

STATE OF DELAWARE



DEPARTMENT OF TRANSPORTATION

DESIGN-BUILD PROJECT

for

DOVER TRANSIT CENTER

Dover Transit Center
State Contract # 25-020-01
Federal Contract # ERRA-2009(31)

SCOPE OF SERVICES PACKAGE

CONTRACT DOCUMENTS

PART 4

SPECIAL PROVISIONS

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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 can be found in Appendix IV 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

**SECTION 108A - BASELINE PROGRESS SCHEDULE
(CRITICAL PATH METHOD SCHEDULE)**

SP108A-1 DESCRIPTION

The schedule submitted in accordance with DB Section 108-01 shall be prepared using the Critical Path Method (CPM).

SP108A-1.1 General

The Project shall be planned and documented using the Baseline Progress Schedule, a conventional CPM schedule in the form of an activity on node diagram based on the principles defined by the 1994 issue of the Construction Planning & Scheduling Manual published by the Associated General Contractors of America. The schedule shall be used for coordination and monitoring of all Work under the Contract, including all activities of Subcontractors, design, and construction; shall compare the Work performed to the Contract time and phasing requirements; and shall assign necessary resources for Inspection and Administration of the Contract.

Acceptance of the schedule by the Department's Project Manager shall not be construed to imply approval of any particular method or sequence of construction or to relieve the Design-Builder of providing sufficient Materials, Equipment, and labor to guarantee completion of the Project in accordance with the Contract. Acceptance shall not be construed to modify or amend the agreement or the date of completion therein.

Failure by the Design-Builder to include in the Baseline Progress Schedule any element of Work required for the performance of the Contract shall not excuse the Design-Builder from completing all Work required within the completion date(s) specified in the Contract notwithstanding acceptance of the schedule by the Department's Project Manager.

Float contained in the Baseline Progress Schedule is not for the exclusive use and benefit of either the Department or the Design-Builder.

If the Design-Builder fails to comply with the provisions of this Special Provision, the Department's Project Manager may suspend payments.

SP108A-1.2 Schedule Submittals

A) Ninety Day Schedule

1) Within 15 Calendar Days following the Contract Award, the Design-Builder shall submit to the Department's Project Manager, a detailed schedule for the first 90 Days of Work and a generalized schedule for the balance of the Work. The detailed portion of this schedule shall meet the requirements of Section 108A-1.2(B). The 90-day schedule must be consistent with the Proposed Baseline Project Schedule submitted with the Proposal unless otherwise agreed by the Department.

2) The 90Day schedule will be reviewed by the Department's Project Manager and revised by the Design-Builder to incorporate the Department's Project Manager's comments and to correct deficiencies. Upon acceptance by the Department's Project Manager, the 90-Day schedule shall be used for all Project scheduling activities, and updated monthly until the issuance of the accepted Baseline Progress Schedule.

B) Baseline Progress Schedule

1) Within 45 Calendar Days following the Contract Award, the Design-Builder shall prepare and submit a Baseline Progress Schedule for the entire Project to the Department's Project Manager for review and Approval. The Baseline Progress Schedule must be consistent with the proposed Baseline Project Schedule submitted with the Proposal unless otherwise agreed by the Department.

2) The Design-Builder will incorporate into this schedule all Project activities, activities for the placement of orders and anticipated delivery dates of Materials and Equipment, activities assigned to Subcontractors, activities assigned to the Department or the Department's Project Manager and other outside agencies (such as, Design Reviews and permit reviews), and all Utility Work or work by other Contractors within or near the Contract limits.

C) Schedule Updates

See Section SP108A-3.3.

SP108A-2 MATERIALS

A) The Design-Builder shall furnish, maintain, and operate a system that can produce a CPM network diagram using the precedence diagramming method and other reports and graphics as described within this Special Provision. In addition, the Design-Builder shall provide a microcomputer with CPM scheduling software and necessary peripheral hardware for use by the Department's Project Manager in monitoring the scheduling system meeting this specification.

SP108A-3 SCHEDULE REQUIREMENTS

General SP108A-3.1

The Design-Builder's Baseline Progress Schedule shall meet the following requirements:

A) Baseline Progress Schedule Format

The Design-Builder shall use the precedence diagramming methods. The Work breakdown schedule of the Baseline Progress Schedule shall be formatted in a manner consistent with the pricing and payment method contained in the Contract.

B) Project Calendars

Holidays and non-Work Days shall be established in coordination with the Department's Project Manager. Additional Project calendars shall be used for activities that have Contract imposed time restrictions, such as, seasonal limitations for asphalt paving.

C) Activities Data

1) Activity Identification Number – Each activity shall have a unique identification number.

2) Activity Description – Each activity shall be clearly described. Use of descriptions referring to percent of a multi-element item (i.e., construct deck 50%) will not be acceptable. Separate activities shall represent different elements of multi-element activities (i.e., construct forms, install rebar, and pour concrete). Multiple activities with the same Work description shall include a location description.

3) Activity Duration – The Design-Builder shall subdivide the Work into individual

activities having durations of no longer than 60 Work Days each. Exceptions to this rule will be reviewed by the Department's Project Manager on an activity by activity basis. If multiple shifts and/or overtime are anticipated during the development of activity durations, a list of affected activities and the shift/overtime assumptions shall be provided to the Department's Project Manager. If requested by the Department's Project Manager, the Design-Builder shall furnish production rates or other information needed to justify the reasonableness of activity time durations.

- 4) Expected seasonal weather conditions, such as precipitation and temperature, shall be included by the Design-Builder in the planning and scheduling of activities.
- 5) Start and Finish Dates – The earliest start date, earliest finish date, latest start date, and latest finish date shall be shown for each activity.
- 6) Total float shall be shown for each activity. Total float is the full amount of time by which the start on an activity may be delayed without causing the Project to last longer.
- 7) The Baseline Progress Schedule shall contain none of the following:
 - a) Excessive leads or lags;
 - b) Assigned constraints, except as specified in the Contract Documents or as specifically allowed by the Department's Project Manager;
 - c) Multiple calendars, except as allowed by the Contract Documents; or
 - d) Retained logic.
- 8) Activity Codes - Activities shall be coded to allow for the following summaries:
 - a) Responsible party for the accomplishment of each activity, i.e., Design-Builder, Subcontractor, Department, and Utility Owner. The name of each Subcontractor shall be included as soon as they are approved by the Department. Only one party can be responsible for an activity;
 - b) Phase/stage during which activity is planned to be accomplished, including design; and
 - c) Area/location, i.e., bridges, ramps, and mainline station.
- 9) Activity Constraints – The Design-Builder shall not constrain the start or completion of any activity unless specifically required by the Contract or specifically allowed by the Department's Project Manager.
- 10) Activity Resources – The required labor and Equipment shall be shown for each activity as follows:
 - a) Labor may be shown by trade; however, as a minimum the Department's Project Manager will accept total Person Work Days per activity or crew Work Days per activity. If crew Work Days are used, the crew size shall be indicated in the coding, i.e., a crew designated as PAVE4 equals a four Person paving crew; and
 - b) Major Equipment, such as, pile drivers, large cranes, asphalt paving Equipment, and concrete finishing machines shall be shown for each activity.

- 11) Material Quantities – Material quantities for each activity shall be indicated in the resource fields when they become available. Material descriptions such as concrete, asphalt, guide railing, and signs shall be used. Material quantities will be used to verify the reasonableness of the activity durations and to ensure that all Work required by the Design-Builder is accounted for within the schedule.
 - 12) Price Center Designations – Price Center designations for labor, Material, and Equipment shall be included in the cost account fields for each activity resource.
 - 13) Activity Cost – The total budgeted cost per activity shall be included. A labor, Material, and Equipment cost breakdown is not required, but may be provided at the Design-Builder’s option.
- D) Sequence of Operations
- The logic diagram or PERT chart shall show the sequence and interdependence of activities required for complete performance.
- E) Review of the Baseline Progress Schedule
- The Design-Builder shall submit to the Department’s Project Manager, three copies of the logic diagram (PERT chart) and three copies of the following activities listings:
- 1) Activity Number Sort – Activities listed in ascending order of their numbers; and
 - 2) Total Float/Early Start Sort – Activities listed in ascending order based on amount of their float with consideration of activity early start dates.

An electronic back-up copy of the computerized Baseline Progress Schedule also shall be provided.

The Department’s Project Manager will review the Baseline Progress Schedule and then hold a discussion meeting with the Design-Builder. Within two weeks from this meeting the Design-Builder shall make adjustment to the Baseline Progress Schedule to eliminate conflicts, objections and ambiguities found by the Department’s Project Manager. The Design-Builder shall submit for review three copies of the revised schedule materials as described above.

Upon completion of the final review by the Department’s Project Manager, the Design-Builder shall incorporate the final revisions and submit two copies of the schedule diskettes containing the computerized Baseline Progress Schedule and three copies of each of the revised logic diagram (PERT chart) and computer printouts. The logic diagram (PERT chart) shall be on 279 mm x 425 mm size sheets and not a continuous diagram. This final submission shall be submitted for approval within one week of the Design-Builder’s receipt of the revisions.

SP108A-3.2 List of Submittals

Within 60 Calendar Days of the Contract Award, the Design-Builder shall provide a list of submittals required under the Contract, i.e., Design Plans, Project Specifications, shop drawings, required permits, and erection/demolition plans. The list shall show a schedule submission date for each submittal and identify the earliest activity affected by each of these submittals. This list shall be revised and updated monthly with each schedule submission.

SP108A-3.3 Schedule Updating

- A) Monthly Progress Reports and Projections

The Design-Builder shall update the schedule monthly. Each update shall show actual

dates of activities started and completed; the percent of Work completed to date on each activity started, but not yet completed and the status of procurement of critical Materials. The updated schedule data shall be submitted to the Department's Project Manager on computer disk. The Design-Builder also shall provide updated activity number and total float/early start sorts, a 60 Day look-ahead bar chart by early start, and a narrative report. The narrative report shall include a description of problem areas, current and anticipated delaying factors and their estimated impact on performance of other activities and mandated contract dates, and the explanation of corrective action taken or proposed.

The Department's Project Manager shall conduct a monthly review of the updated schedule. The review shall occur after receipt of the Design-Builder's updated information and shall serve as a forum to discuss slippages, remedies, revisions, and other relevant issues. The Design-Builder's appropriate design, construction, and scheduling personnel shall attend these working sessions. These reviews may result in the need for submission of revised schedules.

B) Logic diagram (PERT chart) Updates

The logic diagram (PERT chart) shall be updated by the Design-Builder every four months.

SP108A-3.4 Changes to the Accepted Baseline Progress Schedules

The Baseline Progress Schedule shall accurately reflect the manner in which the Design-Builder intends to proceed with the Project and shall incorporate the impact of delays and Orders-on-Contract when these factors can be accurately determined. All changes made to the schedule, i.e., the addition of activities, changes in logic, or changes in activity durations, shall be submitted in writing and are subject to written acceptance by the Department's Project Manager before inclusion in the Baseline Progress Schedule.

To initiate changes to the approved schedules, the Design-Builder shall meet with the Department's Project Manager and provide the information necessary to prepare a revised (updated) logic diagram (PERT chart) and computer-generated schedule listing.

SP108A-3.5 Compliance with the Schedule

The Design-Builder shall employ and supply a sufficient force of Workers, Materials, and Equipment and shall prosecute the Work with such diligence so as to maintain the rate of progress indicated on the approved schedule to prevent Work stoppage and ensure completion of the Project within the Contract time. Any additional or unanticipated costs or expense required to maintain the schedule, shall be solely the Design-Builder's obligation and shall not be charged to the Department unless provided for in other provisions of the Contract.

In the event a notice is received of a change to the Contract which is likely to cause or is causing delays, the Design-Builder shall notify the Department's Project Manager in writing within ten Calendar Days, of the effect, if any, of such change, or extra Work, or suspension or other conditions upon the Baseline Progress Schedule and shall state in what respects, if any, the approved Baseline Progress Schedule should be revised with the reasons therefore. The reasons for these revisions must be succinct, comprehensive, and factual to merit consideration.

SP108A-4 PROGRESS CHECK POINTS AND PAYMENT

Specified schedule submittals and schedule updates shall be considered Progress Check Points.

The cost of preparing and updating the CPM schedule and meeting all other requirements of this specification shall be included in Price Center 1.

Payment will be made under Price Center 1 per Part 2 – DB Section 100, Section 109.

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SECTION 108C - KEY PERSONNEL QUALIFICATIONS AND REQUIREMENTS

In the qualifications specified below, the word “shall” indicates a required minimum qualification. The word “should” indicates the Delaware Department of Transportation’s preferred qualifications, but such qualification is not a mandatory requirement.

- A) **Design-Builder's Project Manager***: Should have a minimum of 15 years experience in management of construction projects including road projects and commercial site development, with demonstrated experience on the design and construction of projects with similar scope, nature, and complexity as this project. The Design-Builder’s Project Manager shall have served in a similar role on a minimum of one prior project and shall be the Design-Builder's representative and single point of contact.
- B) **Principal-in-Charge***: Should have a minimum of 20 years experience in construction projects including road projects and commercial site development that include work on projects with similar scope, nature, and complexity as this project. The Principal-in-Charge shall have served in a similar role on a minimum of one prior project of similar scope, nature, and complexity as this project.
- C) **Lead Engineer***: The Lead Engineer (Design Manager) shall be a registered professional engineer in the State of Delaware and shall have a minimum of 15 years experience in highway and site design and construction. The Lead Engineer shall be responsible for coordinating other design disciplines, including, but not limited to architectural, electrical engineering, structural engineering, and landscape design. The Lead-Engineer shall have served in a similar role in a project of similar scope, nature, and complexity as this project.
- D) **Lead Architect***: The Lead Architect shall be a registered Professional Architect in the State of Delaware with a minimum of 15 years architectural design and development of commercial properties.
- E) **Quality Control Manager***: The Quality Control Manager’s responsibilities include, but are not limited to, creation and execution of the Submitter’s quality program, quality personnel, assurance activities independent of production, enforcement of quality procedures, and documentation of quality records including public information, environmental compliance and labor compliance. The Quality Manager shall report directly to the Submitter’s executive management team. The Quality manager will also be required to work in conjunction with the Department’s Quality Assurance and Quality Control representative during the life of the project. The Quality Manager should have at least ten years of recent experience developing, implementing, and overseeing quality programs.

*Denotes Key Personnel

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211503 - DEMOLITION OF BUILDINGS

Description:

This work consists of the demolition and removal of the structures as specifically specified on the Plans, described herein, and as directed by the Engineer.

The demolition and/or removal of the building and structure shall consist of complete demolition and/or removal of the building including removal of equipment and fixtures, foundation walls, footings, concrete floors (including basements) porches, steps, sheds, garages, barns and other out buildings, concrete masonry and timber structures, fences (belonging to this property, unless otherwise noted) and other structures directed to be demolished; also, disconnecting and terminating utility service facilities; and refilling basements, septic tanks, cesspools and similar cavities with approved material as noted hereinafter; temporary barricading of open basements where necessary for protection of the public; the removal and disposal of materials, shrubbery and debris; final cleaning up of the site and other incidental work.

All buildings and structures to be demolished will be open for inspection, and may be seen by appointment at any time convenient to the Real Estate Section prior to the time limit for receipt of bids.

It is the responsibility of the Contractor to examine the Right-of-Way Agreements on file available for the project at the District Office, and ascertain the conditions outlined therein.

General Requirements and Construction Methods:

Time and Manner of Performance: Bidders are advised to ascertain from the Real Estate Section of the availability and vacation of buildings which are to be demolished or removed under the Contract, of the possible vacation or removal or demolition of building on the site of the Contract by other parties, and the provisions of agreements between the State and Property Owners that may relate to the bid or to the work to be performed. The Contractor shall also confer with the Real Estate Section on the above-mentioned matters immediately after award of the Contract and at such other times thereafter as may be necessary or advisable. The Contractor shall be governed by the provisions of the above mentioned Right-of-Way Agreements.

The Contractor shall not begin the work of demolition of any building until the Engineer has declared in writing that the building is available for demolition.

Damages to Existing Roadways, Sidewalks and Curbs: All damages to existing roadway, sidewalk and curb areas caused by demolition work shall be replaced or repaired by the Contractor to the satisfaction of the Engineer at the Contractor's expense.

Laws and Permits: The Contractor shall comply with all Federal, State and local ordinances, regulations and laws and secure the necessary permits for prosecuting the work of this item.

Certificates: Required certificates, if any, of satisfactory performance of the demolition work signed by local Building Inspectors must be presented to the Department of Transportation before final payment will be made.

Rodent Control: Prior to commencing demolitions, the Contractor shall present to the project District Office of the Department of Transportation a certificate, certifying that the buildings have been

properly exterminated of rodents and other household pests.

Families in Vicinity: The Contractor shall note that the work described herein is also intended to assure that demolition work will be scheduled, undertaken and completed, in a manner which will maintain to the maximum extent possible existing levels of public convenience services, and health and safety conditions, for the individuals or families in the immediate vicinity, including those whose homes and businesses are in the process of acquisition as a part of the highway project.

Permits: A demolition permit will be required. Please note that a demolition permit and building permit are required for moving a building.

Construction Methods:

Trees and shrubbery may be removed as necessary to remove the structure. Any small shrubbery bordering the structure shall be removed. Where party walls are involved the Contractor shall take particular precautions to insure that the work will be executed under accepted standard practices and procedures; and that Article 12, "Protection of Work and Property of A.I.A., General Conditions of Contract", shall be adhered to. The remaining adjoining wall of properties shall be made secure and safe by the installation of proper footings. All party walls must be braced during demolition as required and as directed in order to maintain structural stability and safety.

Party walls that become exposed are to be furred, wire lathed, and plastered for water protection including basement walls as required.

