHANGED AFTER AWARD. THE DEPARTMENT WILL REVIEW THE FIGURES SUBMITTED ON THE BREAKOUT SHEET(S) TO ENSURE THEY MATCH THE RESPECTIVE LUMP SUM BID AMOUNT(S). MATHEMATICALLY INCORRECT BREAKOUT SHEETS WILL BE RETURNED FOR IMMEDIATE CORRECTION.

BREAKOUT SHEETS MAY BE SUBMITTED;

VIA E-MAIL TO: [DOT-ASK@STATE.DE.US](mailto:DOT-ASK@STATE.DE.US)  
SUBJECT: **T200811301.01** 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. T200811301.01****ITEM 272511 - Pond Outlet Structure, Concrete, Maryland**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Pond Outlet Structure Concrete - BMP #070032	\$	\$
2	1	EA	Pond Outlet Structure Concrete - BMP #070033	\$	\$
3	1	EA	Pond Outlet Structure Concrete - BMP #070034	\$	\$
4	1	EA	Pond Outlet Structure Concrete - BMP #070035	\$	\$
<b>TOTAL ITEM 272511 - Pond Outlet Structure Concrete, Maryland \$</b> <b>(LUMP SUM BID PRICE FOR ITEM 272511)</b>					

CANNOT BE  
USED FOR  
BIDDING

**BREAKOUT SHEET - 2****CONTRACT NO. T200811301.01****602772 - Mechanically Stabilized Earth Walls**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	LS	Bridge 1-482 MSE Walls at Abutment 1 (Abutment and Wingwalls)	\$	\$
2	1	LS	Bridge 1-482 MSE Walls at Abutment 2 (Abutment and Wingwalls)	\$	\$
<b>TOTAL ITEM 602772 - Mechanically Stabilized Earth Walls \$ _____</b> <b>(LUMP SUM BID PRICE FOR ITEM 602772)</b>					

CANNOT BE  
USED FOR  
BIDDING

**BREAKOUT SHEET - 2A****CONTRACT NO. T200811301.01****602772 - Mechanically Stabilized Earth Walls**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	LS	Bridge 1-486 MSE Walls at Abutment 1 (Abutment and Wingwalls)	\$	\$
2	1	LS	Bridge 1-486 MSE Walls at Abutment 2 (Abutment and Wingwalls)	\$	\$
<b>TOTAL ITEM 602772 - Mechanically Stabilized Earth Walls \$ _____</b> <b>(LUMP SUM BID PRICE FOR ITEM 602772)</b>					

CANNOT BE  
USED FOR  
BIDDING

**BREAKOUT SHEET - 3****CONTRACT NO. T200811301.01****ITEM 605755 – OVERHEAD SIGN SUPPORTS AND FOUNDATIONS**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Overhead Sign Support and Foundations SO1405, Type 2	\$	\$
2	1	EA	Overhead Sign Support and Foundations SO1410, Type 4	\$	\$

**TOTAL ITEM 605755 - OVERHEAD SIGN SUPPORTS AND FOUNDATIONS \$****(LUMP SUM BID PRICE FOR ITEM 605755)**

CANNOT BE  
USED FOR  
BIDDING

**BREAKOUT SHEET - 4****CONTRACT NO. T200811301.01****ITEM 617518 – DRAINAGE HEADWALLS, MODIFIED**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Drainage Headwall, HW-1	\$	\$
2	1	EA	Drainage Headwall, HW-48	\$	\$
3	1	EA	Drainage Headwall, HW-60	\$	\$
4	1	EA	Drainage Headwall, HW-61	\$	\$
5	1	EA	Drainage Headwall, HW-110	\$	\$
6	1	EA	Drainage Headwall, HW-501	\$	\$
7	1	EA	Drainage Headwall, HW-527	\$	\$
8	1	EA	Drainage Headwall, HW-543	\$	\$
<b>TOTAL ITEM 617518 - DRAINAGE HEADWALLS, MODIFIED \$</b>					
<b>(LUMP SUM BID PRICE FOR ITEM 617518)</b>					

**BIDDING**

**BREAKOUT SHEET - 5****CONTRACT NO. T200811301.01****ITEM 708658 – DRAINAGE INLETS MODIFIED**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Drainage Inlet, DI-14	\$	\$
2	1	EA	Drainage Inlet, DI-110	\$	\$
3	1	EA	Drainage Inlet, DI-294	\$	\$
4	1	EA	Drainage Inlet, DI-301	\$	\$
5	1	EA	Drainage Inlet, DI-302	\$	\$
6	1	EA	Drainage Inlet, DI-303	\$	\$
7	1	EA	Drainage Inlet, DI-321	\$	\$
8	1	EA	Drainage Inlet, DI-322	\$	\$
9	1	EA	Drainage Inlet, DI-323	\$	\$
10	1	EA	Drainage Inlet, DI-325	\$	\$
11	1	EA	Drainage Inlet, DI-326	\$	\$
12	1	EA	Drainage Inlet, DI-327	\$	\$

