

DELAWARE STATE UNIVERSITY



DSU ALUMNI STADIUM PARKING RENOVATION

Contract #: PC-2013-003-ASD

JUNE 10, 2013

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END OF SECTION 00850

SECTION 01005 - ADMINISTRATIVE PROVISIONS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Work covered by the Contract Documents
- B. Contract Method
- C. Work Sequence.
- D. Contractor Use of Premises.
- E. Owner Occupancy.
- F. Owner-furnished Products.
- G. Allowances.
- H. Alternates.
- I. Unit Prices
- J. Applications for Payment.
- K. Owner Supplied Construction Documents
- L. Coordination.
- M. Field Engineering
- N. Reference Standards

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. The general work included in the Statewide Parking Lot Improvements for all of New Castle, Kent, and Sussex Counties involves removing the existing vegetation in the areas scheduled to receive crack repair, cleaning the surfaces, performing the designated crack repair and placing sand on the hot sealant in high traffic areas. The other activity scheduled for these sites involves full depth pavement repair as specified on the drawing sheets. Any existing parking bumpers are to be removed and replaced as indicated for each site. The existing parking areas are scheduled to be restriped and new symbols painted as specified. Geotextile fabric shall be installed where directed and according to manufactures instructions. Selected sites will require grading and sloping to achieve positive drainage. This shall be completed as indicated on the drawings.

1.03 CONTRACT METHOD

- A. Construct the work under a single, lump sum contract.

- B. Items noted "NIC" (Not in Contract), will be furnished and installed by others.

1.04 WORK SEQUENCE

- A. Construct work in stages to accommodate owner's occupancy requirements during the construction period; coordinate construction schedule and operations.
- B. Begin work within seven (7) days after receipt of a State purchase order and Notice to Proceed and be substantially completed before inclement weather starts.

1.05 CONTRACTOR USE OF PREMISES

- A. Limit use of premises for work and for construction operations to allow for owner occupancy.
- B. Coordinate use of premises under direction of owner.

1.06 OWNER OCCUPANCY

- A. Owner will occupy premises during entire period of construction for the conduct of his normal operations. Cooperate with owner to minimize conflict, and to facilitate owner's operations.

1.07 OWNER-FURNISHED PRODUCTS:

- A. None

1.08 SCHEDULE OF ALLOWANCES

- A. None

1.09 ALTERNATES

- A. Alternates quoted on bid forms will be exercised as owner option. Accepted alternates will be listed in owner-contractor agreement
- B. Coordinate related work and modify surrounding work affected by accepted alternates as required to complete the work.
- C. Schedule of Alternates: (Refer to Bid Form)

1.10 UNIT PRICES

- A. Unit Prices quoted on bid forms will be exercised as owner option.
- B. Coordinate related work and modify surrounding work affected by accepted unit prices as required to complete the work.
- C. Schedule of Unit Prices: (Refer to Bid Form)

1.11 APPLICATIONS FOR PAYMENT:

- A. Submit 3 copies of each application under procedures of Section 00800.
- B. Content and Format: Use table of contents of Project Manual.

1.12 OWNER SUPPLIED CONSTRUCTION DOCUMENTS:

- A. The contractor will be furnished, free of charge, five (5) copies of drawings and project manuals (or less if requested). Additional sets will be furnished at the cost of reproduction, postage and handling.

1.13 COORDINATION:

- A. Coordinate work of the various sections of specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.
- B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical, electrical and plumbing work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas (except as otherwise shown,) conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Execute cutting and patching to integrate elements of work, uncover, ill-timed, defective, and non-conforming work, provide openings for penetrations of existing surfaces, and provide samples for testing. Seal penetrations through floors, walls, and ceilings.

1.14 FIELD ENGINEERING

- A. Provide field engineering services; establish grades, lines, and levels, by use of recognized engineering survey practices.
- B. Control datum for survey is that shown on drawings. Locate and protect control and reference points.

1.15 REFERENCE STANDARDS

- A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the bid date, except when a specific date is specified.
- C. Obtain copies of standards when required by contract documents. Maintain copy at job site during progress of the specific work.

PART 2 -PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01005

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 PROJECT DESCRIPTION

- A. The Contractor for this project shall furnish all labor, materials, equipment and services necessary for and reasonably incidental to fully perform all the work indicated as their responsibility and as shown on the drawings and specified in the specifications.

- B. The work shall include the following: ***Parking Lot Renovation at Alumni Stadium***, as shown on the drawings and as specified in the specification manual, including, but not necessarily limited to the following.

- a. *Repainting striping and symbols.*
- b. *Full depth Asphalt repair.*
- c. *Milling of Asphalt.*
- d. *New asphalt surface overlay.*
- e. *Stormwater Drainage Remediations.*
- f. *Misc. C.I.P. Concrete.*
- g. *Stadium Entrance System.*
- h. *Chainlink Fencing.*

- C. This contract is to be constructed in accordance DeIDOT's Standards and Specifications, August 2001 and the most recent "Revisions and Corrections to the DeIDOT's Standard Specifications, August 2001", "The Supplemental Specifications to the August 2001 Standards and Specifications" and the special provisions found in these documents. It is the sole responsibility to obtain and adhere to said references.

http://www.deldot.gov/information/pubs_forms/manuals/standard_specifications/index.shtml. The project contains, but is not limited to, the following standard items:

- a. ***EXCAVATION AND EMBANKMENT***
- b. ***BAR REINFORCEMENT***
- c. ***REINFORCED CONCRETE PIPE, 12", CLASS III***
- d. ***PAVEMENT - MILLING, HOT-MIX, VARIABLE DEPTH***

- e. PORTLAND CEMENT CONCRETE CURB*
- f. PORTLAND CEMENT CONCRETE SIDEWALK, 4"*
- g. INTEGRAL PORTLAND CEMENT CONCRETE CURB & GUTTER*
- h. METAL DOWNSPOUTS*
- i. CHAIN-LINK FENCE*

1.3 WORK SEQUENCE

- A. The Work will be conducted in one phase to provide the least possible interference to the activities of the Owner's personnel and to permit an orderly transfer of personnel and equipment to the new facilities.
- B. Begin work within 10 days after receipt of a State purchase order and Notice to Proceed and be substantially completed as indicated on submitted project schedule.

1.4 CONTRACTOR USE OF PREMISES

- A. General: Limit use of the premises to construction activities in areas indicated.
 - 1. Confine operations to areas within Contract limits indicated.
- B. Contractor shall coordinate with the owner to ensure access is maintained for authorized Delaware State University personnel to all critical site entrances amenities during the project and at the completion of each shift.

PART 2 - MATERIALS

Not applicable to this section.

PART 3 - EXECUTION

Not applicable to this section.

END OF SECTION 01010

SECTION 01020 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division- 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for Allowances.
 - 1. Selected materials and equipment are specified in the Contract Documents by Allowances. In some cases, these Allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of Allowances may include the following (Refer to “Schedule of Allowances” include at the end of this Section):
 - 1. Lump-sum Allowances.
 - 2. Unit-cost Allowances.
 - 3. Contingency Allowances.
- C. Selection and Purchase:
 - 1. At the earliest practical date after award of the Contract, advise the Owner of the date when the final selection and purchase of each product or system described by an Allowance must be completed to avoid delaying the Work.
 - 2. At the Owner's request, obtain proposals for each Allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
 - 3. Purchase products and systems specifically selected (in writing) by the Owner.
- D. Submittals:

1. Submit proposals and recommendations for purchase of products or systems included in Allowances, in form required for change order.
 2. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each Allowance.
- E. Coordinate Allowance work with related work to ensure that each selection is completely integrated and interfaced with related work.
- F. Lump-Sum Allowances and Unit-Cost Allowances:
1. These Allowances shall cover the cost to the Contractor, less any applicable trade discount, of the materials and equipment required by the Allowance delivered at the site, and all applicable taxes.
 2. The Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the original Allowance shall be included separately in the Contract Sum and not in the Allowance.
 3. Whenever the cost is more than or less than the Allowance, the Contract Sum shall be adjusted accordingly by Change Order.
 - a. Change Order Mark-up: The amount of each change order resulting from final selection of products and systems covered by an Allowance shall be the difference between the Contractor's purchase price amount and the Allowance, and shall not include Contractor's mark-up (or subcontractor's mark-up) except to the extent clearly demonstrated (by Contractor) that either scope of installation or nature of work required was changed from that which could have been foreseen from description of Allowance and other information in contract documents. No mark-up is permitted for selection of higher or lower priced materials or systems, of same scope and nature as originally indicated.
 - b. Change Order Data: Where applicable, include in each change order proposal both the quantities of products being purchased and unit costs, along with total amount of purchase to be made. Where requested, furnish survey-of-requirements data to substantiate quantities. Indicate applicable taxes, delivery charges, and amounts of applicable trade discounts.
- G. Contingency Allowances:

1. Use the contingency Allowance only as directed for the Owner's purposes and only by Change Orders that indicate amounts to be charged to the Allowance.
2. Change Orders authorizing use of funds from the contingency Allowance, for purchase of products and equipment, will include Contractor's related costs and reasonable overhead and profit margins. These related costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
3. At Project closeout, credit unused amounts remaining in the contingency Allowance to the Owner by Change Order.

H. Unused Materials:

1. Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.
 - a. When requested by the Owner, prepare unused material for storage by Owner where it is not economically practical to return the material for credit. When directed by the Owner, deliver unused material to the Owner's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.

PART 2 - PRODUCTS (Not Applicable)

END OF SECTION 01020

SECTION 01026 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for unit prices.
 - 1. A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.
 - 2. Unit prices include all necessary material, labor, overhead, profit and applicable taxes.
 - 3. Refer to individual Specification Sections for construction activities requiring the establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- B. Schedule: A "Unit Price Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods described under each unit price.
 - 1. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

PART 2 - PRODUCTS

(Not Applicable).

PART 3 - EXECUTION

UNIT PRICES

01026-1

3.1 UNIT PRICE SCHEDULE

(This is listed within the bid form.)

END OF SECTION 01026

SECTION 01030 – ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for Alternates.
- B. Definition: An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the bidding requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept the corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.
- C. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.
- D. Notification: Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- E. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each Alternate.
 - 1. Include as part of each Alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

PART 2 - PRODUCTS (Not Applicable).

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PART 3 - EXECUTION

Schedule of Alternates:

- Alternate No. 1 – Stamped asphalt in lieu of standard overlay
- Alternate No. 2 – Concrete pad in lieu of asphalt
- Alternate No. 3 – Chain-link fence in lieu of Entrance System
- Alternate No. 4 – Modular arch support bases

END OF SECTION 01030

SECTION 01040 - PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
 - 1. Coordination.
 - 2. Administrative and supervisory personnel.
 - 3. General installation provisions.
 - 4. Cleaning and protection.
- B. Field engineering is included in Section "Field Engineering".
- C. Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".
- D. Requirements for the Contractor's Construction Schedule are included in Section "Submittals".

1.3 COORDINATION

- A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
 - 1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
 - 2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and

- repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of schedules.
 2. Installation and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project Close-out activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials (PARKING BUMPERS) and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.4 SUBMITTALS

- A. Staff Names: Within 15 days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

PROJECT COORDINATION

01040-2

3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.2 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the

remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.
31. Wind damage.

END OF SECTION 01040

SECTION 01050 - FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. General: This Section specifies administrative and procedural requirements for field engineering services, including, but not necessarily limited to, the following:
 - 1. Land Survey Work.
 - 2. Engineering Services

1.3 SUBMITTALS

- A. Certificates: Submit a certificate signed by the Land Surveyor or Professional Engineer certifying that the location and elevation of improvements comply with the Contract Documents.
- B. Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of Sections "Submittals" and "Project Closeout".

1.4 QUALITY ASSURANCE

- A. Surveyor: Engage a Registered Surveyor registered in the State of Delaware, to perform required surveying services
- B. Engineer: Engage a Professional Engineer of the discipline required, registered in the State of Delaware, to perform required engineering services.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Owner will identify existing control points and property line corner stakes.
- B. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks before proceeding to layout the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
 - 1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
 - 2. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.
- C. Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- D. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction. **The contractor shall contact Miss Utility 48 hours prior to digging, 1-800-282-8555.**

3.2 PERFORMANCE

- A. Working from lines and levels established by the property survey, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
 - 1. Advise entities engaged in construction activities, of marked lines and levels provided for their use.
 - 2. As construction proceeds, check every major element for line, level and plumb.
- B. Surveyor's Log: Maintain a surveyor's log of control and other survey Work. Make this

log available for reference.

1. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.
 2. On completion of foundation walls, major site improvements, and other Work requiring field engineering services, prepare a certified survey showing dimensions, locations, angles and elevations of construction and sitework.
- C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.
- D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical work.

END OF SECTION 01050

SECTION 01090 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

- 1.01 **Definitions:** Basic Contract definitions are included in the General Conditions.
- A. **Indicated** refers to graphic representations, notes or schedules on Drawings, or Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used, it is to help locate the reference.
 - B. **Directed:** Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Engineer", "requested by the Engineer", and similar phrases. No implied meaning shall be interpreted to extend the Owner's Representative's responsibility into the Contractor's supervision of construction.
 - C. **Approve,** used in conjunction with action on submittals, applications, and requests, is limited to the Owner's Representative's duties and responsibilities stated in General and Supplementary Conditions. Approval shall not release the Contractor from responsibility to fulfill Contract requirements.
 - D. **Regulation** includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.
 - E. **Furnish** means "supply and deliver, ready for unloading, unpacking, assembly, installation, and similar operations."
 - F. **Install** describes operations at the site including "unloading, unpacking, assembly, erection, anchoring, applying, working to dimension, protecting, cleaning and similar operations."
 - G. **Provide** means "furnish and install, complete and ready for use."
 - H. **Installer:** "Installer" is the Contractor or an entity engaged by the Contractor, as an employee, subcontractor or sub-subcontractor for performance of a particular construction activity, including installation, erection, application and similar

operations. Installers are required to be experienced in the operations they are engaged to perform.

The term "experienced", when used with "Installer" means having a minimum of 5 previous Projects similar in size to this Project, and familiar with the precautions required, and with requirements of the authority having jurisdiction.

- I. Project Site is the space available for construction activities, either exclusively or with others performing other construction on the Project. The extent of the Project Site shall be as directed by the Owner's Representative, and may or may not be identical with the description of the land upon which the Project is to be built.
- J. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, at the Project Site or elsewhere, and to report on, and, if required, to interpret results of those inspections or tests.
- K. Working Day: Any calendar day, except: 1) Saturdays, Sundays, and holidays; 2) days where conditions identified in the Contract require the Contractor to suspend construction operations; 3) days with inclement weather that prevents prosecution of the scheduled work. On inclement weather days that result in partial prosecution of the work, partial working days will be charged as determined by the Engineer. Partial working days will be charged in one-quarter day increments. If the Contractor receives permission from the Engineer to work on a Sunday or holiday, full working days will be charged, weather permitting. No time charge will be assessed if the Contractor elects to work on Saturdays. Should the Contractor prepare to begin work on any day on which inclement weather prevents the work from beginning at the usual starting time and the crew is dismissed as a result, the Contractor will not be charged for a working day whether or not conditions change during the day and the rest of the day becomes suitable for construction operations.

1.02 SPECIFICATION FORMAT & CONTENT EXPLANATION

- A. Specification Format: These specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format, AASHTO and MASTER FORMAT numbering system. Selected sections follow Del DOT specifications. The bidders shall follow the specifications as provided in the bid package.

- B. Language used in the Specifications is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and where the context so indicates.
 - 1. Imperative language is used generally. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or by others when so noted.