Roof lines shall be carefully repaired with proper cornices and painting of exposed woodwork due to the demolition.

Also, additional supplement to the foregoing requirements concerning protection of party walls during demolition, the BOAC Basic Code, Section 13, and Article 13, "Precautions During Building Operations", of the Building Code of New Castle County (when job is located in New Castle County; for the Contract in Kent and Sussex Counties, the Contractor shall contact the proper County officials for such regulations), shall be adhered to.

All utilities must be notified in writing. A demolition permit will not be issued until all utilities have given written confirmation of disconnection and/or capping.

Building's which are required to be demolished or removed under the Contract, shall be torn down or moved to a new location outside the right-of-way of the project. No new location shall be used if the Contractor is notified by the State during the permit process that the location is proposed or contemplated for acquisition by the State. In lieu of demolition, the buildings may be used for the purpose of fire training by a local fire department in strict accordance with County Ordinances and the regulations and limitations established by DNREC and the State Fire Marshall's office. If this option is desired by the Contractor, he/she shall be required to submit a Value Engineering Proposal to the Department for approval. The Contractor will also be responsible for all damages from such burning to adjacent properties, utilities and roadways.

It shall be the responsibility of bidders to ascertain, by their own inspection and investigation, the sizes and condition of buildings, their types of construction, data concerning equipment and fixtures in, or a part of the building, whether or not such information be shown or given in the Plans, specifications, or other Contract documents, and to make such other investigations that may be necessary for a complete understanding of the work to be performed. Bids shall be based on the bidders' own findings.

The Department of Transportation does not guarantee that the condition and contents of buildings will be the same at the time of starting work, as they were when bidders inspected the site or prepared their bids; neither does the Department of Transportation assume any responsibility for destruction or loss due to fire, theft, or vandalism that may occur prior to the time that the Contractor takes possession of the buildings for demolition. The Contractor shall accept buildings in the condition prevailing at the time they are made available to him/her for demolition.

All building materials, fixtures and equipment in, attached or belonging to, the buildings at the time they are declared available for demolition shall become the property of the Contractor unless otherwise providing in the Right-of-Way Agreement with the owners.

Prior to and throughout the demolition process, the Contractor shall visibly inspect premises and structures for asbestos containing materials. If at any time during the demolition process the Contractor suspects or finds asbestos containing materials, he/she shall stop operations on the site where the suspect material is found and immediately notify the Engineer. The Contractor is responsible for all materials (including asbestos) hauled from the site, and all costs associated with the disposal of materials.

Materials and debris shall not be placed or stored within the limits of any existing street. The parking, loading and operation of trucks on existing highways or streets shall be governed by existing laws, ordinances and regulations and by the pertinent provisions of Section 107.07 of the Standard Specifications.

Basements of buildings demolished or removed by the Contractor, septic tanks, cesspools (including field drains or tile field) and similar cavities shall be cleared of unsuitable materials by a licensed septic hauler and disposed of in accordance with state laws. Copies of hauling bills will be supplied to DelDOT. All such cavities after inspected by DELDOT shall be backfilled with material conforming to Borrow Type C of subsections 209.02 and 209.04, placed and compacted to a density of not less than 95 percent as specified in subsection 202.05, and graded to drain at surrounding grade levels. The furnishing of backfill shall be included in the lump sum price for the Contract or on construction Contracts shall be incidental to this item.

All depressed curb sections of driveway entrances are to be replaced with curb of the type consistent with the curb adjacent to it unless otherwise directed. Behind the curb shall be backfilled and the area graded to drain.

If the Contract requires the abandonment of wells as noted on the Plans, the wells shall be abandoned in accordance with the procedures set forth in the DNREC's Regulations Governing the Construction of Water Wells dated January 20, 1987. All wells to be abandoned shall be sealed only by a licensed well Contractor, well driller, or well driver. The Contractor or Contractor Team must be licensed by DNREC to perform this work. Copies of the above referenced material can be obtained from the Water Supply Section of DNREC's Division of Water Resources.

The Contractor shall adhere to Section 9 of DNREC's Regulations Governing the Construction of Water Wells regarding the abandonment of the monitoring wells and other wells as noted on the Plans. Within thirty (30) days of abandonment of the wells, the Contractor must submit to DNREC, a Well Abandonment Report signed by the licensed Contractor/driller/driver in charge of on-site supervision of the well abandonments. The report form can be obtained from the Water Supply Branch of DNREC's Division of Water Resources. A copy of the completed report shall be provided to the Department's inspector at the time of submission to DNREC.

To supply security to the site during the performance of this Agreement/Contract the Contractor

shall as soon as possible after award post "No Trespassing" signs on all sides of the site. Wherever necessary for protection of the public or where required by State or local laws, regulations or ordinances, the Contractor shall construct and maintain substantial temporary barricades or fences closing off open cellars. At no time shall there be any void left uncovered and not posted.

Prior to the demolition of any buildings, the Contractor shall provide for the disconnection and removal from the building to the R/W of all water, sewer, gas, electric, telephone service facilities and other buried or overhead cables. All removals shall be done in accordance with the requirements of municipalities and utility companies owning or controlling them. The Contractor shall notify the municipalities and utility companies of the time any such disconnections may need to be made, and he/she shall perform the work according to their standard practices and requirements and under their supervision, or arrange for its performance by their forces. The cost of any and all such utility work including charges, if any, made to the municipalities and utility companies, shall be borne by the Contractor and shall be included in the price bid for the item "Demolition of Buildings".

Prior to acceptance of the Contract, small shrubbery in the way of mowing, all materials and debris accumulated from demolition of buildings and from other work in connection therewith, shall be removed from the site and shall be disposed of by the Contractor. The ground surface shall be graded, if necessary, to eliminate water pockets, then the area shall be covered with 6" (150 mm) of topsoil and seeded in accordance with Sections 732, 734 and 735. The site of each demolished building shall then be cleaned up and left in a condition satisfactory to the Engineer.

Breakdown of Lump Sum Price and Right of Department to Delete Demolition of One or More Buildings:

The attention of bidders is directed to the fact that in the Proposal, a lump sum bid for Demolition of Buildings will be made for all Buildings to be demolished. However, each bidder will be required to show an analysis of the lump sum price bid for Demolition of Buildings by listing the price of each individual building on a separate sheet to be attached to and submitted with the Proposal form.

The Department of Transportation reserves the right to delete from the Contract the demolition of any of the individual buildings shown on the Plans, and the lump sum price to be paid for Demolition of Buildings will be reduced in accordance with the Contractor's itemized attachment to the Proposal. The Contractor shall make no claims for additional compensation because of deletion of any of the individual buildings from this Contract and the corresponding reduction in the Lump Sum Price Payment.

Method of Measurement:

~~———— The quantity of building demolition will not be measured.~~

Basis of Payment:

~~———— The quantity of building demolition will be paid for at the Contract lump sum. Price and payment shall be full compensation for the cost of furnishing all materials, and for all labor, equipment, tools, permits, certificates, and incidentals necessary to complete the work of this item as specified, including any excavation, Type "C" Borrow, backfilling and compaction, topsoil and grading required. The item shall include the cost of abandoning the wells, if such condition exists in the Contract.~~

~~———— The price bid for this item shall also include the removal of sidewalks, drives, patios, trailer parking pads, replacement of curb and other miscellaneous items as required and/or as directed. At the~~

~~option of the Engineer, each separate work area will be accepted when completed as the entire work progresses.~~

~~———— The lump sum price bid for the item shall be reduced based on the analysis of the lump sum price for individual buildings submitted by the Contractor, in the event one or more of the buildings designated for demolition is/are deleted from the Contract.~~

12/14/01

302500 - DEL. NO. 3 STONE
302501 - DEL. NO. 8 STONE
302502 - DEL. NO. 2 STONE
302503 - DEL. NO. 57 STONE
302504 - DEL. NO. 67 STONE
302505 - DEL. NO. 10 STONE
302509 - DEL. NO. 1 STONE

Description:

This work consists of furnishing, hauling, placing, and compacting stone, in accordance with the details and notes shown on the Plans and/or as directed by the Engineer.

Materials and Construction Methods:

The stone for Del. No(s). 1, 2, 3, 57, 67, 8 and 10 shall comply with quality and gradation requirements of respective Sections 805, and 813 of the Standard Specifications.

Construction methods shall conform to the requirements of notes on the Plans and/or as directed by the Engineer.

When used in a temporary situation, the stone shall be removed and disposed of by the Contractor as directed by the Engineer.

Method of Measurement:

~~———— The quantity of stone will be measured as the actual number of tons (metric tons) for stone placed and accepted. The weight will be determined according to Subsection 109.01.~~

Basis of Payment:

~~———— The quantity of stone will be paid for at the Contract unit price per ton (metric ton). Price and payment will constitute full compensation for furnishing, hauling, and placing all materials, and for all labor, equipment, tools, and incidentals required to complete the work.~~

NE - 1/17/01

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

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

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

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

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

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

- 401662 - SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 115
GYRATIONS, PG 64-22
- 401663 - SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160
GYRATIONS, PG 64-22
- 401664 - SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 205
GYRATIONS, PG 64-22

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

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

- 401704 - SUPERPAVE, TYPE C HOT-MIX, 115 GYRATIONS, PG 64-22, (NON-
CARBONATE STONE)
- 401705 - SUPERPAVE, TYPE C HOT-MIX, 160 GYRATIONS, PG 64-22, (NON-
CARBONATE STONE)

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

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

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

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

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

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

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

NOTE: NOT TO BE USED FOR BUS LOOP WEARING SURFACES.

Description:

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

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

Materials:

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

Asphalt Binder:

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

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

Substitution of a higher temperature grade will require prior approval by the Engineer. If PG 76-22 is the specified binder, recycled asphalt pavement (RAP) and natural sand shall not be allowed in the mixture. If a producer would like to submit a mixture with natural sand, the Engineer will perform a deformation test using the Asphalt Pavement Analyzer (APA). The sample will be tested per AASHTO TP xxx “Determining Rutting Susceptibility of Asphalt Paving Mixtures Using the Asphalt Pavement Analyzer (APA).” If the depth of measured permanent deformation is 2 mm or less after 8000 strokes and a fatigue criteria of less than 1.0 mm/stroke after at least 50000 strokes, the mixture may be approved for use.

Shingles:

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

The overall percentage of RAP and recycled shingles (5% maximum) shall not exceed 20% of the mixture. The RAP and recycled shingles mixture are not permitted on wearing course.

Mineral Aggregate:

The mineral aggregate employed in the target gradation of the job mix formula (JMF) shall conform to Section 805 and the following criteria. These criteria apply to the combined aggregate blend.

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

¹Coarse Aggregate Angularity is tested according to ASTM D5821.

²Fine Aggregate Angularity is tested according to AASHTO TP-33.

³Clay Content is tested according to AASHTO T176.

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

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

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

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

For any roadway with a minimum average daily traffic volume (ADT) of 8000 vehicles and a posted speed of 35 mph (60 kph) or greater, the polish value of the composite aggregate blend shall be greater than 8.0 when tested according to Maryland State Highway Administration MSMT 411 – “Laboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces.” RAP shall be assigned a value of 4.0. The contractor shall supply all polish values to the Engineer upon request.

Mineral Filler:

The mineral filler shall conform to AASHTO M17.

Mixture Requirements:

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

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

Superpave Gyratory Compactive (SGC) Effort:

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

Superpave Gyratory Compactive (SGC) Effort:

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

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

DESIGN ESAL'S (MILLION)	REQUIRED DENSITY (% OF THEORETICAL MAXIMUM SPECIFIC GRAVITY)			VOIDS-IN-MINERAL AGGREGATE (% - MINIMUM)					VOIDS FILLED WITH ASPHALT (% - MINIMUM)
	N _{INITIAL}	N _{DESIGN}	N _{MAX}	NOMINAL MAX. AGGREGATE (MM)					
				25.0	19.0	9.5	12.5	4.75	
0.3 to < 3	≤ 90.5								65.0 - 78.0
3 to < 10	≤ 89.0	96.0	≤ 98.0	12.0	13.0	15.0	14.0	16.0	65.0 - 75.0 ¹
10 < 30									
≥ 30									

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

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

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

Gradation Control Points:

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

Nominal Maximum Aggregates Size Control Points, Percent Passing										
SIEVE SIZE	25.0 MM		19.0 MM		12.5 MM		9.5 MM		4.75 MM	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
37.5 MM	100	-	-	-	-	-	-	-	-	-

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

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

Gradation Classification:

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

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

Plant Production Tolerances:

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

Design Evaluation:

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

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

The proposed JMF shall include the following:

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

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

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

- % of G_{mm} at N_d , VMA at N_d , VFA at N_d , Fines to effective asphalt binder (P_{be}) ratio, and unit weight (kg/m^2) at both N_d and N_m .

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

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

Compaction:

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

Method of Measurement and Basis of Payment:

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

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

12/4/03

401699 - QUALITY CONTROL/QUALITY ASSURANCE OF BITUMINOUS CONCRETE

.01 Description.

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

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

.02 Definitions.

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

- **Quality Assurance (QA):** All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.
- **Quality Control (QC):** The sum total of the activities performed by the Contractor in order to assure that the product meets contract requirements.
- **Quality Control (QC) Plan:** The detailed description of the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties governed by the Specifications. The QC Plan must address the actions needed to keep the process in control, detect when the process is going out of control, and responses to correct the situation(s).
- **Quality Level Analysis:** A statistical procedure that provides a method for estimating the percentage of each lot or subplot of material, product, item of construction, or completed construction that may be expected to be within specified tolerances.
- **Standard Deviation:** A term used in statistics to indicate the value calculated from the square root of the difference between the individual measurements in a group and their average. Standard deviation is calculated by taking the square root of the sum of the squares of the differences of each of n values and the mean value, this sum first divided by (n-1).
- **Target Value:** The acceptable value for a controlling characteristic of a product. The JMF will establish each of these values for the material.
- **Test Methods:** Shall be AASHTO test methods. Copies of these test methods shall be available at each qualified laboratory.
- **Upper Quality Index (QU):** The index reflecting the statistic related to the upper boundary to which a sample (or sample statistic) may deviate from the target value and still be considered acceptable.
- **Volumetric Properties:** Air voids, voids in mineral aggregates (VMA), voids filled with asphalt (VFA), and dust to effective asphalt.

.03 Equipment.

(a) Material Production Test Equipment.

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

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

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

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

(b) Pavement Construction Test Equipment.

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

.04 Quality Control (QC) Plan.

(a) Material Production QC.

(1) Job Mix Formula – Material Production.

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

The component materials design shall include designating the source and the expected proportion (within 1 percent for the aggregate components, and within 0.1 percent for the other components) of each component to be used in order to produce workable hot-mix asphalt having the specified properties. For plant component feed adjustments, RAP can be considered in the same manner as an individual aggregate component. The JMF target characteristic values include the mixing temperature range, core temperature range for gyrations, the percentage of the asphalt cement component (both total and virgin), and the percentages of the aggregate amounts retained on the sieves to be addressed by the JMF as shown in Table 1.

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

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

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

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

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

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

Table 1 - Aggregate Gradation - JMF and Control Point Information										
Sieves to be addressed by JMF/Range values are percentages passing by weight										
Sieve Size mm (inch)	4.75 mm	4.75mm Range	9.5 mm	9.5mm Range	12.5 mm	12.5mm Range	19.0 mm	19.0mm Range	25.0 mm	25.0mm Range
37.5(1.5)	No		No		No		No		Yes	100
25.0(1.0)	No		No		No		Yes	100	Yes	90-100
19.0 (3/4)	No		No		Yes	100	Yes	90-100	Yes	20-90
12.5(1/2)	Yes	100	Yes	100	Yes	90-100	Yes	23-90	Yes	
9.5 (3/8)	Yes	95-100	Yes	90-100	Yes	28-90	Yes		Yes	
4.75(#4)	Yes	90-100	Yes	32-90	Yes		Yes		Yes	
2.36(#8)	Yes		Yes	32-67	Yes	28-58	Yes	23-49	Yes	19-45
(#16)	Yes	30-60	Yes		Yes		Yes		Yes	
(#30)	Yes		Yes		Yes		Yes		Yes	
(#50)	Yes		Yes		Yes		Yes		Yes	
(#100)	Yes		Yes		Yes		Yes		Yes	
.075(#200)	Yes	6-12	Yes	2-10	Yes	2-10	Yes	2-8	Yes	1-7

(2) Process Control – Material Production.

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

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

- Using testing equipment that is knowingly out of calibration or is not working properly.
- Reporting false information such as test data, JMF information, or any info requested by DelDOT
- When the Contractor fails to comply to their approved QC Plan in reference to

- materials testing
- Substantial deviations to AASHTO or DelDOT procedures when running tests, sampling stockpiles, or testing hot mix.
- The use of any material not listed in the JMF.
- The use of the wrong PG graded asphalt.
- If samples fall within the Contractors action points in the QC Plan but the Contractor fails to take the corrective action in the approved QC Plan

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

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

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

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

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

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

(b) Pavement Construction – Process Control.

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

.05 Acceptance Plan.

(a) Material Production – Tests and Evaluations.

The Engineer will conduct acceptance tests. The Engineer will directly base acceptance on the acceptance test results, the asphalt cement quality, the Contractor's QC Plan work, and the comparisons

of the acceptance test results to the QC test results. The Engineer may elect to utilize test results of the Contractor in some situations toward judging acceptance. All acceptance tests shall be performed by qualified technicians at qualified laboratories following AASHTO or DelDOT procedures, and shall be evaluated using Quality Level Analysis.

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

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

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

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

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

day and properly label it with all pertinent information.