**TOTAL ITEM 708658 - DRAINAGE INLETS, MODIFIED \$ \_\_\_\_\_**  
**(LUMP SUM BID PRICE FOR ITEM 708658)**

**BREAKOUT SHEET - 6****CONTRACT NO. T200811301.01****ITEM 708659 – DRAINAGE MANHOLES, MODIFIED**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Drainage Manhole, Type 2, MH-10	\$	\$
2	1	EA	Drainage Manhole, Type 1, MH-11	\$	\$
3	1	EA	Drainage Manhole, Type 2, MH-12	\$	\$
4	1	EA	Drainage Manhole, Type 2, MH-13	\$	\$
5	1	EA	Drainage Manhole, Type 1, MH-14	\$	\$
<b>TOTAL ITEM 708659 - DRAINAGE MANHOLES, MODIFIED \$ _____</b> <b>(LUMP SUM BID PRICE FOR ITEM 708659)</b>					

USED FOR  
BIDDING

**BREAKOUT SHEET - 7**  
**737523 - PLANTING (in DE)**

**CONTRACT NO. T200811301.01**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	15	EA	<i>Acer rubrum 'Red Sunset'</i> , Red Maple, 3" Cal, B&B	\$	\$
2	13	EA	<i>Liquidambar styraciflua</i> , Sweet-gum, 2" Cal, B&B	\$	\$
3	2	EA	<i>Platanus occidentalis</i> , Sycamore, 3" Cal, B&B	\$	\$
4	10	EA	<i>Quercus palustris</i> , Pin Oak, 3" Cal, B&B	\$	\$
5	2	EA	<i>Quercus rubra</i> , Red Oak, 2" Cal, B&B	\$	\$
6	4	EA	<i>Ilex opaca 'Jersey Knight'</i> , American Holly (Male), 6' Ht, B&B	\$	\$
7	50	EA	<i>Ilex opaca 'Miss Helen'</i> , American Holly, 6' Ht, B&B	\$	\$
8	45	EA	<i>Juniperus virginiana</i> , Eastern Redcedar, 6' Ht, B&B	\$	\$
9	148	EA	<i>Pinus strobus</i> , Eastern White Pine, 6' Ht, B&B	\$	\$
10	30	EA	<i>Cercis canadensis</i> , Eastern Redbud, 2" Cal, B&B	\$	\$
11	6	EA	<i>Crataegus viridis 'Winter King'</i> , Winter King Hawthorn, 5' Ht, B&B	\$	\$
12	12	EA	<i>Hamamelis virginiana</i> , Common Witchhazel, 5' Ht, B&B	\$	\$
13	44	EA	<i>Alnus serrulata</i> , Smooth Alder, 3' Ht, CG	\$	\$
14	78	EA	<i>Aronia arbutifolia 'Brilliantissima'</i> , Red Chokeberry, 24" Ht, CG	\$	\$
15	61	EA	<i>Abelia x grandiflora</i> , Glossy Abelia, 24" Ht, CG	\$	\$
16	60	EA	<i>Rhus copallina</i> , Flameleaf Sumac, 24" Ht, CG	\$	\$



**BREAKOUT SHEET - 7**  
**737523 - PLANTING (in DE)**

**CONTRACT NO. T200811301.01**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
17	44	EA	<i>Viburnum dentatum</i> , Southern Arrowwood, 3' Ht, CG	\$	\$
18	56.3	MGAL	Watering	\$	\$