The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

- C. Assignment of Specialists: Certain construction activities shall be performed by specialists, recognized experts in the operations to be performed. Specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no option. Never the less, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

1.03 DRAWING OF SYMBOLS

- A. General: Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., ninth edition.
- B. Mechanical/Electrical Drawings: Graphic symbols on mechanical and electrical Drawings are aligned with symbols recommended by ASHRAE. Where appropriate, they are supplemented by symbols recommended by technical associations. Refer instances of uncertainty to the Engineer for clarification before proceeding.

1.04 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable industry standards have the same force and effect as if bound or copied into Contract Documents. Such standards are part of the Contract Documents by reference. Individual Sections indicate standards the Contractor must keep available at the Project Site.

- B. Publication Dates: Where the date of issue of a referenced standard is not specified, comply with the standard in effect as of date of Contract Documents.
1. Updated Standards: Submit a Change Order proposal where an applicable standard has been revised and reissued after the date of the Contract Documents and before performance of Work. The Engineer will decide whether to issue a Change Order to proceed with the updated standard.
- C. Conflicting Requirements: Where compliance with two or more standards that establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced. Refer uncertainties as to which quality level is more stringent to the Engineer for a decision before proceeding.
1. Minimum Quantities or Quality Levels: The quantity or quality shown or specified is the minimum to be provided or performed. Indicated values are minimum or maximum values, as appropriate for the requirements. Refer instances of uncertainty to the Engineer for decision before proceeding.
- D. Copies of Standards: Each entity engaged on the Project shall be familiar with standards applicable to that activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
 2. Although copies of standards needed for enforcement of requirements may be part of submittals, the Owner's Representative reserves the right to require submittal of additional copies for enforcement of requirements.
- E. Abbreviations and Names: Where acronyms or abbreviations are used in the Specifications or other Contract Documents they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.
- F. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional

settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work. The contractor shall be responsible for all cost associated with testing and certifications required to complete the project.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01090

STATE OF DELAWARE 2013 Holidays		
New Year's Day	January 1	Tuesday
Martin Luther King Jr. Day	January 21	Monday
Good Friday	March 29	Friday
Memorial Day	May 27	Monday
Independence Day	July 4	Thursday
Labor Day	September 2	Monday
Veterans Day	November 11	Monday
Thanksgiving Day	November 28	Thursday
Day After Thanksgiving	November 29	Friday
Christmas Day	December 25	Wednesday

* The observed date may be different for employees in 24/7 operations/facilities

SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Pre-Construction Conference.
 - 2. Pre-Installation Conferences.
 - 3. Coordination Meetings.
 - 4. Progress Meetings.
- B. Construction schedules are specified in another Division-1 Section.

1.3 PRE-CONSTRUCTION CONFERENCE

- A. Schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The Owner, Engineer and their consultants, the Contractor and their superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
 - 1. Tentative construction schedule.
 - 2. Critical Work sequencing.
 - 3. Designation of responsible personnel.

4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.
7. Submittal of Shop Drawings, Product Data and Samples.
8. Preparation of record documents.
9. Use of the premises.
10. Office, Work and storage areas.
11. Equipment deliveries and priorities.
12. Safety procedures.
13. First aid.
14. Security.
15. Housekeeping.
16. Working hours.

1.4 PRE-INSTALLATION CONFERENCES

- A. Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Engineer of scheduled meeting dates.
 1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases
 - e. Deliveries.
 - f. Shop Drawings, Product Data and quality control Samples.
 - g. Possible conflicts.
 - h. Compatibility problems.
 - I. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's recommendations.
 - l. Compatibility of materials.
 - m. Acceptability of substrates.
 - n. Temporary facilities.

- o. Space and access limitations.
 - p. Governing regulations.
 - q. Safety.
 - r. Inspection and testing requirements.
 - s. Required performance results.
 - t. Recording requirements.
 - u. Protection.
2. Record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Engineer.
 3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.5 COORDINATION MEETINGS

- A. Conduct Project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 PROGRESS MEETINGS

- A. Conduct progress meetings at the Project site at regularly scheduled intervals. Notify the Owner and Engineer of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and Engineer, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 2. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements.
 - b. Time.
 - c. Sequences.
 - d. Deliveries.
 - e. Off-site fabrication problems.
 - f. Access.
 - g. Site utilization.
 - h. Temporary facilities and services.
 - I. Hours of Work.
 - j. Hazards and risks.
 - k. Housekeeping.
 - l. Quality and Work standards.
 - m. Change Orders.
 - n. Documentation of information for payment requests.
 - o. Submittals and other items affecting progress of work.
- D. Reporting: No later than 5 days after each progress meeting date, the Owner will distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Applicable)

PROJECT MEETINGS

01200-4

***DSU ALUMNI STADIUM PARKING RENOVATION
CONTRACT #: PC-2013-003-ASD***

JUNE 10, 2013

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01200

PROJECT MEETINGS

01200-5

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Procedures.
- B. Construction Progress Schedules.
- C. Schedule of Values.
- D. Shop Drawings.
- E. Product Data.
- F. Samples.
- G. Manufacturers' Instructions.
- H. Manufacturers' Certificates.

PROCEDURES

- A. Deliver submittals to Century Engineering, Inc., 4134 North DuPont Highway, Dover, DE 19901. A courtesy copy is to be sent to the Director of Planning and Construction at the Delaware State University, 1200 North DuPont Highway, Dover, DE 19901-2277.
- B. Transmit each item under a transmittal. Identify Project, Contractor, subcontractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and Engineer review stamps. Allow 2 weeks for Engineer's initial processing of submittals requiring review and return. Submittals will be returned without action when received indirectly (not through the Contractor).
- C. Submit initial progress schedules and schedule of values in duplicate within fourteen (14) days after award of Contract. After review by Engineer, revise and resubmit as required. Submit revised schedules reflecting changes since previous submittal.
- D. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.
- E. After Engineer's review of submittal, revise and resubmit as required, identifying changes made since previous submittal.

- F. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.
- G. Submit a complete schedule of submittals in duplicate within (20) days after award of Contract. After review by Engineer, revise and resubmit as required. Submit revised schedules reflecting changes since previous submittal.

1.03 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit horizontal bar chart with separate bar for each major trade or operation identifying first work day of each week.

1.04 SCHEDULE OF VALUES

- A. Submit typed schedule of AIA Form G703. Contractor's standard form or media-driven printout will be considered on request.
- B. Format: Table of Contents of this Project Manual. Identify each line item with number and title of the major Specification sections.
- C. Include in each line item amount of Allowances specified in Section 01005. For unit cost Allowances, give quantities measured from Contract Documents multiplied by the unit cost equal to the total for the item.
- D. Include in each line item a directly proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list change orders, for each application for payment.

1.05 SHOP DRAWINGS

- A. Submit the number of opaque reproduces which Contractor requires, plus four (4) copies which will be retained by Engineer.

1.06 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work. Include manufacturers' installation instructions when required by the Specification section.

- B. Submit the number of copies which Contractor requires, plus four (4) copies which will be retained by Engineer.

1.07 MANUFACTURERS' INSTRUCTIONS

- A. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, in quantities specified for product data.

1.08 SAMPLES

- A. Submit full range of manufacturers' standard color, textures, and patterns for Architect's selection. Submit samples for selection of finishes within thirty (30) days after date of Contract.
- B. Submit Samples to illustrate functional characteristics of the Product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- C. Include identification of each Sample, giving full information.
- D. Submit the number specified in respective Specification section; one will be retained by Engineer. Reviewed Samples which may be used in the Work are indicated in the Specification section.

1.09 FIELD SAMPLES

- A. Provide field samples of finishes at Project as required by individual Specifications section. Install sample complete and finished. Acceptable samples in place may be retained in completed Work.

1.10 ITEMS TO BE SUBMITTED AT CONTRACT SIGNING

- A. Performance and Labor and Material Payment Bonds: One (1) copy of each bond for each copy of the agreement, submit simultaneously with the signed agreement.
- B. Policies or Certificates of Insurance: One (1) copy of each policy or certificate for each copy of the agreement, submit simultaneously with the signed agreement.