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

- AASHTO T312 – Preparing a mixture samples using a gyratory compactor.
- AASHTO T166, Method C (Rapid Method) – Bulk specific gravity of compacted samples.
- AASHTO T308 – Asphalt cement content.
- AASHTO T30 – Aggregate gradations, using samples from the asphalt cement content test.
- AASHTO T209 – Theoretical maximum specific gravity.
- ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method

(b) Pavement Construction – Tests and Evaluations.

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

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

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

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

The minimum size of a compaction lot shall be 100 tons. If the compaction lot is between 101 and

1000 tons, the Engineer shall randomly determine four compaction acceptance test locations. If the compaction lot is between 1001 and 1500 tons, the Engineer shall randomly determine six compaction acceptance test locations. If the compaction lot is between 1501 and 2000 tons, the Engineer shall randomly determine eight compaction acceptance test locations. If the compaction lot is greater than 2000 tons, the Engineer shall randomly determine two compaction acceptance test locations per 500 tons.

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

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

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

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

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

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

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

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

- AASHTO T166, Method C (Rapid Method) – to determine the bulk specific gravity of the cores.

- AASHTO T209 – to calculate the theoretical maximum specific gravity and the density of the non-compacted mixtures.
- ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method.

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

.06 Payment and Pay Adjustment Factors.

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

(a) Material Production – Pay Adjustment.

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

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

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

1. For each parameter, calculate the mean value and the standard deviation of the test values for the lot to the nearest 0.1 unit.
2. For each parameter, calculate the Upper Quality Index (QU):
$$QU = ((JMF \text{ target}) + (\text{single test tolerance}) - (\text{mean value})) / (\text{standard deviation}).$$
3. For each parameter, calculate the Lower Quality Index (QL):
$$QL = ((\text{mean value}) - (JMF \text{ target}) + (\text{single test tolerance})) / (\text{standard deviation}).$$
4. For each parameter, locate the values for the Upper Payment Limit (PU) and the Lower Payment Limit (PL) from Table 2 – Quality Level Analysis by the Standard Deviation Method. (Use the column for “n” representing the number of sublots in the lot. Use the closest value on the table when the exact value is not listed).

5. Calculate the PWL for each parameter from the values located in the previous step:

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

Final Pay Adjustment =

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

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

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

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

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

Table 2 – Quality Level Analysis by the Standard Deviation Method							
PU or PL	QU and QL for “n” Samples						
	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9

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

Table 2 – Quality Level Analysis by the Standard Deviation Method							
PU or PL	QU and QL for “n” Samples						
	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8	n = 9
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
61	0.39	0.33	0.31	0.30	0.30	0.29	0.29
60	0.36	0.30	0.28	0.27	0.27	0.27	0.26
59	0.32	0.27	0.25	0.25	0.24	0.24	0.24

Table 3 - Material Parameter Weight Factors		
Material Parameter	Single Test Tolerance (+/-)	Weight Factor
Asphalt Content	0.4	0.30
#8 Sive (19 mm or >)	7.0	0.30
#8 Sieve (12.5 mm or <)	5.0	0.30
#200 Sieve (0.075 mm) Sieve	2.0	0.30
Air Voids (4.0% Target)	1.5	0.10

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

(b) Pavement Construction – Pay Adjustments.

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

- Degree of compaction of the in-place material

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

1. Calculate the average density values from the subplot tests values, to the nearest 0.1 unit.
2. Calculate the Degree of Compaction:
 Degree of Compaction =

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

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

* or remove and replace it at Engineer's discretion

Table 5a: Compaction Price Adjustment Other¹ Locations	
Degree of Compaction (%)	Pay Adjustment Factor (%)
>96	-100*
95	-2
94	0
93	+3
92	0
91	0
90	0
89	-1
88	-5
87	-15
86	-25
85	-30
84	-100*

* or remove and replace at Engineer's discretion

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

.07 Dispute Resolution.

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

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

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

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

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

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

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

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

02/28/09

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

Description.

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

Materials and Equipment.

The following material shall be available to complete this work:

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

The following equipment shall be available to complete this work:

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

Construction Method.

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

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

Performance Requirements.

The Engineer will judge the patch on the following basis:

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

Basis of Payment.

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

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

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

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

Structural Number Calculations

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

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

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

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

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

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

Example:

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

Calculation:

For the Type B lift the calculation would be:

Existing HMA	2 * 0.32	=	0.64
GABC	7 * 0.14	=	<u>0.98</u>
			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	=	<u>0.98</u>
			2.52

605545 - SOIL BORINGS, LAND

General:

This Special Provision addresses requirements for soil borings advanced through unconsolidated or partly consolidated sediments or decomposed rock by use of Hollow Stem Augers (HSA) or Drive Casing and sampling with a split barrel sampling spoon at locations defined by the Design-Builder. Those soil borings made over "deep" water requiring a barge or other special equipment will be considered Soil Borings, Water. All others will be considered Soil Borings, Land and shall be performed in accordance with this Special Provision.

Standard Penetration Tests (SPT) and Split Barrel Sampling of the soils shall be taken at the ground surface and at 5 foot maximum intervals thereafter in all hollow stem auger and drive casing holes.

Hollow Stem Auger Method:

The Design-Builder shall use a power-driven, continuous, hollow-stem auger casing with a center hole plug point to advance and maintain the hole. The clear inside diameter of the hollow stem must be large enough to allow for the insertion of a 3.0 inch Outside Diameter (O.D.) Shelby Tube soil sampler and attached rods through the in-place auger casing when elevations are reached for securing soil samples.

When using auger casings, the relative resistance to penetration, general feel and performance of the auger operation, and the cuttings obtained from the auger shall be observed and recorded for detection of changes in the materials encountered.

The plug point shall be withdrawn through the hollow stem, the sampler lowered through the full length of the auger, then driven or pressed below the auger bit and withdrawn. After replacing the plug point, the auger shall proceed to the next point of sampling. When the use of hollow stem augers is not feasible because of site conditions, the use of drive casings will be permitted.

All boreholes shall be preserved from collapse and bottom instability during advancement and sampling operations. When drilling below the natural ground water level, drilling fluid shall be maintained inside the augers at a level above the ground water level at all times. If it is required to prevent bottom instability, water should be added to maintain a positive static water head inside the augers during drilling and withdrawal of the drilling rods. If artesian water pressures are suspected or encountered, stand pipes or higher density drilling fluid shall be used to maintain a stable hole and prevent soil flow. Cleaning out of the augers shall be required if the accumulation of material within the hollow-stem, between sampling intervals, is of a degree that is detrimental to the purpose of the sampling operation. Cleaning out the augers shall be performed with wash rods and a roller or side discharge chopping bit.

Drive Casing Method of Advancing Borings:

All sampling and other procedures referencing the HSA method will also apply where drive casing is employed.

Casings shall be extra-strong steel pipe or flush-coupled casing with nominal inside diameter of 4 inches.

Casings shall be sunk vertically through earth and other materials, including boulders and rock veins, to rock, or if not to rock, to such depth below ground as ordered by the Design-Builder's Geotechnical Engineer. They shall be driven down without washing to the depth at which a sample is to be taken, after which the material shall be cleaned out to the bottom of the casing and the sampler driven or pushed below the bottom of the cleaned casing. After sampling, casing driving shall be resumed.

The use of clean water for cleaning out the casing between sample elevations will be required. Re-circulated water shall not be used. The Design-Builder shall make suitable arrangements for properly procuring and disposing wash water.

The weight of hammer to be used in driving the casing shall be 300 pounds with a 24-inch height of free fall. The hammer shall be raised by means of a rope having one end wrapped (not more than three loops) around a winch head. Wire rope will not be permitted. A continuous record of the blows per foot required for the driving of the casing shall be kept.

Simultaneously washing and driving of the casing will only be permitted except when expressly accepted by the Design-Builder's Geotechnical Engineer. Where the use of water is permitted, borings shall be advanced by saw tooth, chopping, fishtail, or rollerbits, all having side discharge jets. In advancing the boring, return water circulation, resistance to penetration and general performance of the drill shall be observed for detection of change in material. The casing shall next be advanced, if needed for retaining the hole open, to the point of maximum penetration of the washed pilot hole. The casing shall be cleaned in a manner to result in minimum disturbance of the soil below the casing shoe. All sampling shall be performed in advance of the casing shoe. A record must be kept of the depths between which simultaneous washing and driving occurred.

In some cases where the characteristics of the soil are suitable, the Design-Builder's Geotechnical Engineer may discontinue driving the casing and accept advancing the boring by means of wash rods with a roller bit or side discharge chopping bit to the elevations at which samples are to be taken. This procedure shall be noted in the boring record. Should there be any indication of the sides of the hole collapsing, thus blocking normal progress of the boring, driving of the casing shall be resumed.

When a boulder or a stratum of ledge rock is encountered before the required depth of boring has been reached, it shall be the Design-Builder's responsibility to carry the boring through or pass these obstacles but only by methods submitted for review and written comment from the Department. The Design-Builder may, in some cases, be permitted to core the boulder or rock stratum to determine its size and characteristics. The required size of sampler to be used below the obstacle shall determine the size of boring to be made. A log of the nature of the obstacle and the method used to carry the boring through the obstacle shall be recorded.

Any method used to carry the boring through the obstacle other than rock core drilling in excess of one (1) foot, shall be performed by the Design-Builder at the Lump Sum Contract Price.

If the Design-Builder abandons a boring before adequate information is obtained and starts another boring adjacent to it in preference to carrying the boring through the obstacle, or because of a shattered or misaligned casing, no additional payment will be made for the work done on the abandoned boring.

Sampling Device:

The sampling device for ordinary, dry samples from Soil Borings shall be a standard split barrel

sampler meeting the requirements of the "Standard Method for Penetration Test and Split Barrel Sampler of Soil", ASTM D1586.

Sampling Procedure:

The HSA shall be drilled to the sampling depth and the loose material within the casing cleaned to its bottom after removal of the plug point and before driving the sampler. Clean out shall be accomplished by roller bit, chipping bit or other methods submitted for review and written comment from the Department.

The sampling procedure shall be in accordance with ASTM D1586. All sampling devices, including driving mechanisms, used by the Design-Builder shall be submitted for review and written comment from the Department.

Samples of the soil retained in the split barrel sampler shall be taken from that portion of the soil column between six (6) and eighteen (18) inches below the bottom of the casing. The sample so obtained shall be representative of the material from which it is taken and shall be in an unwashed condition. Samples recovered from wash water, commonly termed "wash samples" will be unacceptable. If less than nine (9) inches of soil is retained in the sampler, a second sample shall be taken immediately below the deficient sample, after first advancing the boring. If more than one soil type is present in the sampler, a sample shall be taken of each type, and the length of each type of soil in the sampler shall be noted on the boring log.

Preservation and Identification of Samples:

The Design-Builder shall collect, preserve, and provide identification for all disturbed samples obtained with the split barrel sampler in accordance with ASTM1586.

Determination of Running Sand:

In order to determine whether the water pressure on sand, if encountered in a boring is sufficient to cause the sand to run when unconfined, the Design-Builder's Geotechnical Engineer may order a test for running sand.

The test shall consist of obtaining a sample of the sand with a split barrel sampler as specified in the sampling procedure. The casing shall then be drilled to a depth specified by the Geotechnical Engineer, and carefully washed out to the bottom. The hole shall then be allowed to stand ten (10) minutes, and the elevation at which the sand then stands in the casing shall be measured. The water in the casing shall then be removed to a point five (5) feet above the bottom of the casing to produce an unbalanced hydrostatic condition and the elevation of the top of the sand shall again be measured.

No more than one such test will be required at each substructure unit when sand is encountered at depths near or above the anticipated elevation of the bottom pier or abutment excavation.

The test for running sand will be considered a normal procedure in the drilling of Soil Borings. No additional compensation will be allowed over and above the Lump Sum Contract Price for this work.

Ground Water:

Depth to ground water shall be determined when initially encountered and upon completion. The Design-Builder shall also take a water level reading 24 hours after the augers are removed. In the event

the hole collapses before the ground water is observed the depth to the collapsed portion shall be recorded. Ground water determination as described in this paragraph will not be paid for separately, but will be considered incidental to the work.

Records and Logs:

The Design-Builder shall keep a complete and accurate record of all details of the Soil Boring operations in a field book and on suitable boring log forms provided by the Design-Builder. Within 48 hours of completion of each boring, copies of the field logs on 8-1/2 x 1 inch paper shall be submitted to the Department's Project Manager for review and written comment. The description of the soil, rock and other material encountered in the boring shall be made by the Design-Builder's Geotechnical Engineer. Each boring log shall record the information pertinent to the boring work being accomplished as outlined in the following sections or as deemed necessary by the Geotechnical Engineer. The following general information shall be recorded on each and every boring log:

- (a) Title of project and section designation
- (b) Location of site by name, and/or survey station, and offset, if any, right or left of survey baseline
- (c) Hole number as specified on the Plans
- (d) Names of the Design-Builder's Field Engineer, Inspector, and drilling crew
- (e) Date of starting and completing each boring
- (f) Ground elevation of the top of the hole
- (g) Depth to the top of ground water, if present.

The following information shall be recorded on the boring logs for that portion of the boring penetrating unconsolidated or partly consolidated sediments or decomposed rock by drilling and sampling with a split barrel sampler:

- (a) Type of drill rig used
- (b) Size, type and length of augers used in each hole
- (c) Method used to clean out casing between sampling intervals
- (d) Size of split barrel sampler, weight of hammer, height of drop, and number of blows of the hammer for each six (6) inches of penetration of the sampler out of a total minimum penetration of eighteen (18) inches for each sample. Where six (6) inches is not penetrated in one hundred (100) blows of the hammer, the distance penetrated in one hundred (100) blows shall be recorded
- (e) Depth to beginning and end of sampling drive, and the length of sample recovered from the sampler
- (f) Depth to the top of each change or stratum of material
- (g) Description of the material encountered shall be in accordance with ASTM D2488 and shall include:
 - (1) Type - topsoil, sand, silt, clay, gravel, silty clay, sandy silt, etc.
 - (2) Color - light brown, dark reddish brown, etc.
 - (3) Moisture - dry, moist, wet, very wet, etc.
 - (4) Consistency - soft, loose, medium, firm, stiff, etc. as determined by "N" values in Table 1 below.

**TABLE 1
DEGREE OF DENSITY OR CONSISTENCY**

Non-Cohesive Soils Descriptive term	(Sand) Standard Penetration "N" Blows/Ft.	Cohesive Soils Descriptive Term	(Clay) Standard Penetration "N" Blows/ft.
Very loose	0-4	Soft	0-4
Loose	5-10	Firm	5-8
Medium	11-30	Stiff	9-15
Dense	31-50	Very Stiff	16-30
Very Dense	51+	Hard	31+

(h) Unusual occurrences such as running sand, voids, loss of water, etc.

(i) The distance through which a roller bit is used to advance the hole in soft or weathered rock which is too soft to core drill and too hard to advance augers.

Utilities:

The Design-Builder shall verify the exact location of all known utilities prior to drilling.

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720527 - PLASTIC DRUMS

Description:

The item shall consist of furnishing, placing, relocating and maintaining plastic drums with reflective sheeting. Each drum weighted with sand filled base or weighted with other approved devices comprising an integral part of the drum shall be able to withstand 60 mph (100 km/h) winds, and conforming to the applicable requirements of the manual "Delaware Traffic Controls for Street and Highway Construction, Maintenance, Utility & Emergency Operations", (latest edition with all revisions made up to the Advertisement date). The device shall have at least an 18" (450 mm) diameter at the top and bottom and be at least 36" (900 mm) high. Drums damaged or stolen shall be replaced at the Contractor's expense. The drums shall be either new or refurbished to ensure required reflectivity as described herein; the Engineer may reject those plastic drums not suitable for the intended purpose. The warning light as applicable shall be installed on the top of the weighted drum.

Reflective Sheeting for Plastic Drums

Reflective sheeting shall consist of a retroreflective lens system having a smooth outer surface. When adhesive backing is used, the sheeting shall have a pre-coated adhesive on the backside protected by an easily removable liner.

A. Color Requirements

The colors specified shall be matched visually and shall be within the color tolerance limits shown on the appropriate Highway Color Tolerance Charts issued by the Federal Highway Administration utilizing the instruments thereon. Certification as to conformance with these requirements is acceptable.

**TABLE I
Color Specification Limits and Reference Standards
Type III Sheeting**

	Color Chromaticity Coordinates*								Reflectance	
	(Corner Points)								Limits	
	1		2		3		4		Y	
	X	Y	X	Y	X	Y	X	Y	Min	Max
White**	.303	.287	.368	.353	.340	.380	.274	.316	27	--
Orange	.505	.360	.630	.371	.581	.418	.516	.394	14	30

Reference***
Standard
(Munsell Papers)

White** 5.0PB 7/1
Orange 2.5 YR 5.5/1

* The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 standard calorimetric system measured with standard illumination source C.

** Silver White is an acceptable color designation.

*** Available from Munsell Color Company; 2441 Calvert Street, Baltimore, Maryland 21218.

B. Reflective Intensity

The reflective sheeting shall have minimum Specific Intensity per unit Area (SIA as shown in Table II expressed as "candelas per footcandle per foot" (Cd fx -1) ft. -2.) Measurement of SIA shall be conducted in accordance with the method detailed in section 718 of FP-79.

TABLE II
Minimum Specific Intensity
Per Unit Area (SIA)
(Candelas Per Footcandle Per Foot)
A - Glass Bead Retroreflective
Element Material

Observation Angle	Entrance Angle	White	Red	Orange	Yellow
0.2	-4	250	45	100	170
0.2	+30	150	25	60	100
0.5	-4	95	15	30	62
0.5	+30	65	10	25	45

C. Specular Gloss

The reflective sheeting shall have an 85 degree specular gloss of less than 50 for III when tested in accordance with ASTM 523.