**TOTAL ITEM 737523 - PLANTING (in DE) \$**  
**(LUMP SUM BID PRICE FOR ITEM 737523)**

CANNOT BE  
USED FOR  
BIDDING

**BREAKOUT SHEET - 8**  
**737531 - PLANTINGS, MARYLAND**

**CONTRACT NO. T200811301.01**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	18	EA	<i>Acer rubrum 'Red Sunset'</i> , Red Maple, 3" Cal, B&B	\$	\$
2	14	EA	<i>Platanus occidentalis</i> , Sycamore, 3" Cal, B&B	\$	\$
3	13	EA	<i>Juniperus virginiana</i> , Eastern Redcedar, 6' Ht, B&B	\$	\$
4	22	EA	<i>Pinus strobus</i> , Eastern White Pine, 6' Ht, B&B	\$	\$
5	9	EA	<i>Cercis canadensis</i> , Eastern Redbud, 2" Cal, B&B	\$	\$
6	11	EA	<i>Magnolia virginiana</i> , Sweetbay Magnolia, 2" Cal, B&B	\$	\$
7	18	EA	<i>Viburnum prunifolium</i> , Black-haw, 2" Cal, B&B	\$	\$
8	31	EA	<i>Aronia arbutifolia 'Brilliantissima'</i> , Red Chokeberry, 24" Ht, CG	\$	\$
9	7	EA	<i>Ilex x verticillata 'Southern Gentleman'</i> , Southern Gentleman Winterberry, 24" Ht, CG	\$	\$
10	36	EA	<i>Ilex x verticillata 'Winter Red'</i> , Winter Red Winterberry, 24" Ht, CG	\$	\$
11	47	EA	<i>Viburnum dentatum</i> , Arrowwood Viburnum, 24" Ht, CG	\$	\$
12	1125	EA	<i>Aster lateriflorus</i> , Calico Aster Alder, Plugs	\$	\$
13	495	EA	<i>Aster novae-angliae</i> , New England Aster, Plugs	\$	\$
14	1205	EA	<i>Carex typhina</i> , Cat-Tail Sedge, Plugs	\$	\$
15	1275	EA	<i>Eupatorium dubium</i> , Joe-Pye Weed , Plugs	\$	\$
16	1570	EA	<i>Panicum virgatum</i> , Switchgrass, Plugs	\$	\$
17	570	EA	<i>Solidago rugosa</i> , Wrinkleleaf Goldenrod, Plugs	\$	\$

**BREAKOUT SHEET - 8**  
**737531 - PLANTINGS, MARYLAND**

**CONTRACT NO. T200811301.01**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
18	270	EA	<i>Solidago sempervirens</i> , Seaside Goldenrod, Plugs	\$	\$
19	3193	EA	Lowland Meadow Establishment	\$	\$
20	5226	EA	Upland Meadow Establishment	\$	\$
21	454	SY	Wet Meadow Establishment	\$	\$
22	1.837	TON	Applying Limestone to Salvaged Topsoil, Non Topsoiled Areas	\$	\$
23	36.663	CY	Applying Compost to Salvaged Topsoil, Non Topsoiled Areas	\$	\$
24	5.501	HR	Tractor and Hand Mowing	\$	\$
25	536.750	CF	Relocating Plants	\$	\$
26	536.750	CF	Abandoned Planting Pits	\$	\$
27	1610.250	SY	Additional Mulching	\$	\$

**TOTAL ITEM 737513 - PLANTINGS, MARYLAND \$ \_\_\_\_\_**  
**(LUMP SUM BID PRICE FOR ITEM 737531)**

**BREAKOUT SHEET - 9**  
**ITEM 910007 - OUTLET STRUCTURE**

**CONTRACT NO. T200811301.01**

ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	EA	Outlet Structure - BMP #604	\$	\$
2	1	EA	Outlet Structure - BMP #605	\$	\$
3	1	EA	Outlet Structure - BMP #606	\$	\$
4	1	EA	Outlet Structure - BMP #607	\$	\$
5	1	EA	Outlet Structure - BMP #608	\$	\$
6	1	EA	Outlet Structure - BMP #609	\$	\$
7	1	EA	Outlet Structure - BMP #610	\$	\$
8	1	EA	Outlet Structure - BMP #611	\$	\$
9	1	EA	Outlet Structure - BMP #612	\$	\$
10	1	EA	Outlet Structure - BMP #613	\$	\$
11	1	EA	Outlet Structure - BMP #616	\$	\$
12	1	EA	Outlet Structure - BMP #617	\$	\$
13	1	EA	Outlet Structure - BMP #618	\$	\$
14	1	EA	Outlet Structure - BMP #619	\$	\$
15	1	EA	Outlet Structure - BMP #620	\$	\$

**TOTAL ITEM 910007 - OUTLET STRUCTURE \$ \_\_\_\_\_**  
**(LUMP SUM BID PRICE FOR ITEM 910007)**

# "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](mailto:DOT-ASK@STATE.DE.US)  
SUBJECT: **T200811301.01** 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.**

**CERTIFICATION**

Contract No. T200811301.01  
Federal Aid Project No. NH-2015 (20)

The undersigned bidder, \_\_\_\_\_  
whose address is \_\_\_\_\_  
and telephone number is \_\_\_\_\_ hereby certifies the following:

I/We have carefully examined the location of the proposed work, the proposed plans and specifications, and will be bound, upon award of this contract by the Department of Transportation, to execute in accordance with such award, a contract with necessary surety bond, of which contract this proposal and said plans and specifications shall be a part, to provide all necessary machinery, tools, labor and other means of construction, and to do all the work and to furnish all the materials necessary to perform and complete the said contract within the time and as required in accordance with the requirements of the Department of Transportation, and at the unit prices for the various items as listed on the preceding pages.