1.11 COLOR SELECTION

- A. Submit all items requiring color selection together (at one time) to facilitate color coordination by Architect.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01300

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. General Quality Control.
- B. Workmanship.
- C. Manufacturer's Instructions.
- D. Manufacturer's Certificates.
- E. Mock-ups.
- F. Manufacturers' Field Services.
- G. Testing Laboratory Services.

1.02 RELATED REQUIREMENTS

- A. Section 00100 - General Conditions: Inspection and testing required by governing authorities.

1.03 QUALITY CONTROL, GENERAL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.04 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.05 MANUFACTURER'S INSTRUCTIONS

- A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with contract documents, request clarification from architect before proceeding.

1.06 MANUFACTURERS' CERTIFICATES

- A. When required by individual specifications section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.07 MOCK-UPS

- A. None Required.

1.08 MANUFACTURERS' FIELD SERVICES

- A. When specified in respective specification sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.
- B. Representative shall submit written report to owner listing observations and recommendations.

1.09 TESTING LABORATORY SERVICES

- A. Contractor shall employ and pay for services of an Independent Testing Laboratory to perform inspections, tests, and other services required by various specification sections.
- B. Services will be performed in accordance with requirements of governing authorities and with specified standards.
- C. Reports will be submitted to owner in triplicate giving observations and results of tests, indicating compliance or noncompliance with specified standards and with contract documents.
- D. Contractor shall cooperate with Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.
 - 1. Notify owner and Testing Laboratory 24 hours prior to expected time for operations requiring testing services.
 - 2. Make arrangements with Testing Laboratory and pay for additional samples and tests for contractor's convenience.

- E. Any item found unsatisfactory by the testing agency shall be removed, replaced and retested at no additional cost to the Owner.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01400

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.

1.02 REQUIREMENTS INCLUDED (INDICATED BY **)

- A. Temporary Electricity and Lighting
- B. Temporary Telephone Service
- C. Temporary Water **
- D. Temporary Sanitary Facilities **
- E. Construction Aids
- F. Barriers **
- G. Temporary Heat and Ventilation
- H. Temporary Enclosures
- I. Protection of Installed Work **
- J. Water Control
- K. Cleaning During Construction **
- L. Project Identification
- M. Field Offices and Sheds
- N. Removal of Construction Facilities and Restoration of Site
- O. Security
- P. Access Roads and Parking Areas
- Q. Temporary Controls**
- R. Traffic Regulation **

1.03 GENERAL

- A. Comply with National Electric Code.
- B. Comply with Federal, State and local codes and regulations and with utility company requirements.
- C. Coordinate work with owner's requirements.

1.04 MATERIALS

- A. Materials must be new and must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

1.05 TEMPORARY ELECTRICITY AND LIGHTING

- A. Provide temporary electric power and power distribution system as needed to perform the work.
- B. The Contractor may use the Owner's electric service at certain metered locations as directed by the Owner. If the electric bill at those locations used by the Contractor exceeds the normal monthly billing of *\$100.00 per month, the Contractor is responsible for paying the portion of the bill over and above that amount, on a monthly basis.

1.06 TEMPORARY TELEPHONE SERVICE

- A. Provide telephone service as necessary to properly conduct the work and to comply with applicable regulations.
- B. At each telephone, post a list of important telephone numbers.

1.07 TEMPORARY WATER

- A. Provide potable water for drinking and construction purposes.
- B. The Contractor shall make all necessary arrangements for temporary water service for construction purposes, and furnish at his own expense all piping and accessories required.
- C. Take positive measures to preclude cross-connections and backflow.
- D. The Contractor will assume the cost of water consumed if responsible care and restraint are not exercised by the Contractor in its use.

1.08 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean and maintain facilities and enclosures.

1.09 CONSTRUCTION AIDS

- A. Each subcontractor shall provide construction aids and equipment required by his personnel and to facilitate execution of his work. Examples are scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.
- B. Mutual use may be arranged by the contractor where applicable.

1.10 BARRIERS

- A. Materials at contractor's option, as appropriate to serve required purpose.

1.11 HEAT, VENTILATION

(Not Used)

1.12 ENCLOSURES

(Not Used)

1.13 PROTECTION OF INSTALLED WORK

- A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
- B. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.

1.14 WATER CONTROL

- A. Maintain excavations free of water. Provide and operate pumping equipment. Grade site to drain.

1.15 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials and rubbish; periodically dispose of legally off site.
- B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.16 PROJECT IDENTIFICATION

(Not Used)

1.17 FIELD OFFICES AND SHEDS

- A. Field offices and sheds are to be provided by the Contractor as necessary to properly conduct the work and associated activities such as progress meetings, maintaining as-built drawings, and storage of materials.

1.18 REMOVAL OF CONSTRUCTION FACILITIES AND RESTORATION OF SITE

- A. Remove temporary materials, equipment, services, and construction prior to Substantial completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of two (2) feet; grade site as indicated.

1.19 SECURITY

- A. Security of persons and property in areas under control of the contractor shall be the contractor's exclusive responsibility.
- B. The contractor, at this own expense, shall initiate whatever programs that are necessary to execute his responsibility.
- C. Control of access to the areas under his control shall be maintained. Visitors shall be required to report immediately to the Contractor's Superintendent and to produce full identification which will be recorded in the Contractor's Daily Log, along with the purpose of the visit.

1.20 ACCESS ROADS AND PARKING AREAS

- A. Provide and maintain uninterrupted vehicular access to site and within it:
 - 1. To temporary construction facilities, storage and work areas.
 - 2. For use by persons and equipment involved in construction of project.

- B. Maintain traffic areas free as possible of excavated materials, construction equipment, products, snow, ice and debris.
- C. Keep fire hydrants and water control valves free from obstruction and accessible for use.
- D. Designated areas of existing parking facilities may be used for parking of construction personnel's private vehicles and of contractor's light-weight vehicles.

1.21 TEMPORARY CONTROLS

- A. Provide the following Temporary Controls:
 - 1. Control of noise.
 - 2. Control of dust, both on site and within building.
 - 3. Control of surface water to prevent damage to the project, the site or adjacent properties.
 - 4. Control of pests and rodents to prevent infestation of construction or storage areas.
 - 5. Control of debris.
 - 6. Control of pollution of soil, water or atmosphere in accordance with applicable laws.
 - 7. Control of erosion in accordance with applicable laws.
 - 8. Control of mud and snow, including removal where necessary to construction operations. Remove any mud tracked from site onto public roads or streets.

1.22 TRAFFIC REGULATION

- A. Obtain all temporary permits for access to, and use of public roads and streets for construction and hauling purposes. Comply with traffic control regulations applying to permit issuance.
- B. Provide all markers, signs, lights and barriers on, and near the site to safely control construction traffic and public access.

END OF SECTION 01500

SECTION 01600 - MATERIALS AND EQUIPMENT

1.01 GENERAL CONDITIONS

- A. The general provisions of the contract, including the Conditions of the Contract (General, supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.
- B. Where work is to be executed under Separate Prime Contracts, the provisions of this section apply to each contract.

1.02 REQUIREMENTS INCLUDED

- A. All material and equipment incorporated into the work shall:
 - 1. Conform to applicable specifications and standards.
 - 2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Architect.
- B. Manufactured and Fabricated Products shall conform to the following requirements:
 - 1. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - 2. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - 3. Two or more items of the same kind shall be identical, by the same manufacturer.
 - 4. Products shall be suitable for service conditions.
 - 5. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
- C. Do not use material or equipment for any purpose other than that for which it is designated or is specified.
- D. Materials removed from existing structures shall not be re-used in the completed work

unless specifically indicated or specified.

- E. For material and equipment specifically indicated or specified to be re-used in the work:
 - 1. Use special care in removal, handling, storage and reinstallation, to assure proper function in the completed work.
 - 2. Arrange for transportation, storage and handling of products which require off-site storage, restoration or renovation. Pay all costs for such work.