D. Color Processing

The sheeting shall permit cutting and color processing with compatible opaque process inks in accordance with the manufacturer's recommendations at temperature of 60 °F (16°C) to 100°F (38°C) and relative humidity (R.H.) at 20 to 80 percent.

E. Shrinkage

A 9" (225 mm) by 9" (225 mm) reflective sheeting specimen with liner shall be conditioned a minimum of 1 hour at 72°F (22°C) and 50 percent relative humidity. The liner shall be removed and the specimen placed on a flat surface with adhesive side up. Ten minutes after the liner is removed and again after 24 hours, the specimen shall be measured to determine the amount of dimensional change. The reflective sheeting shall not shrink in any dimension more than 1/32" (0.79 mm) to 10 minutes nor more than 1/10" (2.54 mm) to 24 hours.

F. Flexibility

The sheeting, with liner removed and conditioned for 24 hours at 0°C shall be sufficiently flexible to show no cracking when slowly bent, in one second's time, around 1/8" (3 mm) mandrel with adhesive contacting the mandrel. For ease of testing, it is recommended that talcum powder should be spread over the adhesive sticking to the mandrel.

G. Adhesive

The reflective sheeting shall include a pre-coated pressure sensitive adhesive backing, which may be applied without necessity of additional adhesive coats on either the reflective sheeting, or application surface.

The protective liner attached to the adhesive shall be removed by peeling without soaking in water, or other solvents without breaking, testing, or removing any adhesive from the backing. The protective liner shall be easily removed following accelerated storage for 4 hours at 160°F (71°C) under a weight of 2.5 lbs. per square inch (1758 kg/m²).

The adhesive backing of the reflective sheeting shall produce a bond to support a 1 3/4 pound (0.79 kg) weight for 5 minutes, without the bond peeling for a distance of more than 1" (25 mm) when applied to a smooth aluminum surface and tested as specified in Section 718, FP-79.

H. Impact Resistance

Reflective sheeting material, applied according to the manufacturer's recommendations to a cleaned, etched aluminum panel of alloy 6061-T6, 0.04" (1 mm) by 3.0" (75 mm) by 5.0" (125 mm) and conditioned for 24 hours at 32°F (0°C), shall show no cracking when the face of the panel is subjected to an impact of 2 pounds (0.91 kg) weight with 5/8" (16 mm) rounded tip dropped from a 100" pound (11 N-m) setting on a Gardner Variable Impact Tester, IG-11120.

Method of Measurement:

~~Plastic drums shall be paid for Each/Day furnished and maintained. This includes relocation(s) of the drum as directed by the Engineer or as noted on the plans.~~

Basis of Payment:

~~The number of plastic drums, measured as provided above shall be paid for at the contract unit price bid Each/Day for Payment for "Plastic Drums" as required by the Contract, shall be made at the lump sum contract price, which price and payment shall constitute full compensation for furnishing and placing all materials, including plastic drums, reflective sheeting; for installation and all relocations, for maintenance, labor, tools, equipment, and incidentals required to complete the item.~~

01/17/01

720556 - BOLLARD

Description:

This work consists of furnishing and installing a removable timber bollard in accordance with the notes, Standard Construction Details and as directed by the Engineer.

Materials and Construction Methods:

The bollard shall be made of seasoned uniform, and straight timber conforming to the requirements of Section 601 and treated with the water borne preservative chromated copper arsenate in accordance with Section 814.

Concrete shall be Class B conforming to the requirements of Section 612.

Reflector panels, if required, shall conform to the requirements of Section 749.

Steel housing for accommodating the bollard shall be galvanized and installed in the hole in vertical position on a 6" (150 mm) bed of stone and encased with concrete as shown on the Standard Construction Details and/or as directed. All hardware shall be galvanized steel.

Method of Measurement:

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

Basis of Payment:

The quantity of bollards will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing and placing all materials, including stone, steel housing and hardware, reflector panels as shown on the Standard Construction Details, timber and concrete, excavation, backfilling, disposing of the surplus material, for all labor, tools, equipment and necessary incidentals to complete the work.

1/29/02

742500 - FLAGGER REQUIREMENTS

742.01 Description. Flagger shall consist of furnishing personnel and necessary equipment for the controlling of traffic through work areas.

742.02 Flagger Requirements. Flaggers shall be governed by and familiar with the Manual on Uniform Traffic Control Devices (MUTCD) Part VI, latest edition, and updates, and shall conform to the requirements of the latest version of the manual entitled "Delaware Traffic Controls for Street and Highway Construction, Maintenance, Utility and Emergency Operations" (latest edition with all revisions made up to the date of Advertisement of this project and from hereon shall be addressed as the Traffic Manual). Flaggers shall have completed flagger training and testing, within the last 4 years as offered by American Traffic Safety Services Association (ATSSA) or the Delaware Construction Craft Laborers' Apprenticeship Program. The Contractor shall provide appropriate documents showing the flagger certification status throughout the duration of Contract. When additional flagpersons are needed on a project the Contractor shall supply the Engineer with this documentation prior to them beginning work. The Contractor shall also have available a person certified to flag who will relieve the flagperson for any necessary breaks. Flaggers are required to have their approved flagger card, and a photo identification card on their person at all times while flagging. Failure to produce an approved card, when requested to do so by anyone authorized by DelDOT, shall be grounds to have that person removed from the flagger job.

Flagger shall be completely covered (clothed) from neck to feet. The minimum clothing requirements for flagger shall be long pants and a standard T-shirt with sleeves along with appropriate footwear (no open toe shoes). In addition to this, flaggers shall be required to wear high visibility clothing in accordance with Section 6E.02 High-Visibility Clothing of the MUTCD. When directed by the Engineer, the flagger shall be equipped with a two-way radio or an approved communication device.

Flagging Procedure:

Flagging procedure shall conform to paragraphs E-4 through E-7 of Traffic Manual. Flaggers and operators of construction machinery or trucks shall be made to understand that every reasonable effort must be made to allow the driving public the right-of-way and prevent excessive delays. Whenever flagpersons are relieved or rotated it shall be the Contractor's responsibility to assure that the relief flagperson has been fully orientated about the operation.

Flaggers are required to use DelDOT approved STOP/SLOW (S/S) paddles as hand signaling devices. Flags are generally only allowed for emergencies. S/S paddles are required to meet the requirements of Section E-2 of the Traffic Manual. Any border around the SLOW side shall be black. S/S paddles shall be a minimum of 24 inches x 24 inches (600 mm x 600 mm) with minimum 8 inch (200 mm) high, "C" series letters on the STOP side of the paddle and 8 inch (200 mm) high, "B" series letters on the SLOW side of the paddle and are required to have high intensity retroreflective sheeting for the orange, red and white colors (both day and night). A rigid handle shall be provided such that the bottom of the sign paddle shall be 6 feet (1.8 m) above the ground. Flagger stations shall be sufficiently illuminated at night in accordance with Section E-5 of the Traffic Manual. Care shall be taken to assure that traffic is not blinded from any direction of travel by illumination of the flaggers' station. The flagger must be positioned so as to be clearly visible to traffic.

Any Flagger not performing duties in accordance with Delaware Traffic Controls for Street and Highway Construction, Maintenance, Utility and Emergency Operations Manual or non compliance to the specifications shall be justification for the Engineer to suspend work in conformance with Subsection 104.07 of the Standard Specifications. The flaggers shall be replaced and when the flaggers are in

compliance with the policies outlined in this specification, the work may resume.

Flagger Cards may be confiscated from personnel flagging improperly. The Engineer shall contact the Contractor's supervisor. The supervisor shall confiscate the card from the flagger. The card shall be turned over to the Engineer and forwarded to DeIDOT's Safety Section. The Safety Section shall forward the card, or if the person refuses to give up the card, a letter to ATSSA's main office for the purpose of removing the individual's name from the certified list. Any flagger whose card has been confiscated shall be retrained and retested prior to consideration for reinstatement. Retraining and retesting shall not occur until at least one month after the infraction.

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743500 - WARNING LIGHTS, TYPE A
743501 - WARNING LIGHTS, TYPE B
743504 - WARNING SIGNS
743507 - TEMPORARY BARRICADES, TYPE III
743525 - TEMPORARY WARNING SIGNS

Description:

This work consists of furnishing, installing and maintaining these traffic control devices in accordance with the "Delaware Traffic Controls for Streets and Highways Construction, Maintenance, Utility & Emergency Operations" (latest edition with all revisions made up to the date of the Advertisement of this Contract), and from hereon called as the Traffic Manual, notes and details on the Plans and as directed by the Engineer.

As required under the section entitled "Certification" traffic control devices shall be certified as crashworthy in accordance with NCHRP Report 350. In case of conflict between the Traffic Manual and the requirements of NCHRP Report 350, the requirements of NCHRP Report 350 shall govern.

Materials and Construction Methods:

Materials and construction of all signs and barricades shall meet all requirements including reflectorization of the Traffic Manual.

Unless specified on the Plans, all traffic control devices shall be either new or restored to a satisfactory condition. All reconditioned and/or restored traffic control devices must be approved by the Engineer before their use. Bases of warning signs, when required, shall be weighted with sandbags to resist overturning.

Lane closings necessary for the installation of barricades and the placement of other traffic protection devices shall be in accordance with the requirements of the Traffic Manual. Type III barricades shall have a minimum width of 6'.

Traffic protection devices shall be suitably maintained at all times. Such maintenance shall include washing sign faces, replacing deficient batteries and lights, aligning lights properly, replacing reflective materials, relocating barriers, and any other maintenance of traffic protection devices deemed necessary by the Engineer to maintain traffic in safe and effective manner.

Warning signs and temporary warning signs shall be retroreflective and shall have rounded corners as per FHWA publication "Standard Highway Signs".

For purposes of measurement and payment the following definitions for signs shall apply:

Warning Signs (Item 743504) are those signs that are generally permanently installed at the beginning of a project and remain in place for the duration of the project.

Temporary Warning Signs (Item 743525) are those signs erected for a particular operation or phase of the project and may remain in place just during working hours such as "Flagger Ahead" signs or may remain in place for several days or more such as "Right Lane Closed" signs.

All holes or trenches within paved roadways or sidewalks which could not be practically backfilled and paved prior to restoring the area to traffic, shall be covered by protective covers consisting of temporary steel plates, furnished, installed and secured in place by the Contractor at no extra cost to the Department.

All traffic control work and related items shall either be performed entirely by the Contractor's own organization or totally subcontracted. Maintenance of the equipment shall not be subject to this requirement.

Certification:

Temporary traffic control devices used on all highways open to the public in this State shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350 and the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration **Information:** Crash Tested Work Zone Traffic Control Devices. It is the requirement of the Department that such certification be submitted for traffic control devices used on **all** projects, not just those involving the National Highway System.

In brief, certification of compliance with NCHRP report 350 is required for the following categories of traffic control devices:

Category I contains small and lightweight channelizing and delineating control devices which includes cones, tubular markers, flexible delineator post and drums, all without any accessories or attachments.

Category II includes traffic control devices that are not expected to produce significant vehicular velocity changes to impacting vehicles. These devices which shall weigh 100 pounds (45 kg) or less, include Type I, II and III barricades, portable sign supports with signs, and intrusion alarms. Also included are drums, cones, and vertical panels with accessories or attachments.

For DelDOT administered projects the certification shall be submitted to the Engineer prior to installation or use of traffic control devices. For Category I devices, the manufacturer may self-certify that the devices meet NCHRP-350 criteria. For Category II and Category III devices, the Contractor shall supply the Federal Highway Administration's NCHRP-350 acceptance letter for each type of device.

Method of Measurement:

~~———— Temporary Barricades, Type III erected by the Contractor shall be measured in unit of L.F./Day actually furnished and used as required and approved by the Engineer.~~

~~———— Warning Lights, Types A and B will be measured in units of Each/Day for each type, actually furnished and used, and approved by the Engineer.~~

~~———— Warning Signs shall be furnished and erected by the Contractor and measurement shall be made per Each for the duration of the contract. Temporary Warning Signs shall be measured in unit of Each/Day furnished and erected.~~

Basis of Payment:

~~———— The number of temporary barricades measured as described above, shall be paid for at the Contract unit price bid per L.F./Day barricade for the item "Temporary Barricades, Type III" which prices and payments shall be full compensation for providing certification, furnishing, placing, maintaining, and~~

~~relocating the barricades as required, all labor, equipment, tools, and all incidentals necessary to complete the work. Barricades stolen or damaged shall be replaced at the Contractor's expense.~~

~~———— The number of each type of warning lights measured as described above shall be paid for at the Contract unit price bid per Each/Day for the item, "Warning Lights, Type A, or Type B" as required by the Contract, which prices and payments shall be full compensation for providing certification, furnishing, placing, maintaining and relocating the lights, all labor, equipment, tools, and all incidentals necessary to complete the work. Warning lights stolen or damaged shall be replaced at the Contractor's expense.~~

~~———— The number of Warning Signs, measured as described above, shall be paid for at the Contract unit price bid per Each for the item, "Warning Signs", and the Contract unit price bid per Each/Day for "Temporary Warning Signs" which prices and payments shall be full compensation for providing certification, furnishing, placing, maintaining, and relocating warning signs, and any temporary sign supports, hardware, materials and all labor, equipment, tools, and incidentals necessary to complete the work. Signs stolen or damaged shall be replaced at the Contractor's expense.~~

~~———— Payment for traffic control devices shall be based on the Contractor's daily certification, on a Department's form, that the number of traffic control devices are fully operational (i.e., lights working, signs in good legible condition and in their proper position).~~

02/27/09

743514 - FURNISH AND MAINTAIN MESSAGE BOARD

Description:

The item shall consist of furnishing, placing, operating and maintaining trailer mounted message board during the construction of the project. When no longer required for use on the project as decided by the Engineer, the message board with trailer and related hardware shall become the property of the Contractor.

The message board must be approved by the Department prior to use. For a list of approved message boards and approval process, contact DelDOT's Safety Officer at (302) 853-1339.

Operation and Maintenance:

The message board shall be placed and relocated on the job site at location(s) as determined by the Engineer. The Contractor shall have qualified and trained message board programmer(s) to program desired messages, and mechanic(s) to perform required service on the message board unit, available on a 24 hour basis. The Contractor shall maintain and service the message board unit throughout the period of its operation on the job.

Basis of Payment:

~~The payment for the item shall be made for at the Contract unit price per Each Day bid for the item "743514 - Furnish and Maintain Message Board", which price and payment shall constitute full compensation for furnishing the message board with trailer, placing, relocating, operating programming, final removal when no longer required, and for all labor, tools, equipment, and necessary incidentals to complete the work.~~

If an operational problem is reported to the Contractor at any time during use of the unit, the Contractor shall have two hours after receipt of notification to rectify the problem to the Engineer's satisfaction. ~~If such repair is not made satisfactorily, no payment will be made for the six hour quarter day in which the failure occurred. Also, a second failure within any 6 hour quarter day period will void payment for that period.~~

It is the Department's intent that the Message Board operate continuously whenever the unit is in service. The Contractor is required to make all necessary arrangements to assure continuous operation of the unit. To this end, the Contractor shall designate an on-site representative, other than the Project Superintendent, who shall be the Department's contact on all project issues related to the Message Board. The Contractor shall also designate a Manufacturer's Representative to be on call for technical assistance or as otherwise necessary.

03/22/07

763588 - MAINTENANCE OF TRAFFIC

Description:

This item shall be used for construction activities that require traffic control, but will be performed outside the physical limits or time frames of the maintenance of traffic plans provided for the roadway contract.

All requirements of the traffic manual "Delaware Traffic Controls for Streets & Highways Construction, Maintenance, Utility & Emergency Operations (latest edition with all revisions made up to the date of Advertisement of this project and from hereon shall be addressed as the Traffic Manual) shall apply for all traffic control devices. Any, and all, control, direction, management and maintenance of traffic shall be performed in accordance with the requirements of the Traffic Manual, and notes on the Plans.

Materials and Construction Methods:

The Contractor and all of the Contractor's subcontractors working on this project shall submit to the Construction Engineer a traffic control Plan for the Department's approval before the start of work. The time restrictions as listed in the "Notice to Contractors" shall be applicable.

The Contractor shall be responsible for all traffic control devices except as specifically noted above, and shall perform all work in a manner that will insure the least practicable obstruction to traffic consistent with safety. Advanced coordination with the Department and other Contractors working in the area is required so there is no conflict or overlap with other maintenance of traffic set-ups in the area of work.

The Contractor shall provide and maintain ingress and egress for each property abutting the construction area and each property located between the diversion points of any detour and the actual construction site. Construction activities which may temporarily or otherwise interfere with property access shall be coordinated in advance with the affected property owners.

The Contractor shall conduct construction operations in a manner which will minimize delays to traffic, and shall meet the following requirements:

1. The flagger(s) shall direct the flow of traffic in concert with the traffic signals in construction areas to avoid queuing, unless active work prohibits such action.
2. When a lane adjacent to an open lane is closed to travel, the traffic control devices shall be set 2 feet (0.61 m) into the closed lane from the edge of the open lane, unless an uncured patch exists or actual work is being performed closer to the open lane.
3. Lanes shall not be closed unless construction activity requiring lane closure is taking place, or will take place within an hour; lanes shall be reopened immediately upon completion of the work. The Contractor shall conduct construction operations in a manner so as to minimize disruption to traffic during peak hours and periods of heavy flow. The Department reserves the right to stop or change the Contractor's operations, if in the opinion of the Engineer, such operations are unnecessary at that time or if they can be conducted in a manner with less impact on traffic.

4. Work in the vicinity of traffic signals, shall be scheduled to minimize the time during which the signal is operated without detectors, and approval of the Engineer shall be required for such schedule.

It is required that all traffic control work and related items shall either be performed entirely by the Contractor's own organization, or totally subcontracted. Maintenance of equipment shall not be subject to this requirement.