**Bidder's Certification Statement [US DOT Suspension and Debarment Regulation (49 CFR 29)]:**

**NOTICE:** All contractors who hold prime contracts (Federal Aid) with DelDOT are advised that the prime contractor and subcontractors are required to submit to DelDOT a signed and notary attested copy of the Bidder Certification Statement for each and every subcontract that will be utilized by the prime contractor. This Certification **must** be filed with DelDOT prior to written approval being granted for each and every subcontractor. Copies of the Certification Form are available from the appropriate District Construction Office.

Under penalty of perjury under the laws of the United States, that I/We, or any person associated therewith in the capacity of (owner, partner, director, officer, principal, investigator, project director, manager, auditor, or any position involving the administration federal funds):

- a. am/are not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any federal agency;
- b. have not been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past 3 years;
- c. do not have a proposed debarment pending; and,
- d. have not been indicted, convicted, or had a civil judgement rendered against (it) by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted, indicate below to whom it applies, initiating agency, and dates of action. Providing false information may result in criminal prosecution or administrative sanctions.

\_\_\_\_\_  
\_\_\_\_\_

(Insert Exceptions)

**DBE Program Assurance:**

**NOTICE:** In accordance with 49 CFR Part 26 the undersigned, a legally authorized representative of the bidder listed below, must complete this assurance. By its signature affixed hereto, assures the Department that it will attain DBE participation as indicated:

**Disadvantaged Business Enterprise \_\_\_\_\_ percent (blank to be filled in by bidder)**

The foregoing quantities are considered to be approximate only and are given as the basis for comparison of bids. The Department of Transportation may increase or decrease the amount of any item or portion of the work as may be deemed necessary or expedient. Any such increase or decrease in the quantity for any item will not be regarded as a sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work, except as provided in the contract.

Accompanying this proposal is a surety bond or a security of the bidder assigned to the Department of Transportation, for at least ten (10) percentum of total amount of the proposal, which deposit is to be forfeited as liquidated damages in case this proposal is accepted, and the undersigned shall fail to execute a contract with necessary bond, when required, for the performance of said contract with the Department of Transportation, under the conditions of this proposal, within twenty (20) days after date of official notice of the award of the contract as provided in the requirement and specifications hereto attached; otherwise said deposit is to be returned to the undersigned.

I/We are licensed, or have initiated the license application as required by Section 2502, Chapter 25, Title 30, of the Delaware Code.

By submission of this proposal, each person signing on behalf of the bidder, certifies as to its own organization, under penalty of perjury, that to the best of each signer's knowledge and belief:

1. The prices in this proposal have been arrived at independently without collusion, consultation, communication, or Agreement with any other bidder or with any competitor for the purpose of restricting competition.
2. Unless required by law, the prices which have been quoted in this proposal have not been knowingly disclosed and will not knowingly be disclosed by the bidder, directly or indirectly, to any other bidder or competitor prior to the opening of proposals.
3. No attempt has been made or will be made by the bidder to induce any other person, partnership, or corporation to submit or not to submit a proposal for the purpose of restricting competition.

I/We acknowledge receipt and incorporation of addenda to this proposal as follows:

No.	Date	No.	Date	No.	Date	No.	Date	No.	Date
-----	------	-----	------	-----	------	-----	------	-----	------

**BIDDERS MUST ACKNOWLEDGE RECEIPT OF ALL ADDENDA**

**MUST INSERT DATE OF FINAL QUESTIONS AND ANSWERS ON WEBSITE:** \_\_\_\_\_



Sealed and dated this \_\_\_\_\_ day of \_\_\_\_\_ in the year of our Lord two thousand \_\_\_\_\_ (20\_\_\_\_).

\_\_\_\_\_  
Name of Bidder (Organization)

Corporate  
Seal

By: \_\_\_\_\_  
Authorized Signature

Attest \_\_\_\_\_

\_\_\_\_\_  
Title

SWORN TO AND SUBSCRIBED BEFORE ME this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

Notary  
Seal

\_\_\_\_\_  
Notary



**BID BOND**

TO ACCOMPANY PROPOSAL  
(Not necessary if security is used)

KNOW ALL MEN BY THESE PRESENTS That: \_\_\_\_\_

of \_\_\_\_\_ in the County of \_\_\_\_\_ and State of \_\_\_\_\_ as

**Principal**, and \_\_\_\_\_ of \_\_\_\_\_ in the County of

\_\_\_\_\_ and State of \_\_\_\_\_ as **Surety**, legally authorized to do business in the State of

Delaware ("**State**"), are held and firmly unto the **State** in the sum of \_\_\_\_\_

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_), or \_\_\_\_\_ percent not to exceed \_\_\_\_\_

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_) of amount of bid on Contract No. T200811301.01, 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