1.03 MANUFACTURER'S INSTRUCTIONS

- A. When contract documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Engineer.
 - 1. Maintain one set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions.
 - 2. Do not proceed with work without clear instructions.
- C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by contract documents.

1.04 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
 - 1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of contract documents and approved submittals, and that products

are properly protected and undamaged.

- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.05 STORAGE AND PROTECTION

- A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

- 1. Store products subject to damage by the elements in weather-tight enclosures.
- 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

- B. Exterior Storage.

- 1. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspection of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

- D. Store flammable materials so as to prevent contact with flames and fire. Conform with manufacturer's recommendations and local laws. Pay particular attention to storage of:

- 1. Paint materials
- 2. Cleaning and other solvents
- 3. Fuels

- E. Protection After Installation:

- 1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

1.06 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Product List.

1. Within 14 days after date of Owner-Contractor Agreement, submit a complete list of major products proposed for use, with the name of the manufacturer, trade name, and model number of each product and the installing subcontractor.

B. Contractor's Options.

1. For products specified only by reference standard, select any product meeting that standard.
2. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with the specifications.
3. For products specified by naming one or more products or manufacturers and "or equal", bidders must, during the bidding period, submit a request for substitutions for any product or manufacturer not specifically named. See provisions in Paragraph 1.06C.
4. For Products specified by naming only one product and manufacturer, there is no option.

C. Substitutions.

1. Requests for substitutions shall be made in writing and received by the Owner before 4:30 p.m., 10 calendar days prior to bid opening. Subsequently, substitutions will be considered only when a Product becomes unavailable due to no fault of the Contractor. The Architect will review requests and will notify bidders in an Addendum if the requested substitution is acceptable.
2. Submit a separate request for each product, supported with complete data, with drawings and samples as appropriate, including:
 - a. Comparison of the qualities of the proposed substitution with that specified.
 - b. Changes required in other elements of the work because of the substitution.

- c. Effect on the construction schedule.
 - d. Cost data comparing the proposed substitution with the product specified.
 - e. Any required license fees or royalties.
 - f. Availability of maintenance service, and source of replacement materials.
3. Engineer shall be the judge of the acceptability of the proposed substitution.
 4. A request for a substitution constitutes a representation that bidder:
 - a. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the product specified.
 - c. Will coordinate the installation of an accepted substitution into the work, and make such other changes as may be required to make the work complete in all respects.
 - d. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

END OF SECTION 01600

SECTION 01700 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Closeout Procedures.
- B. Final Cleaning.
- C. Warranties and Bonds.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.
 - 1. Fiscal provisions, legal submittals, and other administrative requirements.
- B. Section 00600 - Bonds, Certificates and Administrative Forms (AIA Documents), applies to this Section.

1.03 CLOSEOUT PROCEDURES

- A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.
- B. When Contractor considers work has reached final completion, submit written certification that contract documents have been reviewed, work has been inspected, and that work is complete in accordance with contract documents and ready for owner's inspection.
- C. In addition to submittals required by the conditions of the contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted contract sum, previous payments, and sum remaining due.
- D. Owner will issue a final change order reflecting approved adjustments to contract sum not previously made by change order.

1.04 FINAL CLEANING

- A. Execute prior to final inspection.
- B. Remove waste and surplus materials, rubbish, and construction facilities from the project and from the site. Provide final cleaning.

1.05 OPERATION AND MAINTENANCE DATA

- A. Provide data for:
 - 1. Mechanical equipment and controls.
 - 2. Electrical equipment and controls.
- B. Submit three (3) sets prior to final inspection, bound in 8-1/2 x 11 inch (216 x 279 mm) three-ring side binders with durable plastic covers.
- C. Provide a separate volume for each system, with a table of contents and index tabs for each volume.
- D. Part 1: Directory, listing names, addresses, and telephone number of: Suppliers and Contractor.
- E. Part 2: Operation and maintenance instructions, arranged by specification division. For each specification give names, addresses, and telephone number of subcontractors and suppliers. List:
 - 1. Appropriate design criteria.
 - 2. List of equipment.
 - 3. Parts list.
 - 4. Operating instructions.
 - 5. Maintenance instructions, equipment.
 - 6. Maintenance instructions, finishes.
 - 7. Shop Drawings and Product Data.
 - 8. Warranties

1.06 WARRANTIES AND BONDS

- A. Provide duplicate, notarized copies. Execute Contractor's submittals and assemble

documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.

- B. Submit material prior to final application for payment. For equipment put into use with Owner's written permission during construction, submit within seven (7) days after first operation. For items of work delayed materially beyond date of substantial completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of work. Coordinate with owner, deliver to project site and obtain receipt prior to final payment.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01700

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Maintain at the site for the owner one (1) record copy of:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Engineer field orders or written instructions.
 - 6. Approved shop drawings, product data and samples.
 - 7. Field test records.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
- B. File documents and samples in accordance with CSI format.
- C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by owner's representative.

1.03 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in the code designated by owner's representative.

1.04 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress.

1. Do not conceal any work until required information is recorded.
- C. Drawings: Legibly mark to record actual construction:
1. Depths of various elements of foundation in relation to finish first floor datum.
 2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 4. Field changes of dimension and detail.
 5. Changes made by Change Order.
 6. Details not on original contract drawings.
- D. Specifications and Addenda: Legibly mark each Section to record:
1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 2. Changes made by Change Order.
- 1.05 SUBMITTAL
- A. Prior to contract close-out, contractor shall submit record documents as specified for owner's review and acceptance, contractor shall submit a set of reproducible sepias for Owner=s use.
- B. Accompany submittal with transmittal letter in duplicate, containing:
1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Title and number of each record document.
 5. Signature of contractor or his authorized representative.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01720

202547 - REMOVAL AND DISPOSAL OF EXCESS MATERIALS

Description:

This item will consist of removing (i.e. loading and hauling) and disposing of excess materials, including soil, rock and debris, that is excavated from private utility trenches or on-site to an approved disposal site.

Construction Methods:

Upon Award of the Contract, the Contractor shall immediately notify Delaware State University's Contract Administration office in writing of the intended disposal site(s) and the proposed haul routes. DelDOT reserves the right to reject the site(s) and/or the hauling routes. Material hauling will also be governed by the provisions of Subsection 105.12, Load Restrictions, of the Standard Specifications. Upon receiving written approval of the site(s) and hauling routes from DelDOT, the Contractor shall obtain all permits necessary to haul and dispose of the materials and shall submit a copy of same to the District Engineer.

Method of Measurement:

The quantity of excess material removed and disposed of will be measured in cubic yard (meter).

Basis of Payment:

The quantity of excess material removed and disposed of, in excess of contract scope, will be paid for at the Contract unit price per cubic yard (meter) for removal and disposal of excess material. Price shall be full compensation for removing and disposing of the material and all equipment, tools, labor, work and any other items incidental thereto and necessary to complete the work.

END OF SECTION 202547

**302011 - DEL. NO. 3 STONE
302014 - DEL. NO. 8 STONE
302010 - DEL. NO. 2 STONE
302012 - DEL. NO. 57 STONE
302013 - DEL. NO. 67 STONE
302015 - DEL. NO. 10 STONE
302009 - 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.

1/17/01

END OF SECTION 302503

302006 – Graded Aggregate Base Course

Description:

This work consists of furnishing, placing, and compacting graded aggregate base course materials on a prepared subgrade or base.

Materials:

The material used to construct graded aggregate base course shall conform to the requirements of Section 813 and Section 821, Type B.