At the end of each work day, the Contractor shall correct all pavement edge drop-offs within 10 feet (3 m) of a travel lane to result in a drop-off of no more than 2 inches (50 mm). This corrective work shall be accomplished with Temporary Roadway Material (TRM) unless an alternate method is specified in the Plans. All ruts and potholes shall be filled with TRM by the end of each work day. If temporary elimination of a drop-off hazard cannot be accomplished, then the area should be properly marked and protected with traffic control devices such as temporary barricades, warning signs, flashing lights, etc. as required; the payment for TRM materials and the traffic control devices shall be made under the respective items of the Contract.

All the operations shall be properly signed with notice of "Pavement Drop-Off" and/or "Uneven Pavement".

All construction signs and barricades shall meet the applicable standards for reflectorization as required in the Traffic Manual.

When specified on the Plans, the Contractor shall be required to have an American Traffic Safety Services Association (ATSSA) certified traffic control supervisor on the project. The ATSSA certified traffic control supervisor's sole responsibility will be the maintenance of traffic on the project. This responsibility shall include the installation, operation, maintenance and service of traffic control devices. Also included is the keeping of a daily log to record maintenance of traffic activities i.e. number and location of traffic control devices; and times of installation, changes, and repairs to traffic control devices. He/she shall also serve as the liaison with the Department concerning the Contractor's maintenance of traffic.

All cost for providing the services of an ATSSA certified traffic control supervisor shall be included in this item.

Certification:

Temporary traffic control devices used on all highways open to the public in this State shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350 and the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration **Information:** Crash Tested Work Zone Traffic Control Devices. It is the requirement of the Department that such certification be submitted for traffic control devices used on **all** projects, not just those involving the National Highway System.

In brief, certification of compliance with NCHRP report 350 is required for the following categories of traffic control devices:

Category I contains small and lightweight channelizing and delineating control devices which includes cones, tubular markers, flexible delineator post and drums, all without any accessories or attachments.

Category II includes traffic control devices that are not expected to produce significant vehicular velocity changes to impacting vehicles. These devices which shall weigh 45 kg or less, include Type I, II and III barricades, portable sign supports with signs, and intrusion alarms. Also included are drums, cones, and vertical panels with accessories or attachments.

Category III includes traffic control devices that are expected to cause significant vehicular velocity changes to impacting vehicles. These devices which weigh more than 45 kg include temporary barrier, temporary impact attenuators, and truck-mounted attenuators.

Category IV includes portable or trailer-mounted devices such as arrow panels, variable message signs, temporary traffic signals and temporary area lighting.

The requirements for certification are as follows:

Category I - All devices shall be certified as conforming to NCHRP Report 350 criteria.

Category II - All new devices shall be certified as conforming to NCHRP Report 350 criteria.

Category III - All new temporary barrier devices shall be certified as conforming to NCHRP Report 350 criteria.

Category IV - Certification of compliance to NCHRP Report 350 criteria is not required.

For DelDOT administered projects the certification shall be submitted to the Engineer prior to installation or use of traffic control devices. For Category I devices, the manufacturer or contractor may self-certify that the devices meet NCHRP-350 criteria. For Category II and Category III devices, the Contractor shall supply the Federal Highway Administration's NCHRP-350 acceptance letter for each type of device.

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STATE OF DELAWARE



DEPARTMENT OF TRANSPORTATION

DESIGN-BUILD PROJECT

for

DOVER TRANSIT CENTER

Dover Transit Center
State Contract # 25-020-01
Federal Contract # ERRA-2009(31)

SCOPE OF SERVICES PACKAGE

APPENDIX A - PART 4

SUPPLEMENTAL SPECIFICATION

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**SUPPLEMENTAL SPECIFICATIONS
REVISIONS AND CORRECTIONS
TO THE
AUGUST 2001
STANDARD SPECIFICATIONS¹**

(Revised June 23, 2008)

¹ The Contractor shall make himself aware of these revisions and corrections (Supplemental Specifications), and apply them to the **applicable item(s)** of this contract.

Supplemental Specifications to the August 2001 Standard Specifications

Subsection 101.78 Subcontractor. (3/18/2004)

Modify the second paragraph as follows:

Exceptions to this definition are suppliers limited to delivering and depositing, but not incorporating material, suppliers of services that transport material, and the work performed which does not advance the completion of the Contract and is not considered as an item of work.

Subsection 101.79 Substantial Completion. (3/18/2004)

Modify the sentence as follows:

The point at which all Contract items are complete as deemed by the Department excluding any warranties or vegetation growth.

Subsection 102.07 Irregular Proposals. (5/15/2006)

Modify Paragraph B. as follows:

- B. There are unauthorized additions, interlineations, conditional bids, or irregularities of any kind that may tend to make the proposal incomplete, indefinite, or ambiguous.

Delete paragraph G.

Modify Paragraph I. as follows:

- I. The Contractor fails to provide a proposal guaranty.

Subsection 104.04 Accident Notification. (5/15/2006)

Modify the paragraph as follows:

Notify the Transportation Management Center (T.M.C.) at 659-2400 and Engineer concerning any accidents.

Subsection 105.04 Plans and Working Drawings. (5/15/2006)

Modify the 4th paragraph as follows:

Working drawings for concrete structures shall provide such details as are required for successful prosecution of the work. These shall include plans for items such as falsework, bracing, sheeting, shoring, cofferdams, formwork, masonry layout diagrams and bending diagrams for reinforcing steel.

Subsection 105.06 Coordination of the Plans, Standard Specifications, Supplemental Specifications, and Special Provisions. (1/3/2008)

Modify and renumber the following:

1. General Notices (Including Pre-bid meeting minutes & Pre-bid Questions and Answers)

2. Pay Units in Bid Proposal Forms
3. Plans
4. Cross Sections
5. Special Provisions
6. Supplemental Specifications
7. Standard Construction Details
8. Standard Specifications

Subsection 105.09 Utilities. (1/3/2008)

Add the following paragraph:

Overhead High-Voltage Line Safety requires notification to and mutually agreeable measures from the utility from any person intending to carry on any function, activity, work or operation within 10' of any high voltage overhead line.

Subsection 105.13 Maintenance During Construction. (3/18/2004)

Add the following:

The contractor shall mow all grass and weeds within the limits of the Contract, as directed by the Engineer, up to 4 times a year to a height in compliance with subsection 107.01.

Subsection 105.20 Project Acceptance. (3/18/2004)

Modify the first paragraph as follows:

Final acceptance will not occur until completion of the Project in accordance with Subsection 101.16. The Contract time will be stopped at substantial completion.

Subsection 106.09 Disposal of Unacceptable Materials. (5/15/2006)

Modify the paragraph as follows:

All waste materials removed by earthwork operations shall become the property of the Contractor and shall be removed from the Project or otherwise disposed of as specified. Unless specific disposal sites are designated on the Plans, the Contractor shall procure disposal sites. Such disposal sites shall be submitted to and approved by the Engineer. If the contract is federally funded or Federally permitted, the Engineer will submit the proposed site to the State Historic Preservation Office for their approval prior to utilization by the Contractor. No areas that are designated as wetlands will be permitted for use as disposal sites. The submittal shall include a plan of the disposal area, proposed sediment and erosion control devices, existing and proposed final contours, and proposed security measures. All permit requirements such as those required by the Department of Natural Resources and Environmental Control (DNREC) and the U.S. Army Corps of Engineers shall be met by the Contractor when preparing and utilizing off-site disposal areas. The Contractor shall submit a similar proposal for use of designated disposal sites if such detail is not included in the Contract documents. Costs for preparing these plans are incidental to Section 201. For disposal sites designated on the Plans, payment will be made separately under applicable bid items for all necessary erosion and sediment controls, seeding, and mulching. For Contractor-procured disposal sites, such costs are incidental to Section 201. The Department will not consider any delays or monetary claims of any nature resulting from the Contractor's failure or difficulty in finding the necessary disposal sites.

Subsection 107.04 Contractor's Responsibility for Utility Property and Services. (5/15/2006)

Modify the 3rd paragraph as follows:

Fire hydrants on or adjacent to the highway shall be kept accessible to fire apparatus at all times and no material or obstruction shall be placed within 15' (4.5 m) of any such hydrant. Work shall be left entirely accessible at all points to fire apparatus at all times. Whenever any work is done in the area of a fire hydrant or whenever a fire hydrant is relocated or installed, the center of the hose outlet shall be a minimum of 18 in. (457 mm) above the final grade directly beneath the hose outlet.

Subsection 107.07 Public Convenience and Safety. (1/3/2008)

Add the following paragraph:

The Contractor shall maintain a safe work site at all times and be prepared to make repairs as needed after normal working hours in the case of an emergency. If the Department is unable to contact the Contractor to make these repairs then State Maintenance forces or a third party contractor may be used to make such repairs. The cost for this work shall be calculated according to Subsection 109.04(D) for all state personnel involved or third party contractor, including vehicles, equipment and materials needed. This cost will be deducted from money due the Contractor under the Contract.

Subsection 107.09 Protection and Restoration of Property. (5/15/2006)

Modify the 4th sentence in the first paragraph as follows:

The Contractor shall not injure or destroy trees or shrubs outside the limits of construction, nor remove or cut them without proper authority.

Subsection 108.01 Subletting of Contract. (3/18/2004)

Modify the second paragraph as follows:

If the Contractor to whom a contract is awarded proposes to subcontract any part of the work, the scope and value of the work to be done by the subcontractor shall be outlined. The cost of materials to be used by the subcontractor shall be outlined. The cost of materials to be used by the subcontractor shall be included in the value of the subcontracted work. A subcontractor shall not subcontract further a portion of the work intended to be done by the original subcontractor without the express written permission of the Engineer. In granting such permission, the Engineer shall ensure that the subcontractor seeking to subcontract the work to be performed by another shall nonetheless perform with its own organization work amounting to not less than 50% of the total subcontracted bid price.

Subsection 108.09 Schedule of Liquidated Damages. (5/15/2006)

Update table with these new numbers.

Schedule of Liquidated Damages			
Awarded Contract Value		Daily Charge	
For More Than -	To and Including -	Work Day	Calendar Day
\$ 0	\$ 25,000	\$ 380.00	\$ 275.00
25,000	50,000	400.00	290.00
50,000	100,000	540.00	390.00
100,000	500,000	840.00	600.00
500,000	1,000,000	1,090.00	780.00
1,000,000	2,000,000	1,350.00	960.00
2,000,000	5,000,000	1,410.00	1,010.00
5,000,000	10,000,000	1,590.00	1,130.00
10,000,000	15,000,000	2,510.00	1,790.00
15,000,000	20,000,000	4,180.00	2,990.00
20,000,000	25,000,000	5,850.00	4,180.00
25,000,000	30,000,000	7,520.00	5,370.00
30,000,000	35,000,000	9,190.00	6,570.00
35,000,000	Over	10,870.00	7,760.00

Subsection 109.01 Measurement of Quantities. (1/3/2008)

Add the following sentence to Paragraph A:

- A. Weight tickets shall be computer generated.

Subsection 109.04 Payment for Differing Site Conditions, Major Changes, Extra Work, and Force Account. D.8. Subcontracting. (5/15/2006)

Modify the paragraph as follows:

Should an agreed price involve work to be performed by a Subcontractor, then the Prime Contractor's total allowable mark-up on the Subcontracted portion of work shall not exceed 10% of the Subcontractor's proposed price. The Prime Contractor shall, upon request by the Department, submit documentation substantiating the Subcontractor's proposed price.

Section 110 - Erosion, Sediment Control and Water Pollution (1/3/2008)

Delete Section 110 in its entirety modify as follows:

110.01 Definitions

- 110.02 Legal Authority
- 110.03 Sediment and Stormwater Permit Approval
- 110.04 Description of Work
- 110.05 Completion of the Work
- 110.06 Plan Changes
- 110.07 Limits of Construction
- 110.08 Division of Responsibilities
- 110.09 Vegetative Stabilization
- 110.10 Temporarily Stockpiled Material
- 110.11 Channel and Ditch Scour Protection
- 110.12 Sediment-Laden Runoff
- 110.13 Dewatering Operations
- 110.14 Clean Water Diversions
- 110.15 Stream Diversions
- 110.16 Temporary Stream Crossings
- 110.17 Wash Water
- 110.18 Waste Water
- 110.19 Water Pollution Violations Enforced
- 110.20 Maintenance
- 110.21 Erosion and Sediment Control Reports
- 110.22 Failure to Implement and Maintain Erosion and Sediment Control Measures
- 110.23 Contractor Payment
- 110.24 Fines Resulting from Non-Compliance

110.01 Definitions.

Clearing. The clearing of trees, brush, shrubs, downed timber, rotten wood, rubbish, and any other vegetation, except where excluded by the definition for grubbing, as well as the removal of fences and structures. See Subsection 201.01.

Disturbed Area. An area where any activity has been initiated which may result in soil erosion from water or wind or movement of sediments or pollutants into state waters or onto lands in the state, or which may result in accelerated stormwater runoff, including, but not limited to, clearing, grubbing, grading, excavating, transporting, filling, and backfilling of land.

Grubbing. Shall mean the removal of trees, stumps, roots, brush, root mat, and debris from the ground.

Limited Suspension of Activity. Suspension of specific land disturbing work activities when the Contractor fails to implement and maintain the erosion and sediment controls after verbal or written direction to do so by the Engineer. This suspension would be specific to the land disturbing activities that are not compliant. During a Limited Suspension of Activity, progress payments for these specific activities will be withheld until the Contractor has corrected the problems. Time charges will continue and no claim for delay will be considered during a Limited Suspension of Activity.

Phasing. Staged construction sequencing as shown in the Plans.

Significant Rain Event. A rain event that generates erosion.

Site Reviewer. A person on the Contractor's staff assigned to erosion and sediment control review, implementation and maintenance. The level of training (Contractor's Certification or Certified Construction Reviewer) required for the Site Reviewer will be noted in the project plans.

- A. **Contractor's Certification (Blue Card).** Introductory training for erosion and sediment control provided by the Department of Natural Resources (DNREC). For projects designated as having Minor erosion potential, the Contractor must submit as part of his bid, the name and certification number for someone other than the Superintendent who has a Blue Card certification.
- B. **Certified Construction Reviewer (CCR, Gold Card).** Advanced training for

erosion and sediment control provided by the Department of Natural Resources (DNREC). For projects designated as having Medium or Major erosion potential, the Contractor must submit as part of his bid the name(s) and certification number(s) for the individuals on his staff who have a CCR (Gold Card) certification as noted on the plans.

110.02 Legal Authority. The Department is a delegated agency of DNREC as defined in Chapter 40, Title 7 of the Delaware Code and the Delaware Sediment and Stormwater Regulations. Any project built by Contract with the Department shall maintain compliance with the aforementioned law and regulations at all times throughout the life of that project. As a delegated agency, the Department shall enforce compliance with the law and regulations through the Contract documents or may refer a violation to DNREC for enforcement action.

110.03 Sediment and Stormwater Permit Approval. A signature, date, and seal in the Stormwater Engineer's block on the title sheet of the Plans indicates that the Plans were designed in conformance with the applicable State and Federal stormwater regulations and that the Sediment and Stormwater Permit is approved. All work shall be completed pursuant to the Plans and as directed by the site reviewer and the Stormwater Engineer.

Neither review and approval of the erosion, sediment control, and water pollution control plans nor errors and omissions in the plans shall relieve the Contractor from its responsibilities for compliance with the Delaware Sediment and Stormwater Regulations or other applicable laws or regulations and the more stringent water pollution control requirements shall apply.

110.04 Description of Work. Erosion and sediment control measures shall be applied to erodible earth material exposed by any of the Contractor's land disturbing activities on the Project. The work shall consist of the application of temporary and permanent erosion and sediment control items as provided in the Contract or ordered by the Site Reviewer or the Engineer. The temporary erosion control items shall be coordinated with the permanent erosion control items specified. The items shall include, but are not limited to, the use of berms, dikes, dams, sediment basins, traps, geotextiles, stone check dams, silt fences, phased construction, special land grading methods, mats and nets, aggregates, mulches, grasses, slope drains, chemical binders, tackifiers, and other erosion and sediment control items or approved methods as designated in the Contract documents or as directed by the Site Reviewer or the Engineer.

110.05 Completion of the Work. The Contractor shall implement the temporary and permanent erosion control items for each phase of construction as detailed in the Contract documents. Additional erosion and sediment control items may be required during the Project as deemed necessary by the Site Reviewer and the Engineer in order to provide continuous erosion and sediment control protection.

Before starting each phase of any land-disturbing activity, the Site Reviewer shall make certain that all erosion and sediment control items required in that phase are properly installed and functional.

A. Construction Phasing. For Project sites in excess of 20 ac (8 ha), the construction must be phased in 20 ac (8 ha) increments. Once grading is initiated in one 20 ac (8 ha) increment, a second 20 ac (8 ha) increment may be cleared and grubbed provided the Contractor installs and maintains effective erosion and sediment control measures on both sections in such quantities and locations as deemed acceptable by the Site Reviewer and the Engineer.

When balancing earthwork, such as when borrow from a cut is used as fill at a noncontiguous location distant from the cut, more than a total of 20 ac (8 ha) may be allowed to be grubbed and graded within the overall limits of the Project at any one time with prior written approval from the Engineer. In such cases, one 20 ac (8 ha) increment in cut and one 20 ac (8 ha) increment in fill may be grubbed and graded at each separate location concurrently. Examples of when this would likely occur would be on interchange construction or on a new alignment.

The Site Reviewer or the Engineer may further limit the area of clearing, grubbing, stripping, and grading operations to the Contractor's capability and actual progress of keeping the finish grading, mulching, seeding, and other temporary or permanent erosion control measures current according to the approved progress schedule and construction sequence.

B. Construction Sequence. The Contractor shall sequence the construction to comply with the following constraints unless indicated otherwise on the Plans:

1. Implement temporary erosion and sediment control items prior to any operation, which exposes soil to erosion, such as during the clearing portion, and prior to the grubbing portion of each phase of construction.
2. Schedule and perform the clearing and grubbing operations so that grading operations and permanent stabilization can follow immediately thereafter. Once earthwork has begun, the operation shall be continuous from clearing and grubbing through to completion of grading and final stabilization in accordance with Subsection 110.09 A.2. Any interruption in these operations in excess of 14 calendar days must be approved by the Engineer and shall require interim stabilization in accordance with Subsection 110.09 A.1.
3. Vegetatively stabilize bare soil areas in each phase of construction in accordance with Subsection 110.09 A.1 prior to advancing the work into the next phase of construction.
4. Vegetatively stabilize all cut and fill slopes of the highway excavation and embankment as the work progresses in height increments not to exceed 4' (1.2 m) of embankment. This will minimize exposed soil on the slopes to bands of 9-12 feet as measured along the slope face. Excavate roadside ditches as early in the Project as possible to establish good drainage.
5. Vegetatively stabilize all grass ditches, swales, and medians within seven calendar days after their initial excavation.
6. Remove temporary erosion and sediment controls after final stabilization is complete in accordance with Subsection 110.09 A.2. Return land contours to original grade or as indicated on the Plans, and vegetatively stabilize any remaining bare soil areas.

110.06 Plan Changes. The Contractor shall not deviate from the erosion, sediment control, and stormwater management aspects of the Contract shown in the Plans and contract documents, other than as specified in 110.08.A.2.b without prior review and approval by the Engineer, the Stormwater Engineer, the Department's Environmental Section and appropriate regulatory authorities.

For plan changes initiated by the Contractor, revised construction Plans shall be submitted for review and approval by the Engineer, the Stormwater Engineer, the Department's Environmental Section and appropriate regulatory authorities. The revised Plans shall be prepared in accordance with current Department standards for roadway design, traffic control, erosion and sediment control, and stormwater management. Revised Plans shall also conform to all applicable Federal, State, or municipal pollution control laws, rules, or regulations. All supporting design calculations and cost analyses required by the Engineer shall accompany the submission. The number of copies required to be submitted for review shall be determined by the Engineer depending on the nature of the proposed revision.

Contractor proposed revisions to the Plans, 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.

110.07 Limits of Construction. The Contractor shall not perform any work including, but not limited to, clearing, grubbing, construction phasing, equipment storage, and material stockpiling outside the limits of construction shown on the Plans without prior approval of the Engineer.

If the Contractor should require additional lands that are not within Department rights-of-way or easements, it shall be the Contractor's responsibility to make all arrangements with the property owners and to acquire all permits from the appropriate regulatory authorities for the use of these lands.

The Contractor shall acquire a statement signed by the property owners, which releases the Department from all claims arising from the use of the property being considered. The signed statement from the property owner and copies of all permits acquired by the Contractor shall be transmitted by the Contractor to the Engineer for the Engineer's records prior to initiating any operation on the property being considered for use.

110.08 Division of Responsibilities.

A. Site Reviewer. The Site Reviewer is responsible for the following:

1. On Projects with Erosion Potential identified as Minor, Medium, or Major:
 - a. The Site Reviewer shall review and become familiar with all elements of the approved sediment and stormwater management plan. Any questions or issues raised during this review should be discussed with the Contractor, Designer and the Department at the pre-construction meeting. The Site Reviewer should bring up any questions about the plans at this meeting.
 - b. The Site Reviewer shall inspect all perimeter controls in accordance with the approved plan and the Department's Standard Construction Details for Erosion and Sediment Control prior to the Contractor beginning any earth disturbing activities and shall submit an Erosion and Sediment Control Report (E & S Report) to the Department stating that all perimeter controls are in place and functioning.
 - c. The Site Reviewer shall perform sediment and stormwater reviews of the site jointly with a member of DelDOT's construction inspection staff. These inspections shall be completed at least weekly and immediately after any significant rain event. The Site Reviewer shall prepare an E & S Report, which details any corrective actions that need to be implemented and a completion date for each. If no deficiencies exist, the report shall document that all erosion and sediment control measures are in place and functioning. The Site Reviewer and the Inspector shall sign and date the E & S Report at the conclusion of the field inspection. By close of business that day, the report shall be forwarded, via email or FAX, to the Contractor's Superintendent for Implementation with copies sent to the Department's Construction Engineer, the Project Resident, the Stormwater Engineer, and the Contractor's engineer.
 - d. With concurrence of the Engineer, once all land disturbing activities are completed and all permanent erosion and sediment controls and stormwater management elements are in place and vegetatively stabilized, the Site Reviewer shall contact the Stormwater Engineer and schedule an as-built inspection of these features.
2. On Projects with Erosion Potential identified as Medium and Major the Site Reviewer shall be responsible for all of the requirements under 110.08A.1. plus the following (Site Reviewer must be a CCR):
 - a. The Site Reviewer shall accurately fill out a Stormwater Management Facility Construction Checklist(s) for permanent stormwater management ponds. The Site Reviewer shall be present during the construction of these facilities to observe all checklist items for compliance with approved plans and applicable pond construction codes.

- b. The Site Reviewer with concurrence of the DelDOT Project Resident may approve minor changes or deviations to the approved erosion and sediment control/ stormwater management plan. Changes, so approved, shall be documented in the Site Reviewer's weekly report.
- B. Contractor's Professional Engineer. The Contractor's Professional Engineer is responsible for the following:
 - 1. The Contractor's PE shall supervise the Site Reviewer and assure that he or she is performing all of his or her duties and completing all reporting requirements within the timeframes identified in this specification.
 - 2. The Contractor's Professional Engineer shall review, sign and date all E & S Reports that proposed corrective actions that will require plan revisions.
 - 3. The Contractor's Professional Engineer shall sign and seal any Plan Revisions the Contractor proposes to the stormwater management plan, the construction phasing, or the erosion and sediment control plans.
 - 4. The Contractor's Professional Engineer shall review, sign and seal the Stormwater Management Facility Construction Checklist after the Site Reviewer has filled it out
- C. Engineer. The Engineer is responsible for the following:
 - 1. The Engineer is responsible for ensuring that all work is completed in accordance with the approved erosion and sediment control/ stormwater management plan. The Engineer shall designate an E&S inspector on each project who shall accompany the Site Reviewer on site inspections.
 - 2. The Engineer is responsible for assuring the contractor is providing a Site Reviewer if required by the General Notes of the construction plans. The Engineer is also responsible for referring to the Stormwater Engineer any Site Reviewer who fails to perform the duties assigned by this Contract.
- D. Stormwater Engineer. The Department's Stormwater Engineer is responsible for the following:
 - 1. The Stormwater Engineer or his designee shall be represented at the pre-construction meeting and at any erosion and sediment control specific meetings. Any concerns about plan implementation or general procedures shall be discussed and resolved at these meetings.
 - 2. In accordance with subsection 110.22, when the Site Reviewer refers a site or if the condition of the site is consistently not improved by the dates noted in the weekly reports the Stormwater Engineer shall recommend that the Engineer pursue enforcement actions to gain compliance. A Site Reviewer may refer a site for failure to implement the approved erosion and sediment control/ stormwater management plan, or for failure to comply with the recommendations in the E & S Reports.
 - 3. The Stormwater Engineer or his designee shall perform annual performance evaluations of the Site Reviewers using the Department's evaluation form. If it is determined that a Site Reviewer is not providing adequate site control or is not referring problem situations, the representative shall require the Contractor to replace the Site Reviewer for the Project and request that DNREC suspend or revoke his/her certification.
 - 4. The Stormwater Engineer or his designee shall perform an as-built inspection of the permanent erosion and sediment controls and Stormwater management features to determine compliance with the approved Sediment and Stormwater Management Plan. If the Stormwater Engineer or his designee identifies deficiencies during the inspection, a letter will be issued to the Project Resident who will notify the Contractor. These deficiencies must be satisfactorily

- corrected prior to project closeout.
5. The Stormwater Engineer shall complete the Notice of Intent (NOI) at the start of the project and the Notice of Termination (NOT) at the end of the project to meet the requirements of the NPDES Permit.

110.09 Vegetative Stabilization.

- A. Interim and Final Stabilization. An area of the work shall be considered vegetatively stabilized for erosion control if it meets the criteria in one of the following two cases:
1. Interim Stabilization. The seeding and mulching items, sod, or erosion and sediment control items as noted on the Plans are in place and accepted by the Engineer.
 2. Final Stabilization. Meets the requirement for the removal of the temporary erosion controls placed during interim stabilization, and has complete vegetation growth in accordance with section 734 as determined by the Engineer. Complete growth of vegetation includes permanent grass reaching a height of 3" (75 mm) over all seeded areas.
- B. Incremental Stabilization. Side slopes, and other slopes 1:3 (vertical to horizontal) or steeper require placement of either temporary or permanent seeding and mulching as the work progresses in height increments not to exceed 4' (1.2 m) of embankment. This will minimize exposed soil on the slopes to bands of 9-12 feet as measured along the slope face.
- C. Tracking of Slopes. During grading operations the Contractor shall track all slopes 1:3 (vertical to horizontal) or steeper to prevent gully and sheet erosion. The tracking shall be accomplished by driving cleated equipment such as a bulldozer up and down the slopes so the cleats make horizontally oriented indentations in the soil. All costs associated with tracking of slopes at regular increments shall be incidental to Section 202.
- Prior to applying seeding items on slopes 1:3 (vertical to horizontal) or steeper, the Contractor shall track the slopes as described above in order to prepare a stable seedbed. All costs associated with tracking of slopes to prepare a seedbed shall be incidental to the topsoil item being applied to the slope surface.
- D. Maximum Soil Exposure Times. All erodible earth material exposed by the Contractor's activities shall be vegetatively stabilized within the time frames specified below:

<u>Location</u>	<u>Maximum Time to Vegetatively Stabilize</u>
Sediment controls	Seven calendar days from initial construction (berms,
Areas meeting final grades	Seven calendar days from completion of grading
Areas not meeting final grades	Fourteen calendar days from ceasing work in that location

110.10 Temporarily Stockpiled Material. Erodible earth material designated on the Plans or required by the Engineer to be excavated and temporarily stockpiled for later use in the Project shall be located away from live streams and wetlands and placed only in areas deemed appropriate by the Engineer.

The Contractor shall install the erosion and sediment control items designated on the Plans or as directed by the Site Reviewer and the Engineer about the base of the pile in advance of the actual stockpiling operation. Erodible earth material shall be placed in piles of neat conformations. Side slopes shall be seeded and mulched as the pile is placed. All remaining unstabilized surfaces shall be seeded and mulched immediately following completion of the stockpiling operation.

If the Contractor proposes to stockpile erodible earth material in areas not designated on the

Plans, it shall be the Contractor's responsibility to prepare and submit erosion and sediment control plans for those proposed areas, which are located within Department rights-of-way and easements for approval by the Site Reviewer and the Engineer. Materials shall not be stockpiled until an erosion and sediment control plan for the proposed stockpile has been approved by the Site Reviewer and the Engineer. The Contractor is also responsible for getting any permits that are necessary.

If the Contractor proposes to stockpile erodible earth material in areas outside of Department rights-of-way and easements, it shall be the Contractor's responsibility to prepare and submit for approval a plan for the use of the proposed site to the appropriate agencies having jurisdiction. No stockpiling operation shall commence in areas outside the Department rights-of-way and easements until the Engineer has received copies of all plans and permits approved by the appropriate regulatory agencies and received copies of statements signed by the property owners, as required under Subsection 110.07, which release the Department from any claims arising from the use of the property. The Contractor shall be responsible for all costs associated with the installation of erosion and sediment controls required by other agencies having jurisdiction on stockpiles located outside the Department's rights-of-way.

110.11 Channel and Ditch Scour Protection. Riprap or other proposed channel lining items designated on the Plans at pipe, culvert, and bridge inlets and outlets and along channel lengths shall be placed before the pipes, culverts, bridges, and channels become operational.

110.12 Sediment-Laden Runoff. Stormwater runoff from disturbed areas shall be directed to an approved sediment control measure, such as a trap or basin, prior to release to ditches, storm drain systems, streams, or surface water bodies of any type. All storm drain pipes, which convey sediment-laden runoff, shall discharge to a sediment trap or sediment basin prior to release from the Project limits of construction as shown on the Plans, or as directed by the Site Reviewer and the Engineer.

110.13 Dewatering Operations. MOVED TO SECTION 111.

110.14 Clean Water Diversions. Stormwater runoff from non-disturbed areas shall be directed away from work areas using any combination of berms, pipes, dikes, swales, pumps and slope drains or as shown on the Plans, or as directed by the Site reviewer and the Engineer.

110.15 Stream Diversions. The Contractor shall not conduct work in a stream without having first obtained the appropriate wetland and subaqueous lands permit(s).

When work is to be conducted in the flow line of a stream, whether the stream is perennial or intermittent, the Contractor shall use any combination of dikes, swales, ditches, cofferdams, pipes, pumps, and other devices as shown on the Plans, or as directed by the Engineer to direct the stream flow around the work area.

110.16 Temporary Stream Crossings. Equipment shall not be operated in live streams without a stream diversion being installed to the satisfaction of the Engineer. Temporary bridges or other structures shall be installed if the work requires the crossing of a stream by construction equipment.

110.17 Wash Water. Water containing sediment from any construction activity on the Project such as truck washing, saw cutting, milling, aggregate washing, and equipment washing and which is not regulated as a waste water under State or Federal statutes shall be discharged to a sediment trapping device and treated by filtration or settling. Sediment-laden wash water shall not be discharged directly to any ditches, storm drain systems, streams, or surface water bodies of any type. Water mixed with Bentonite (a natural material formed from clay particles) used for drilling or augering shall be collected and removed appropriately. An appropriate use may be disposal in approved fill areas of the project.

110.18 Waste Water. Water containing pollutants such as raw sewage, bitumens, fuels, lubricants, paint, or other harmful materials, is strictly regulated under State and Federal statutes and as such shall not be discharged into waters of the State as defined in Chapter 60, Title 7 of the Delaware Code or into natural or manmade channels or storm drain systems leading to waters of the State.

The Contractor is responsible for obtaining all permits required from the appropriate issuing authority for the discharge of waste waters from the Project site. The Contractor shall pay costs associated with waste water permit acquisition. The Contractor shall submit copies of all permit approvals to the Engineer for the Engineer's records.

110.19 Water Pollution Violations. If a water pollution control violation exists on the Project which in the Engineer's judgment poses a public health or safety risk, such as a fuel or chemical spill or release of raw sewage, the Engineer shall refer the violation to the DNREC for immediate action. The cost of clean up shall be the sole responsibility of the Contractor if the DNREC investigation reveals the Contractor's actions caused the violation.

110.20 Maintenance. Erosion and sediment control items shall be maintained continuously throughout the duration of the project, including periods when the project is inactive or suspended. The Contractor shall repair, replace, or maintain any erosion and sediment control item promptly as noted on the E&S Report or as directed by the Site Reviewer or the Engineer. Any eroded surface shall be stabilized, and any accumulated sediment not trapped by a control measure shall be removed and disposed of in an approved stockpile area or hauled off-site. Access shall be maintained to all sediment control devices until construction phasing and stabilization allow the removal of those controls that are no longer required.

Costs associated with repairing, replacing, and maintaining the erosion and sediment control items are incidental to the initial construction of each item. Sediment removal will be paid for separately under Section 250.

110.21 Erosion and Sediment Control Reports. DelDOT will provide standard Erosion and Sediment Control Report forms and Stormwater Management Facility Construction Checklists to the Contractor to be used for all E&S Reports. The reports will itemize work required to maintain compliance with the Contract. The Contractor shall complete the items of work listed on or before the completion dates indicated on the reports.

110.22 Failure to Implement and Maintain Erosion and Sediment Control Measures. Controlling erosion and sedimentation is the Contractor's responsibility under the Contract. If the Contractor fails at any time to implement and maintain the required erosion and sediment control provisions of the Contract, fails to supply a Site Reviewer, or fails to routinely perform E&S inspections, complete the E & S Reports and correct deficiencies identified in the E & S Reports, the Engineer will notify the Contractor, orally or in writing, to comply with the required erosion and sediment control provisions. If the Contractor fails to perform the work as directed orally or in writing from the Engineer, the Engineer shall take any or all of the following actions listed below to gain compliance.

- A. Limited Suspension of Activity. The Engineer will order a "Limited Suspension of Activity" for the specific land disturbing activities that are not in compliance. Activities necessary to bring the site into compliance will be permitted. The Engineer will establish completion dates for the erosion and sediment control work. Time charges will continue during a Limited Suspension of Activity.
- B. Withhold Progress Payment. The Engineer may withhold monthly estimate and payment for all contract items.
- C. Stop Work Order. The Engineer may suspend the performance of all construction, as noted in Subsection 105.02, until all items of work on the E & S Reports are complete and accepted.

Time charges will continue during this "Shut-Down" period and no claims for additional time or money shall be considered due to "Shut-Downs" resulting from the Contractor's failure to implement and maintain the required erosion and sediment control items.

- D. **Deduct Cost of Work Completed By Others.** The Engineer may proceed with adequate forces and equipment of its own or a third party contractor to implement or maintain the erosion and sediment control items necessary to bring the Project into compliance with the Contract documents.
The entire cost to engage either a third party contractor or the Department's Maintenance personnel, including administration costs, will be deducted from monies due the Contractor.
- E. **Default of Contract.** More than one "Shut-Down" for erosion and sediment control noncompliance may be considered as a failure to perform the terms of the Contract and will be grounds for finding the Contractor in default of the Contract in accordance with Subsection 108.10. If the Contractor defaults on the erosion and sediment control provisions of the Contract, the Project will be referred to the DNREC for enforcement action.