Construction Methods:

Subgrade Placement:

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

Placement:

1. *Equipment.* The aggregate materials shall be spread uniformly by an approved spreading machine or box in such a manner that no segregation occurs. A conventional motor grader will not be approved for placement of graded aggregate on mainline roadway sections. Where it is not possible to use a spreading machine or box in patching or other tight areas, other approved methods can be used only in such manner that no segregation occurs. Water shall be uniformly applied with an approved sprinkling device. Compaction shall be uniformly attained by approved rollers or compactors. No graded aggregate shall be placed until approved equipment is on the Project site and is operational.
2. *Spreading and Compacting.* Graded aggregate material conforming to the requirements of Section 821 shall be placed in successive layers. Each layer shall be placed in a level, uniform cross-section not to exceed 8" (200 mm) in depth, loose measurement, unless otherwise approved by the Engineer. The material shall be deposited and spread parallel to the centerline, and the layer shall extend to the full width as shown on the Plans. The material shall be handled so that no segregation of fine or coarse particles occurs. No more than 1,000' (300 m) of material, as measured along the roadway

centerline, shall be spread in advance of compaction operations. Each layer shall be properly compacted as specified, before starting the next layer. Water shall be added before the material is compacted. The water shall be applied in a manner that results in a uniform and adequate moisture content. Compaction or rolling shall be performed parallel to the roadway centerline starting at the edges and progressing toward the center. It shall continue until each layer is thoroughly and uniformly compacted to the full width as shown on the Plans. After compacting, all voids in the surface of each layer shall be filled with aggregate meeting the requirements of Section 813, Delaware No. 10. Water shall be applied to the surface and compaction continued. Additional Delaware No. 10 aggregate placement, water application, and compaction shall continue until the layer of base material is well bonded and firm, as determined by the Engineer. In no case shall vehicles be allowed to travel in a single track or to form ruts in the base course. If any sharp irregularities are formed in the subgrade or base course material, the affected area shall be scarified to a depth of 6" (150 mm) and compacted to conform to the requirements of Section 202 or this Section.

3. *Performance.* The moisture content of the base course material at the time of compaction shall be within 2% of the optimum moisture content. If the moisture content is not within 2% of optimum, the material shall either be moistened or dried, as needed, and thoroughly mixed before compaction. Compaction of graded aggregate Type A shall continue until each layer is thoroughly and uniformly compacted into a firm and unyielding surface, to the satisfaction of the Engineer. 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.

The determination of compliance with performance requirements as specified in this Subsection shall be in accordance with the following test methods, as modified by the Department:

1. AASHTO T 99 Method C, Moisture-Density Relationship.
2. AASHTO T 191, Density By Sand Cone.
3. AASHTO T 224, Coarse Particle Correction.
4. AASHTO T 238, Density By Nuclear Methods.
5. AASHTO T 239, Moisture Content By Nuclear Methods.

6. AASHTO T 272 Method C, Moisture-Density Family Of Curves.

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

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

Method of Measurement:

The quantity of graded aggregate base course will be measured by the cubic yard (cubic meter). The volume of cubic yards (cubic meters) will be measured as the number of square yards (square meters) of surface area of graded aggregate base course, placed and accepted, multiplied by the depth shown on the Plans. If the depth of the graded aggregate base course placed and accepted is greater than the depth shown on the Plans, the plan depth will be used to measure the quantity for payment. If the limits of measurement for pay quantities for graded aggregate base course are designated on the Plans, the quantity of graded aggregate base course measured for payment will be the number of square yards (square meters) of surface area multiplied by the depth, placed within the payment lines and grades shown on the Plans. If the limits are not designated on the Plans, or have been changed by the Engineer, in-place dimensions of the accepted graded aggregate base course will be established. The computation of quantity will be made from cross-sections taken after the completion of work under this Section. As an alternate method of measurement, graded aggregate base course will be measured by the ton (metric ton) if so required by the Contract. The weight will be determined according to Subsection 109.01. On jobs paying by the ton (metric ton), the Engineer reserves the right to template areas for payment, through use of a conversion factor supplied by the Department, whenever the Contractor exceeds the limits of base course placement shown on the Plans. Materials placed beyond the designated lines and grades as shown on the Plans or beyond the limits established by the Engineer will not be measured for payment.

Basis of Payment:

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The quantity of graded aggregate base course will be paid for at the Contract unit price per cubic yard (cubic meter) or by the number of tons (metric tons) installed, as required by the Contract for this material. Price and payment will constitute full compensation for preparing, furnishing, placing, and compacting the materials, and for furnishing all labor, equipment, tools, and incidentals required to complete the work. No payment will be made for materials placed beyond the designated lines and grades as shown on the Plans or beyond the limits established by the Engineer.

1/17/01

END OF SECTION 302506

401502 - ASPHALT CEMENT COST ADJUSTMENT

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

The Delaware Posted Asphalt Cement Price will be issued monthly by the Department and will be the industry posted price for Asphalt Cement, F.O.B. Philadelphia, Pennsylvania.

The Project Asphalt Cement Base Price will be the anticipated Delaware Posted Asphalt Cement Price expected to be in effect at the time of receipt of bids.

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

Actual quantity of asphalt cement qualifying for any Asphalt Cement Cost Adjustment will be computed on the basis of weight tickets and asphalt percentage from the approved job mix formula.

For Recycled Hot-Mix the asphalt percentage eligible for cost adjustment shall be only the new asphalt cement added to the mix.

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

The Asphalt cement cost adjustment will be calculated on grade PG 64-22 asphalt regardless of the actual grade of asphalt used. The Project Asphalt Cement Base Price for the project will be **\$595.00** per ton (metric ton) based on June 1, 2013 pricing.

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

NOTE

Application of Asphalt Cement Cost Adjustment requirements as indicated above shall apply only to those contracts involving items related to bituminous base and pavements, and with bitumen, having a total of 1,000 tons (1,000 metric tons) or more of hot-mix bid quantity in case of

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Sections 401, 402 and 403; and 15,000 gallons (60 000 liters) or more in case of Sections 304, 404 and 405.

END OF SECTION 401502

401701 - PATTERNED SYNTHETIC ASPHALT SYSTEM

Description:

This work consists of preparing the application area, supplying and placing system materials, and finishing and texturing the system surface in order to construct inlaid crosswalks with the specified color and texture pattern as shown on the Plans.

Materials:

The system shall involve the use of a colored, hot-applied resin-based synthetic asphalt compound incorporating graded aggregates, reinforced with fibers. All installations within the project shall be constructed of the same system.

The final product shall have strong adhesion to the underlying pavement, and be durable, abrasion resistant, and not requiring re-application of color or other maintenance for the life of the adjacent pavement; the proposed system must have adequate supporting documentation of this expected performance.

The Contractor shall submit industry or manufacturer/supplier technical information available for the material and system proposed for use. This information should include material certifications and installation instructions as appropriate for the proposed system.

Construction Methods:

The system shall be placed only within the Plan designated areas – these areas shall be prepared by milling. The milling shall be to a consistent depth from 0.75 inch (19 mm) to .875 inch (22 mm) below the existing grade; all sides shall be vertical along their full depth. Areas milled below .875 inch (22 mm) inch shall be filled with this material and compacted and cured separately and allowed to cool 1 hour. The surfaces receiving the system shall be free from grease, dirt, loose particles, and any other substance that may reduce the system's ability to adhere to the existing surfaces.

If the Engineer determines that the milled surface elevation changes are safe, the Contractor may open the milled area to traffic. However, any damage to the edges shall be repaired at no additional cost to the Department.

The system may be constructed only when environmental conditions meet the requirements of these specifications, or of the material manufacturer/supplier, whichever is more stringent. The following conditions must be met:

- Air temperature, both current and that forecast throughout the cure time shall be 50F to 90F (10C to 32C).
- There must be no surface moisture, and the chance of precipitation during placement must be less than 50%.

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The system materials shall be proportioned, mixed, heated, and placed as recommended by the manufacturer/supplier, and as approved by the Engineer.

The final texture and pattern of the surface shall conform to the Plan details.

The constructed area shall be closed to traffic until the system has cured, cooled, and gained sufficient strength to resist damage to the system. Cure time shall be a minimum of 1 hour. Any areas of deeper depth caused by over-milling will require a longer cure time.

The distance between a straightedge and the final surface shall not exceed 1/4" in 4' (6 mm in 1.2 m) and 3/8" in 10' (9 mm in 3 m) in any direction. Depth of the imprint shall be from 3/8" to 1/2" (9 mm to 13 mm).