110.23 Contractor Payment. Payment will be made at the unit prices bid for the quantities of the various erosion and sediment control items provided in the Contract that are installed by the Contractor and accepted by the Engineer. Approved changes to the Erosion and Sediment Control Plans shall be paid at the applicable unit bid prices. Any additional work or corrections brought about as a result of errors by the Contractor, such as nonconformance with the Contract documents and the construction phasing, staging, or sequencing will be made at the Contractor's expense.

110.24 Fines Resulting from Non-Compliance. If the Department receives any fines from DNREC, the Army Corps of Engineers or the EPA as a direct result of the Contractor's refusal to implement and maintain the required erosion and sediment control, fails to supply a Site Reviewer, or fails to routinely perform E&S inspections, complete the E & S Reports and correct deficiencies identified in the E & S Reports, the Contractor will be responsible to pay the fines or the money will be deducted from monies due the contractor

SECTION 111 – DEWATERING OPERATIONS (6/23/2008)

Delete Section 110.13 in its entirety and add Section 111as follows:

111.01 Permit Required. The State of Delaware, through the Department of Natural Resources and Environmental Control, Division of Water Resources, Water Supply Section regulates the pumping of ground water at depths, rates, and durations that have the potential to affect water supplies, and the pumping of surface water at rates and durations that have the potential to affect water supplies and aquatic environments.

A permit is required when the work described in the Plans requires the deliberate drawdown of the water table using well points, sump pits, or other similar dewatering devices to lower the water table below the work area.

A permit is required when the work described in the Plans requires pumping of water from an excavation and pumping at a rate exceeding 50,000 gallons per day.

111.02 Statewide Permitted Activities. A Statewide General Permit for Dewatering Activities on DelDOT projects has been approved via a memorandum of understanding between DNREC and DelDOT. The effective date of this general permit is June 1, 2008.

No individual dewatering permit shall be required when there is no withdrawal of ground water and pumping rates are less than 50,000 gallons per day.

For individual dewatering permits and Statewide General Permits pumping shall be metered using an instantaneous and totalizing flow meter accurate to within +/- 5%

For Statewide General Permits, DelDOT shall notify the Water Supply Section at (302) 739-9945 at the commencement of dewatering operations. For individual dewatering permits, the Contractor shall notify the Water Supply Section at (302) 739-9945, 48 hours in advance of starting dewatering operations.

The Contractor shall be aware that other State and Federal permits will be required for any entry into streams or wetlands. This Statewide General Permit for Dewatering Activities does not constitute approval, exemption or waiver from any other law, rule or regulation that may apply to the work shown in the Plans or the activities necessary to complete the work because of the Contractor's chosen means and methods of construction. The Contractor shall at all times employ sound sediment control methods to any water pumped from the project site ensuring all discharges are directed to sediment trapping or filtering devices prior to release to surface water bodies or the storm drain system. The Contractor shall not discharge saline water into a fresh water system nor discharge fresh water into a saline water system. The Contractor shall not cause dewatering of wetlands or other surface water bodies.

The Contractor shall notify the DNREC Wetlands and Subaqueous Lands Section prior to any dewatering adjacent to wetlands or if discharge water is proposed to be directed to any wetlands.

Examples of work that may be accomplished under the Statewide General Permit include but are not limited to: dewatering shallow localized depressions, such as mud puddles in the work area, pumping out the roadway pavement box, dewatering for the conversion of temporary sediment basins to permanent stormwater management ponds, dewatering for the maintenance clean out of permanent stormwater management ponds, dewatering of ponded rain water from excavations, dewatering of pipe trenches, dewatering of temporary cofferdams facilitating the excavation of shallow bridge and culvert foundations using sump pits and in-stream bypasses for work areas such as in bridge and culvert replacements.

111.03 Licensing Requirement. When a permit is required, the Contractor shall be responsible for acquiring any and all licenses needed to install or operate the dewatering equipment or shall employ the services of properly licensed subcontractors, such as a licensed well driller.

111.04 Permit Acquisition. Unless covered in the Statewide General Permit for Dewatering Activities, the Contractor shall obtain all necessary permits for dewatering and disposal of pumped water as required to construct and complete the Work. The Contractor shall not commence any dewatering operation without having first obtained the necessary dewatering permit from the Delaware Department of Natural Resources and Environmental Control (DNREC), Water Resources Division, Water Supply Section.

111.05 Permit Acquisition Time. Withdrawal of water at a rate exceeding 50,000 gallons per day will require public notice and possibly a public hearing prior to the issuance of a permit by DNREC. The Contractor shall account for this permit acquisition time in the project schedule. No time extensions will be considered by the Department for the Contractor's failure to account for this time in the project schedule.

111.06 Permit Costs. The Contractor shall pay all costs associated with a dewatering permit acquisition.

111.07 Submission of Approved Permits. The Contractor shall submit copies of all permit approvals to the Engineer for the Engineer's records.

111.08 Submittals. When a permit is required, the Contractor shall submit working drawings of the proposed dewatering system for review and acceptance in accordance with Section 105 of the Standard Specifications.

111.09 Dewatering. The Contractor shall provide for dewatering of the work area using any combination of pumps, sumps, suction and discharge lines and other dewatering system components necessary to remove surface water and, if necessary, ground water in order to facilitate the work described in the Plans or as ordered by the Engineer. The Contractor shall provide back-up equipment and replacement as necessary in order to ensure the continuous dewatering of the work area. Surface and ground water shall not be allowed to rise around the proposed work. Dewatering shall be continued until such time as the work has been brought to finished lines and grades, and accepted by the Engineer. None of the proposed work shown on the Plans shall be laid in water, unless otherwise indicated on the Plans or directed by the Engineer.

111.10 Dewatering Discharge. The Contractor shall assure that no soil particles are present in the discharge from the dewatering system. All pumped water from open excavations shall be directed to an approved sediment trapping device such as a dewatering bag, dewatering basin, portable sediment tank, sediment trap or sediment basin, prior to release to ditches, storm drain systems, streams or surface water bodies of any type.

111.11 Dewatering of Temporary Cofferdams for Bridge Construction. Upon completion of driving of temporary sheet pile in streams, or erection of a temporary dike to create a temporary cofferdam, the sediment-laden water impounded within the cofferdam shall be allowed to rest undisturbed for a 12-hour period in order to induce physical settling of suspended soil particles. Prior to pumping to remove water from temporary cofferdams, the Contractor shall attach the suction line of the pumping equipment to a flotation device, immersing the intake end no more than 6" (150 mm) below the water surface. In this manner, water shall be "skimmed" off the surface. Once the water level has been pumped down, further dewatering shall be accomplished in conjunction with a sump pit constructed in conformance with Department standards.

111.12 Protection of Work Area. The Contractor shall install clean water diversions outside excavation limits to prevent the flow of surface water from undisturbed areas into open excavations using any combination of berms, pipes, dikes, pumps, etc. in order to establish a clean water diversion. The Contractor shall comply with applicable sediment control measures.

111.13 Protection of Adjacent Property. The Contractor shall dispose of pumped water into a suitable conveyance system without flooding or damage to adjacent property, buildings, structures, utilities, and other work. The Contractor shall protect adjacent structures and property from any damage that may occur as a result of settlement or other effects related to the removal of ground water and lowering of the water table. No dewatering discharge shall be drained into work completed or under construction without prior consent of the Engineer. Water shall be disposed of in such a manner as not to be a menace to the Public Health. No discharge to the sanitary sewer system shall be allowed.

111.14 Well Impacts. In the event the Contractor's dewatering operations affect any public or private potable water supplies or wells within the project area, the Contractor shall take whatever steps are necessary to provide uninterrupted water service to those so affected.

Subsection 201.03 Trees and Roadside Amenities Designated to Remain. (5/15/2006)

Modify the subsection title as shown above and modify the paragraph as follows:

The Engineer shall designate such trees, shrubbery, plants and roadside amenities, such as signs, light posts, or other improvements, which are not to be removed, and the Contractor shall protect them from any damage. If any such shrubbery, plants or roadside amenities are damaged, they shall be replaced or repaired. Any trees that are designated to remain that are damaged shall be evaluated by a certified tree surgeon and the contractor shall follow their recommendations to repair or for replacement of the trees. Branches of trees overhanging the roadbed shall be properly trimmed to maintain a clearance height of 20' (6 m), unless otherwise directed. All pruning shall be performed in accordance with the International Society of Arboriculture's Current Tree Pruning Guidelines, Publication ISBN 1-881956-07-5, and as illustrated on the Standard Construction Details.

Subsection 201.10 Basis of Payment. (5/15/2006)

Modify the 1st paragraph as follows:

The quantity of clearing and grubbing will be paid for at the Contract lump sum. Price and payment will constitute full compensation for replacement of suitable material below required depth that was cleared and grubbed; for furnishing and compacting approved material to fill all depressions; for protecting trees, shrubbery, plants and other roadside amenities that are designated to remain, for replacement or repair of damaged trees, shrubbery, plants or other roadside amenities that are designated to remain; for disposal; and for all labor, equipment, tools, and incidentals required to complete the work.

Subsection 207.03 Excavation. (1/3/2008)

Add the following paragraph:

Shoring shall be provided for any excavation exceeding 5'-0" in height. The cost of shoring shall be incidental to item 207000 - Excavation and Backfill for Structures. In lieu of shoring, the contractor may cut slope back as allowed by soil conditions or other obstructions. No payment shall be made for additional excavation or fill outside of limits.

Subsection 208.03 Excavation. (1/3/2008)

Add the following paragraph:

Shoring shall be provided for any excavation exceeding 5'-0" in height. In lieu of shoring, the contractor may cut slope back as allowed by soil conditions or other obstructions. No payment shall be made for additional excavation or fill outside of limits.

Section 209.09 Method of Measurement. (1/3/2008)

Modify the 3rd paragraph as follows:

Where the Engineer determines it to be impracticable to obtain weight-volume conversion factors for the borrow types specified, 3050 lbs of borrow will be considered equivalent to 1 yd³.

Subsection 302.02 Materials. (5/15/2006)

Modify the paragraph as follows:

The material used to construct graded aggregate base course shall conform to the requirements of Section 821. Crushed portland cement concrete may be used as graded aggregate base course, Type B, provided it conforms to the requirements of Section 821.

Subsection 302.04 Placement. Subpart (c) Performance. (5/15/2006)

Delete the first sentence in the 2nd paragraph as follows:

Compaction of graded aggregate Type B shall continue until each layer is thoroughly and uniformly compacted to 98% or more of the laboratory maximum density obtained on a sample of the same material. If the material is too coarse to use the test methods listed below, compaction shall continue until there is no movement of the material under the compaction equipment.

Subsection 401.08 Placing Bituminous Mixtures. (1/3/2008)

Add the following to the 2nd paragraph:

Type B Hot-Mix shall be placed in single individual lifts from 2.25" to 3" in depth.
Type C Hot-Mix shall be placed in single individual lifts from 1.25" to 2" in depth.

Subsection 401.09 Deep Lift Base Course. (1/3/2008)

Modify paragraph (a) as follows:

The base course shall be placed with an approved paver or spreader in approximately equal layers of not less than 3" and not to exceed 6" in depth after compaction.

Add the following to paragraph (a):

When the contractor requests to use Type B Hot-Mix in lieu of BCBC, the Contractor shall request approval from the Engineer for this change. If approved by the Engineer, the Type B Hot-Mix may be placed in lifts of not less than 3" and not to exceed 6" in depth after compaction.

The Type B Hot-Mix placed in lieu of BCBC will be paid at the unit price for BCBC and the asphalt cement cost adjustment will be based on the virgin asphalt of BCBC, not the Type B Hot-Mix.

Modify paragraph (b) as follows:

Base course placed in irregular shaped areas of pavement, such as transitions, crossovers, and entrances, may be placed using a grader.

Subsection 601.07 Hardware. (3/18/2004)

Modify the first paragraph as follows:

Machine bolts, drift pins, dowels, nuts, washers, lag screws, and nails shall conform to the requirements of ASTM A307 Grade A.

Modify the first sentence of the second paragraph as follows:

Machine bolts shall have a hex head and nut, unless otherwise specified and shall conform to the requirements of ASTM A307, Grade A.

Subsection 602.17 Finishing Concrete Surfaces, (b) Ordinary Surface Finish. (5/15/2006)

Modify the 2nd sentence as follows:

On all surfaces, the cavities produced by form ties and all other holes, honeycomb spots, broken corners or edges, and other defects shall be thoroughly cleaned, saturated with water, and carefully pointed and trued with mortar mixed in the proportion of one part portland cement to three parts fine aggregate.

Subsection 602.26 Method of Measurement. (Concrete Structures) (1/3/2008)

Add the following sentence:

Haunches will be computed using the lesser of the designed dimensions or as-built dimensions.

Subsection 612.05 Excavation. (3/18/2004)

Delete the entire paragraph and insert the following:

The trench in which the pipe is laid shall be excavated to the required depth in accordance with Section 208 and the Standard Construction Details.

Subsection 612.06 Bedding of Pipe. (3/18/2004)

Delete the entire paragraph and insert the following:

Unless noted otherwise, all pipes shall receive a Class C bedding as shown on the Standard Construction Details.

Subsection 612.11 Basis of Payment. (3/18/2004)

Modify the second sentence of the first paragraph as follows:

Price and payment will constitute full compensation for furnishing, hauling, and installing pipe; 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; and for all material, labor, equipment, tools, and incidentals required to complete the work.

Modify the first sentence of the second paragraph as follows:

For round pipe under 24" (600 mm) nominal inside diameter, and elliptical pipe under 24" (600 mm) nominal inside horizontal dimension, the excavation (excluding rock), Class C bedding, backfill, and backfilling will be included in the price for this work.

Modify the last paragraph as follows:

Payment for excavation and replacement of unsuitable material encountered below the Class C bedding will be provided for under Section 208.

Subsection 614.11 Basis of Payment. (3/18/2004)

Modify the second sentence of the first paragraph as follows:

Price and payment will constitute full compensation for furnishing, hauling, and installing pipe; 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 in true alignment or which shows any detrimental settlement after laying; for coating if required; and for all material, labor, equipment, tools, and incidentals required to complete the work.

Modify the first sentence of the second paragraph as follows:

For pipe under 24" (600 mm) nominal inside diameter and arch pipe under 24" (600 mm) nominal inside horizontal dimension, the excavation (excluding rock), Class C bedding, backfill, and backfilling will be included in the price of this work.

Modify the last paragraph as follows:

Payment for excavation and replacement of unsuitable material encountered below the Class C bedding will be provided for under Section 208.

Subsection 617.02 Materials. (5/15/2006)

Add the following sentence:

Reinforced concrete flared end sections shall be Class III for all types and class of pipes unless otherwise noted in the Plans.

Subsection 619.11 Test Piles. (3/18/2004)

In paragraph (a) (7) modify the second sentence as follows:

However, in no case shall the pile be driven to exceed 240 blows per 12" (300 mm) or 20 blows per 1" (25 mm) of driving for 3 consecutive inches (75 mm).

Subsection 619.12 Driving Production Piles. (3/18/2004)

In paragraph (5) modify the first sentence as follows:

In no case shall production piles be driven to exceed 240 blows per 12 inches (300 mm) or 20 blows per 1" (25 mm) for 3 consecutive inches (75 mm).

Subsection 623.07 Non-Shrink Grout. (3/18/2004)

Delete the entire paragraph and replace with the following:

Non-shrink grout shall conform to ASTM C1107, Grade C with one modification. The minimum 24-hour strength shall be increased to 5.0 KSI. The sampling and testing procedures of ASTM C1107 need not be changed.

Subsection 623.11 Design Criteria. (1/3/2008)

Modify the first paragraph as follows:

The design of the prestressed, precast, reinforced concrete members shall meet the requirements of the AASHTO LRFD Specifications for Highway Bridges.

The design load shall be HL 93.

Section 701 - Curb and Integral Curb and Gutter (5/15/2006)

Section 701 of the Standard Specifications is replaced with the following:

701.01 Description. This work consists of constructing curbs and integral curbs and gutters on a prepared foundation using either fixed forms or slip forms.

MATERIALS.

701.02 Portland Cement Concrete. Portland cement concrete shall conform to the requirements of Section 812, Class B for either fixed-form work or slip-form work.

701.03 Liquid Membrane Curing Compounds. Liquid membrane curing compound shall comply with Subsection 812.02 (i), (1) Curing Materials.

701.04 Preformed Expansion Joint Material. Preformed cork expansion joint material shall be 1/2 (13 mm) nominal thickness and conform to the requirements of Subsection 808.06.

701.05 Bituminous Joint Sealant. Bituminous joint sealant when needed for longitudinal joints as noted on C-1 and P-2 of the Standard Construction Details shall conform to the requirements of Subsection 808.04 (c).

CONSTRUCTION METHODS.

701.06 Preparation of Foundation. The foundation shall be prepared at the required grade to accommodate the elevations, dimensions, and details shown on the Plans. Grades shall be checked to ensure the drainage is adequate to prevent ponding. Existing subgrade shall be compacted until the surface is firm and unyielding. All unsuitable material shall be removed and replaced with approved material. Graded Aggregate Base Course Type B, (GABC) meeting the requirements of Subsection 302.02 shall be used unless otherwise directed. GABC shall be compacted with water as required in Subsection 302.04 except no spreader box will be required. Where rock is encountered, the grade shall be excavated to 6" (150 mm) below the bottom of the curb and integral curb and gutter and backfilled with GABC.

701.07 Fixed Forms. Fixed forms shall be of wood or metal and shall extend the full depth of the concrete. Composite material forms may be used for radii work. Forms shall be straight, free from warp greater than 1/8" in 10' (3 mm in 3 m), and of sufficient strength to resist the pressure of the concrete, and shall not displace more than 1/4" in 10' (3 mm in 3 m) from the vertical or horizontal plane. Forms shall

remain in both horizontal and vertical alignment until their removal. Forms shall be clean and coated with an approved form release agent before concrete is placed. Divider plates shall be 1/8" thick metal.

701.08 Slip-Forming. Slip forming may be used provided that only approved equipment is used and the surface adjacent to the curb is firm and unyielding to support the weight of the machine.

701.09 Placing Concrete. The concrete shall be placed on a moist foundation, wetting the foundation if necessary. The concrete shall then be consolidated to eliminate air voids and worked sufficiently to bring mortar to the surface. The surface shall be struck off to the required contour and finished smooth and even with an approved float.

Limitations on placing concrete during hot or cold weather shall be as specified in Subsection 501.04.

701.10 Joints. Expansion joints shall be formed using templates or saw cut at no greater than 160' (49 m) intervals. Joints must be cut or formed vertically to the full depth of the curb to allow full contact of the expansion material with the entire surface. Additional expansion joints shall be constructed at each end of radii and at both sides of all structures or obstructions.

Contraction joints shall be constructed at 10' (3 m) intervals. If not templated, all surfaces, front, top and back shall be tooled or saw cut to a minimum depth of 1" (25 mm) and a minimum width of 1/8" (3 mm). Saw cutting shall be done as soon as the concrete has sufficiently set or no more than 16 hours from the time of placement of the concrete to avoid shrinkage cracking. Any curb showing shrinkage cracks shall be removed and replaced at no cost to the Department.

When constructed adjacent to concrete pavement, joints shall coincide with joints in the pavement. When sidewalk is behind the curb all joints shall be in alignment and the expansion joints in the curb shall coincide with expansion joints in the sidewalk.

When curb is placed adjacent to Portland Cement Concrete pavement the curb or pavement shall be formed or tooled to allow sealing as shown in the Standard Construction Details C-1 and P-2.

701.11 Finishing. A wood or magnesium float shall be used to rub the surface smooth while the concrete is still green. Front and back edges of the curb shall be rounded to a 1/4" (6 mm) radius. A steel trowel finish shall next be applied, and finally a soft dampened brush shall be used longitudinally along the surface. Finishing shall be performed to a depth of 2" (50 mm) below the proposed pavement surface elevation.

Before the concrete is given the final finish, the flow line of the gutter shall be checked to ensure positive drainage. Vertical alignment shall match adjacent surfaces such as curbs and drainage inlets. Any deviations in the flow line of more than 1/8" in 10' (3 mm in 3 m) shall be corrected. Irregularities in grade or alignment of the front and back edges of the curb shall not exceed 1/4" in 10' (6 mm in 3 m).

The ends of all curbs shall be transitioned to be flush with the pavement at a ratio of twelve to one (12:1). All approach and exit ends of median island and curb shall also be transitioned flush with the pavement at a ratio of twelve to one (12:1). Triangular (pork chop) island curb shall have all corners transitioned flush with pavement at a slope of four to one (4:1).

701.12 Removal of Forms. Forms may be removed as soon as concrete has hardened sufficiently. Rear and side forms shall not be removed for at least 12 hours. Fill all defects with mortar conforming to the requirements of Section 611. Surfaces exposed after 12 hours but prior to 72 hours, shall be cured using

materials specified in Section 812 or immediately backfilled. Fill all defects with mortar mixed in the proportion of one part portland cement to three parts fine aggregate.

701.13 Curing. Within 30 minutes of the completion of finishing to any portion of the concrete work and prior to any dehydration of the concrete surface, all exposed concrete surfaces shall be cured according to Section 501 for a period of no less than five days. The curb may be opened to traffic prior to the expiration of the five-day cure period if compressive strengths of the representative cores taken by the Department indicate that the strength of the concrete exceeds 2000 psi (14 Mpa). Any additional surfaces exposed prior to the expiration of the five-day cure period, by removing forms for example, shall be immediately cured to the same requirements for the remainder of the five-day period. Formwork that is allowed to remain in place and eliminate the need to cure the respective surfaces must remain tight against the surface to prevent drying of the concrete surface.

The application rate shall be not more than 200 ft²/gal (4.9 m²/L). During the curing period, pedestrian and vehicular traffic shall not disturb newly completed curb or integral curb and gutter other than as noted above.

701.14 Method of Measurement. The quantity of portland cement concrete curb and integral curb and gutter will be measured as the number of linear feet (linear meters) along the front face of the finished curb. Any curb showing cracks shall be replaced in sections that have a minimum length of 10' (3 m), at no cost to the Department.

701.15 Basis of Payment. The quantity of portland cement concrete curb and integral curb and gutter will be paid for at the Contract price per linear foot (linear meter). Price and payment will constitute full compensation for excavating (unless it is included in the excavation for the roadway box and paid for under Section 202), furnishing, and placing all materials; for forming, placing, finishing, and curing concrete; for backfilling, compacting, and disposing of surplus materials; for rounding curb edges, for sealing joints; and for all labor, equipment, tools, and incidentals required to complete the work. Grade Aggregate Base Course will be measured and paid for under Section 302. Isolated rock removal shall be paid for under Section 206 unless already removed and included within Section 205.

Subsection 705.09 Curing. (5/15/2006)

Modify the sentence as follows:

Concrete shall be cured according to Section 501 for a period of 72 hours. The sidewalk shall not be opened to pedestrian traffic for 72 hours. Vehicular traffic shall not be permitted until after 5 days.

Subsection 705.12 Basis of Payment. (5/15/2006)

Add the following sentence:

Curb ramps constructed along the new P.C.C. sidewalk shall be incidental to the sidewalk item in this Section 705-Portland Cement Concrete Sidewalk.

Subsection 708.05 Frames. (3/18/2004)

Add the following paragraph:

Frames for drainage grates fabricated from structural steel that meets or exceeds requirements of AASHTO M 270 Grade 36 or ASTM A 36 will also be acceptable. Such frames shall be fabricated from ½" (minimum thickness) stock, provide a 1 ¼" lip for support of the grate, have a 2" depth to

accommodate a 2" thick grate, and have a bottom width of 4". Tolerances shall be + 1/8", -0". All cutting and welding shall be done in accordance with applicable portions of Subsection 826.12 by certified welders. The fabricated frame shall be hot dip galvanized in accordance with AASHTO M 111 (ASTM A 123) with a minimum of 2 ounces per square foot of zinc coating.

Subsection 708.06 Gratings. (3/18/2004)

Add the following paragraph:

Gratings for drainage inlets fabricated from structural steel that meets or exceed requirements of AASHTO M 270 or ASTM A 36 capable of HS-25 load rating will also be acceptable. Grates shall be of the Type 1, 2, or 3 style as shown in the Standard Construction Details. Type 1 shall have 1" x 2" perimeter bars. Type 2 and 3 shall have 3/4" x 2" perimeter bars. Type 1, 2, and 3 shall have 1/2" x 2" internal bars. Grating spacers shall be flush with the top surface of the grate. Tolerances shall be + 1/8", - 0". All cutting and welding shall be done in accordance with applicable portions of Subsection 812.12 by certified welders. The fabricated grate shall be hot dip galvanized in accordance with AASHTO M 111 (ASTM A 123) with a minimum of 2 ounces per square foot of zinc coating.

Subsection 708.10 Precast and Cast-In-Place Drainage Inlets and Manholes. (5/15/2006)

Modify the subsection title as shown above and modify the 1st paragraph as follows:

Precast and Cast-In-Place drainage inlets and manholes shall be constructed as shown on the Standard Construction Details. Cast-In-Place construction shall be used for drainage structures that tie into existing pipes and structures unless the Engineer approves the use of Precast. Shop drawings are not required for drainage inlets and manholes that match the Standard Construction Details. Shop drawing and design calculations, signed and sealed by a professional engineer, registered in the State of Delaware, shall be submitted for approval for all drainage structures that differ from the Standard Construction Details.

Subsection 708.13 Inlet and Outlet Pipes. (5/15/2006)

Modify the third sentence as follows:

Any space between the pipe and the walls of the drainage inlet shall be filled with non-shrink grout conforming to the requirements of ASTM C1107 with a strength of 5000 psi.

Subsection 713.02 Stabilization. (1/3/2008)

Modify the sentence as follows:

Geotextile for stabilization shall conform to the requirements of AASHTO M 288, Class 1, and Table 4.

Subsection 713.03 Separation. (1/3/2008)

Modify the sentence as follows:

Geotextile for separation shall confirm to the requirements of AASHTO M 288 Class 2, and Table 3.

Subsection 713.04 Erosion Control. (Modify title) (1/3/2008)

Modify the sentence as follows:

Geotextile, woven monofilament for erosion control, shall conform to the requirements of AASHTO M 288, Class 2, and Table 5. All other non- woven geotextiles for erosion control, shall conform to AASHTO M 288 Class 1 and Table 5.

Subsection 715.05 Geotextile. (Modify Title) (1/3/2008)

Modify the sentence as follows:

Geotextile shall conform to the requirements of AASHTO M 288 Class 2 or 3 and Table 2.

Subsection 715.03 Perforated, Corrugated Polyethylene Tubing (CPT). (5/15/2006)

Delete the entire paragraph and replace with the following:

Perforated, CPT shall conform to the requirements of AASHTO M252.

Subsection 715.04 Stone. (3/18/2004)

Modify the first sentence as follows:

Stone for backfill shall conform to the requirements of Section 813, Delaware No. 57.

Subsection Section 715.07 - Video Inspection. (3/18/2004)

Delete the first sentence. Insert the following two sentences:

The entire underdrain system shall be videoed prior to the Project's final inspection. The Contractor may video the underdrain system prior to the placement of the final surface course over the area of the underdrain. If guardrail is placed within 3' (.9 m) from the underdrain, that section shall be videoed after installation of the guardrail.

Section 720 Galvanized Steel Beam Guardrail. (5/15/2006)

Change 'Reflectorized Washers' to 'Guardrail Reflectors'.

Subsection 720.05 Basis of Payment. (5/15/2006)

After the third sentence, add the following sentences:

When specified in the Plans to place/replace or salvage individual elements of guardrail, and an item is listed for those items, then those individual components will be measured/paid as the number of each component under their respective bid item. When installing new guardrail, paid by the linear foot, these items are incidental to guardrail.

Section 725 Guardrail-to-Barrier Connection (Approach and Exit Types). (5/15/2006)

Change 'Reflectorized Washers' to 'Guardrail Reflectors'.

Section 726 Guardrail End Treatment. (5/15/2006)

Change 'Reflectorized Washers' to 'Guardrail Reflectors'.

Subsection 732.02 Materials. (5/15/2006)

Modify the third paragraph as follows:

Topsoil shall have an acidity range of pH 6.0 to pH 6.5. If necessary, lime shall be incorporated into the topsoil to raise the acidity or a sulfur-based product shall be incorporated into the topsoil to lower the acidity. The rate shall be determined by the Engineer, and shall be accomplished prior to or at the time of seeding.

Subsection 732.10 Basis of Payment. (5/15/2006)

Modify the second sentence as follows:

Price and Payment will constitute full compensation for preparing the grade; for furnishing, hauling, and placing all materials, including necessary quantities of lime or sulfur; for maintaining topsoil, for loosening of the topsoil and subgrade to a total depth of 6" (150 mm); and for all labor, equipment, tools, and incidentals required to complete the work.

Subsection 746.03 Construction Methods. (3/18/2004)

Delete the last paragraph. Insert the following two sentences:

The concrete for pole bases shall be placed in accordance with the applicable requirements of Section 602. The bases shall be edged and have a broom finish.

Subsection 748.09 Application. (5/15/2006)

Add the following at the end of this subsection:

(f) *Removal of Pavement Markings when they are not properly applied.*

When it is necessary to remove pavement markings the following shall apply:

- (1.) For paint and epoxy resin, shot/abrasive grit blasting or water blasting equipment shall be used.
- (2.) For alkyd thermoplastic, in addition to the removal techniques discussed for paint and epoxy, burning or grinding equipment may be used.

The removal operation shall be performed in a manner that will not damage the pavement surface to a depth more than 1/8 inch. The contractor must satisfactorily demonstrate his/her proposed equipment and method of removal. Alternative equipment and methods will be considered if satisfactory results can be demonstrated.

The contractor shall collect and dispose of all shot/abrasive grit and pavement marking materials removed from the pavement surface. Washing or sweeping such materials to the roadside will not be

permitted.

(3.) After removal of striping on bituminous concrete pavement, approved flat black paint or asphalt sealer shall be used to cover any exposed aggregate or embedded paint. Price and payment will also include payment for black paint or asphalt sealer.

760.04 Basis of Payment. (5/15/2006)

Modify the paragraph as follows:

The quantity of pavement-milling will be paid for at the Contract unit price per square yard per inch of depth (square meter per 25 millimeters of depth) or at the Contract unit price per square yard (square meter). Price and payment will constitute full compensation for milling or planing the existing pavement; for the cleanup of the hot mix or concrete residue wedge left from the milling operation including but not limited to along the curb line, adjacent to speed humps, across intersecting streets, around manholes, and at the beginning and ending points of the milling operation, for removing and disposing of the milled material; and for all labor, tools, equipment, and incidentals required to complete the work.

Subsection 808.02 Portland Cement Concrete Pavement. (5/15/2006)

Modify Subpart (a) as follows:

a. *Hot-Poured Joint Sealant.* Hot-poured joint sealant shall conform to AASHTO M 324(Type-IV) or AASHTO M 282.

Subsection 808.04 Portland Cement Concrete Structures. (5/15/2006)

Modify Subpart (c) as follows:

c. *Bituminous Joint Sealant.* Bituminous joint sealants may be hot applied conforming to AASHTO M 324 Type-I, or cold applied elastomeric sealant conforming to Federal Specification SS-S-200E (2), Type H.

Subsection 808.06 Portland Cement Concrete Curb and Integral Curb and Gutter. (5/15/2006)

Modify the 1st Sentence as follows:

Materials for portland cement concrete curb and integral curb and gutter shall be preformed expansion joint material of ½” (13 mm) nominal thickness and shall conform to the requirements of AASHTO M 153, Type II.

Subsection 812.04 Composition of Mix. (3/18/2004)

Add the following to the notes under Table 812-A:

Note 13: Concrete (all classes), which fails to reach full 28 day design strength (fc’) will be considered defective and will be evaluated in accordance with Subsection 602.25 Defective Work. Payment for the item with low strength concrete will be determined in accordance with Subsection 602.27 Basis of Payment (b) Price Adjustment for Low Strength Concrete.

Modify the statement in the bottom of box of Table 812-A as follows:

Notes 8, 9, 10, 11, and 13 refer to all classes of concrete. Note 12 refer to Class D concrete.

Section 814 - Timber Preservatives. (3/18/2004)

Delete Paragraph (a).

Subsection 821.01 Description. (5/15/2006)

Modify the paragraph as follows:

This material consists of coarse crushed stone, crushed slag fragments or portland cement concrete fragments. The Contractor shall certify that any recycled material, which is being proposed for use as graded aggregate, is neither hazardous nor toxic.

Subsection 821.03 Material Details. (c) Gradation. (5/15/2006)

Remove all references to graded aggregate, Type A (CR-1). Replace all of Subpart (c) Gradation with the following:

Sieve Size	WEIGHT PERCENT PASSING
	% Passing
	Type B
2 ½" (63.0 mm)	---
1 ½" (37.5 mm)	100
1" (25.0 mm)	---
¾" (19.0 mm)	50-95
No. 4 (4.75 mm)	20-50
No. 10 (2.00 mm)	15-40
No. 20 (850 um)	---
No. 100 (150 um)	2-20
No. 200 (75 um)	0-10

Materials. The graded aggregate shall meet the following properties:

Property	Range
Liquid Limit (T89) ¹	30 max
Plasticity Index (T90) ¹	4 max
Sand Equivalency ¹	25 min
Bituminous Concrete ²	5% max
Brick ²	5% max
Wood ²	0.1% max
Metals ²	0.1% max
Plaster ²	0.1% max
Deleterious materials ²	0.1% max
Los Angeles Abrasion	45% max

¹Minus 0.425 mm (No. 40) sieve material

²By weight

Once a stockpile of material has been tested and approved, no material shall be added to it until the stockpile is depleted.

Subsection 827.02 Silt Fence. (1/3/2008)

Modify the last sentence as follows:

The geotextile shall be inert to commonly encountered chemicals and shall meet the requirements of AASHTO M 288 Table 6.

Delete Table 827-A

Subsection 827.04 Inlet Sediment Control. (1/3/2008)

Modify the entire paragraph as follows:

The geotextile for inlet sediment control shall conform to AASHTO M 288 Class 1 or 2 Table 5 for erosion control.

Delete Table 827-B

Subsection 827.06 Riprap Ditch. (1/3/2008)

Modify the entire paragraph as follows:

The geotextile for a riprap ditch shall conform to AASHTO M 288 Class 2 or 3 Table-2 for drainage.

Subsection 827.12 Stabilized Construction Entrance. (1/3/2008)

Modify the last sentence as follows:

The geotextile shall be inert to commonly encountered chemicals and hydrocarbons, be mildew and rot resistant, and shall conform to AASHTO M288 Class 1 and Table 4 for Traffic < 3 Axles and Class 1 and Table 4 for Traffic > 3 Axles

Delete Table 827-C

Subsection 828.02 (f) Guardrail Reflectors. (5/15/2006)

Change 'Reflectorized Washers' to 'Guardrail Reflectors.'

Modify the paragraph as follows:

Guardrail reflectors shall be fabricated from steel sheet plates conforming to the requirements of ASTM A-6, galvanized to ASTM A153. Retroreflectorized sheeting shall be AR-1000 (Type V) Abrasive resistant and shall be applied in accordance with Subsection 720.03.