Method of Measurement:

The quantity of patterned synthetic asphalt system acceptably textured and colored will be measured as the actual number of square feet (meters) of synthetic asphalt textured, colored, placed and accepted in conformance with the Plans, Specifications and manufacturer's recommendation.

The Engineer will not measure areas of correction for payment.

Basis of Payment:

The quantity of patterned synthetic asphalt system will be paid for at the Contract unit price per square foot (meter). Price and payment will constitute full compensation for preparing and milling the area; saw cutting of perimeter area; supplying, preparing, placing and finishing the resin compound; and for all labor, equipment, and incidentals required to complete the work.

6/9/05

401801 – WMA Superpave, Type C, 115 Gyration, PG 64-22
Superpave - Warm Mix Asphalt (WMA)

Description:

Warm mix asphalt (WMA) is the generic term used to describe the reduction in production, paving, and compaction temperatures achieved through the application of one of several WMA technologies.

The WMA technologies follow all Superpave specifications for the appropriate mixture except as modified herein.

Materials:

WMA may be produced by one or a combination of several technologies involving plant foaming processes and equipment, mineral additives, or chemicals that allow the reduction of mix production temperatures to within 185°F to 275°F.

Mix Design:

Develop and submit a job mix formula for each mixture according to AASHTO R35. Each mix design shall be capable of being produced, placed, and compacted as specified. Apply all mix design requirements for Superpave HMA to the development of the WMA mix design.

The contractor shall submit a written mix design formula for review and approval at least 30 calendar days before production. The following information shall be submitted:

1. WMA technology and/or additive information.
2. WMA technology manufacturer's recommendation for usage.
3. WMA technology manufacturer's established target rate for water and additives, the acceptable variation for production, and documentation showing the impact of excessive production variation.
4. WMA technology manufacturer's material safety data sheets (MSDS).
5. Documentation of past WMA technology field application including points of contact.
6. Temperature range for mixing and compacting.
7. Asphalt binder performance grade test data over the range of WMA additive percentages proposed for use.
8. Laboratory test data, samples and sources of all mix components, and asphalt binder viscosity-temperature relationships.

The contractor shall follow the manufacturer's recommendation for incorporating additives and WMA technologies into the mix. The contractor shall also comply with the manufacturer's recommendation regarding receiving, storage, and delivery of additives.

Construction:

Production Plants. The contractor shall modify their production plant as required by the manufacturer to introduce the WMA technology. Plant modifications may include additional plant instrumentation, the installation of asphalt binder foaming systems and/or WMA technology delivery systems, tuning the plant burner and adjusting the flights in order to operate at lower production temperatures and/or reduced tonnage.

Weather Limitations. Place WMA only on dry, unfrozen surfaces and only when weather conditions allow for proper production, placement, handling, and compacting. Even with WMA technologies, the ambient paving temperature shall be above freezing.

Hauling Equipment, Pavers, Rollers, Joints, Compaction Requirements, Joints, Surface Tests, Method of Measurement, and Basis of Payment shall be as stated in the appropriate Superpave item with the same pavement type, gyrations, asphalt binder grade, and stone type.

END OF SECTION 401801

406507 - CRACK SEALING

Description:

The work covered by these specifications consists of furnishing all labor, equipment, and materials necessary to perform all operations in connection with the cleaning and sealing of construction joints and random cracks in bituminous concrete surfaces with hot poured asphaltic materials.

Materials:

The sealant shall consist of selected blends of paving grade asphalt and vulcanized granulated crumb rubber. During heating in the melting unit, the asphalt and rubber must react to form a flexible adhesive compound, which when properly applied will effectively seal cracks in either asphalt or concrete pavements. The mixture shall be a blend of paving grade asphalt cement, 21% +/- 2% (by weight of mixture) recycled/reclaimed crumb rubber as shown below and other ingredients necessary to meet the following requirements.

The material furnished under these specifications shall have been tested and found acceptable as determined by the qualification tests in accordance with the requirements under these specifications. A certified copy of the test results shall be submitted to the Materials & Research Laboratory to show that the material is duly qualified.

Physical Requirements:

The specification for asphalt rubber sealants after reaction at 350° F (177° C) for one (1) hour shall be as follows:

Test:

Penetration, Cone, 77° F (25° C); .004 in (1/10 mm), .33 lb (150 g), 5 sec	70 maximum
Softening Point, °F (°C)	150° F (65.6° C) minimum
Resilience, 77° F (25° C); %	30% minimum
Ductility, 39.2° F (4° C); in (cm)	2.8 in (7 cm) minimum
Viscosity at 350° F (177° C); lb/ft-sec (C Poise), ASTM D3236	26.8 - 167.7 lb/ft-s (40 - 250 C Poise)

Unit Weight	8.5 lbs/gal (1.0 kg/l)
Coverage; 1/2" x 1/2" (13 mm x 13 mm) crack	11.0 lbs per 100 ft. (5.0 kg per 30 m)

Mixture Requirements:

The pour point of the mixture shall be at least 20° F (-6.7° C) lower than the safe heating temperature, which is the maximum temperature to which the material mixture may be heated without exceeding the permitted flow.

Asphalt Compatibility:

Requirements of ASTM D3405 shall be met by the sealant as tested in accordance with ASTM D3407.

Safety Precautions:

Asphalt rubber sealants must be non-toxic and contain no carcinogenic materials.

Crumb Rubber:

The recycled/reclaimed crumb rubber used in mixture shall meet the following requirements:

- A. Shall be produced from an ambient grinding process (crushes, tears, grinds, and/or abrades the used rubber at or above ordinary room temperature) which produces rubber particles with a very ragged, sponge-like surface. Cryogenically ground rubbers are prohibited.
- B. Shall contain recycled, vulcanized crumb rubber and/or reclaimed (devulcanized) rubber.
- C. Shall contain no more than a trace of fabric.
- D. Shall be free of wire and other contaminating materials, except that up to 4% calcium carbonate or talc may be included to prevent the rubber particles from sticking together.
- E. Shall have no rubber particles greater than 1/4 inch (6.4 mm) in length.

In addition to the certified copy of the test results, the Contractor shall provide a sample, 2 lbs. (.91 kg) minimum, of the sealant to the Department's Materials and Research Section for approval. Any costs shall be paid by the contractor.

An acceptable manufacturer of the sealant is Crafcro, Inc., or approved equal.

Construction Methods:

The equipment used for heating and applying the sealant shall meet the requirements of the sealant manufacturer. The kettle shall be an oil-jacketed double wall kettle equipped with an agitator and a 2 inch (50 mm) hot asphalt pump. The equipment shall have a pump for circulating the transfer oil bath and thermometers in both the oil bath and melting chamber. The equipment used for application of the sealant material shall be equipped with a volumetric measuring device to measure the quantity of sealant material applied.

The sealant material shall be heated as recommended by the manufacturer.

All construction and random cracks with a crack width greater than 1/4 inch (6.4 mm) are to be sealed in accordance to these specifications. All construction and random cracks with a crack width less than 1/4 inch (6.4 mm) are not to be sealed.

No crack sealant shall be applied in wet cracks or when ambient temperature is below 25° F (-3.9° C), unless a heat lance is utilized to adequately dry the crack.

All cracks shall be cleaned of loose dirt and debris by using compressed air of at least 100 psi (7.03 kg/cm²), measured at the source, prior to sealing. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. Any vegetation shall be removed prior to sealing utilizing a motorized wire brush.

Fill joints and cracks in such a manner to provide a band of 2 inches (50 mm) to 4 inches (100 mm), centered over the joint. The thickness of the material shall be approximately 1/16 inch (1.6 mm) not to exceed 1/8 inch (3.2 mm) above the pavement surface. Material shall be leveled by means of a squeegee or a dish mounted on the delivery wand.

Method of Measurement:

The quantity of sealant material will be measured as the number of linear feet (meters) of sealant material applied which shall be checked immediately prior to application in order to determine the actual linear feet (meters) of cracks injected and accepted.

Basis of Payment:

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The quantity of crack sealant material, in excess of contract scope, will be paid for at the Contract unit price per linear feet (meters). Price and payment will constitute full compensation for cleaning cracks/joints, for furnishing, heating, and applying crack sealant and for all labor, equipment, tools, and incidentals required to complete the work.

NOTE:

Contractors shall have at least five years of experience in applying crack sealants and submit a list of six previous contracts describing owner, contract size, type of sealant, phone number and address of contract, etc. The Bidder must attach information as requested to the back of the Bid Proposal. If the requested information is not provided the bid will be declared non-responsive and will not be considered.

NE - 8/16/02

END OF SECTION 406507

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

Description:

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

Materials and Construction Methods:

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

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

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

Method of Measurement:

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

Basis of Payment:

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

For pipe under 24" (600 mm) nominal inside diameter, the excavation, bedding, backfill and backfilling will be included in the price for this work. For pipe of nominal inside diameter 24" (600 mm

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and over), payment for excavation, bedding, backfill and backfilling will be in accordance with Section 208.

10/31/01

**612519 - CORRUGATED POLYETHYLENE PIPE, TYPE C, 15"
612521 - CORRUGATED POLYETHYLENE PIPE, TYPE C, 12"
612527 - CORRUGATED POLYETHYLENE PIPE, TYPE C, 18"
612528 - CORRUGATED POLYETHYLENE PIPE, TYPE C, 24"**

Description:

The item(s) shall consist of furnishing and installing corrugated polyethylene pipe with a corrugated surface both inside and outside in reasonably close conformity with lines and grades indicated on the plans, and as directed by the Engineer.

Materials:

Pipes, couplings and fittings shall be made of polyethylene compounds; and shall meet all applicable requirements of AASHTO M294 current edition Type C. The pipes and fittings shall be free of foreign inclusions and visible defects and pipe shall be cut squarely and cleanly so as not to adversely affect joining or connecting. Visible defects such as cracks, creases, unpigmented or nonuniformly pigmented pipe are not permissible in the pipe as furnished.

The pipe as noted below shall have minimum pipe stiffness at five percent deflection when tested in accordance with the requirements of ASTM D-2412:

Diameter [Inches (mm)]	Pipe Stiffness [psi (KPa)]
12 (300)	50 (345)
15 (375)	42 (240)
18 (450)	40 (276)
24 (600)	34 (234)

The fittings shall not reduce or impair the overall integrity or function of the pipe line, and shall include in-line joint fittings, such as couplings and reducers, and branch or complimentary assembly fittings such as tees, wyes, and end caps. These fittings may be installed by various approved methods, such as snap-on, screw-on, and wrap around. Fittings produced by the manufacturer's other than the supplier of the pipe shall not be permitted without the approval of the Engineer.

All fittings shall be within an overall length dimensional tolerance ± 0.5 inch (13 mm) of the manufacturer's specified dimensions when measured in accordance with AASHTO M-294 and shall not reduce the inside diameter of the pipe being joined by more than 0.5 inch (13 mm).

Reducer fittings shall not reduce the cross-sectional area of the small size.

Couplings shall be corrugated to match the pipe corrugations and shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joint. Couplings shall be bell and spigot, split collar, or screw-on collar. Split collar couplings shall engage at least two full corrugation

on each pipe section and screw on collars shall be in width at least one-half the nominal diameter of the pipe.

Pipe connections shall not separate to create a gap exceeding 3/16 inch (4.8) when measured in a radial direction between pipe and coupling, or between tongue and groove portions of pipe.

The Engineer may demand a manufacturer's certificate signed by the manufacturer's representation stating the product was manufactured, tested and supplied in accordance with all the applicable requirements of AASHTO M-294.

Construction Methods:

Pipe shall be installed in accordance with the applicable requirements of Section 614 of the Standard Specifications and notes on the plans. Backfill materials, and placement of the material shall conform to the applicable requirements of Section 208 of the Standard Specifications.

Joint shall be made with split couplings, corrugated to match the pipe corrugations; and shall engage a minimum of two full corrugations for on each pipe section at the joint. A neoprene gasket shall be used with the couplings to provide a soil tight joint.

Method of Measurement:

The number of feet of polyethylene pipe to be paid under the item(s) shall be the number of linear feet (meters) of pipe installed in place complete and accepted, measured from end to end of pipe.

Basis of Payment:

The number of linear feet of polyethylene pipe measured and as provided above shall be paid for at the contract unit price per Linear Foot (meter) bid for the item "Corrugated Polyethylene Pipe, Type C" of the diameter size(s) required by this contract, which price and payment shall constitute full compensation for furnishing, hauling and installing as described herein and required at the site, cribbing, shoring, and sheeting, for all labor, tools, equipment and necessary incidentals to complete the work.

For round pipe under 24" (600 mm) nominal inside diameter, the excavation (excluding rock), backfill, and backfilling will be included in the price for this work. For pipe of nominal inside diameter or horizontal dimension of 24" (600 mm) and over, payment for excavation and backfill will be in accordance with Section 208. Furnishing of Borrow Type C for pipe of nominal inside diameter or horizontal dimension of 24" (600 mm) and over, will be paid for under Section 210.

Payment for excavation and replacement of unsuitable material encountered below the flow line of pipe will be provided for under Section 208.

1/3/2012

701505 - PORTLAND CEMENT CONCRETE PARKING BUMPER

Description:

This work consists of furnishing and installing portland cement concrete bumpers in accordance with the details and notes shown on Plans. The locations of installing the parking bumpers shall be in accordance with Plans or will be determined in the field by the Engineer.

Materials and Construction Methods:

Portland cement concrete shall be Class B, and shall conform to the requirements of Section 812, and bar reinforcement shall conform to Section 603 of the Standard Specifications.

Unless specified otherwise on the Plans, each parking bumper shall be anchored with two (2) 18 inch (450 mm) number 13 rebars driven flush with the top of the bumper. Any surface preparation necessary to provide a stable installation of the bumpers will be considered incidental to this item.

Method of Measurement:

The quantity of P.C.C. parking bumpers will be measured as the actual number of bumpers installed and accepted.

Basis of Payment:

The quantity of P.C.C. parking bumpers, in excess of contract scope will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials including, but not limited to, concrete, bar reinforcement, anchor pins, installing the bumper as directed, for all labor, equipment, tools and incidentals to complete the item.

NE - 3/14/02

END OF SECTION 701505

701506 - REMOVE AND RESET P.C.C. PARKING BUMPER

Description:

This work consists of removing and resetting existing portland cement concrete bumpers in accordance with the details and notes shown on Plans. The new locations for resetting the parking bumpers shall be in accordance with Plans or will be determined in the field by the Engineer.

Materials and Construction Methods:

The Contractor shall remove and reset the parking bumpers exercising precaution to avoid damage. If, in the opinion of the Engineer, the parking bumpers are damaged by the Contractor's negligence, the Contractor shall replace the damaged bumpers at his/her expense.

Unless specified otherwise on the Plans, each parking bumper shall be anchored with two (2) 450 mm number 13 rebars driven flush with the top of the bumper. Reuse of existing anchor pins will be permitted if in the opinion of the Engineer their use will provide satisfactory anchorage.

Any surface preparation necessary to provide a stable installation of the bumpers will be considered incidental to this item.

Method of Measurement:

The quantity of P.C.C. parking bumpers removed and reset will be measured as the actual number of bumpers removed, reset and accepted.

Basis of Payment:

The quantity of P.C.C. parking bumpers removed and reset, in excess of contract scope, will be paid for at the Contract unit cost per each. Price and payment will constitute full compensation for removing and resetting the parking bumpers, anchor pins, and for all labor, equipment, tools and incidentals necessary to complete the work.

2/14/00

END OF SECTION 701506

708537 - REMOVE CATCH BASIN

Description:

This work consists of removal and disposal of existing catch basins where specified on the Plans.

Material and Construction Methods:

The existing catch basin shall be removed entirely where specified on the Plans. This may require removal of a portion of pipe connected to the catch basin. The pipe shall be removed to the nearest joint or cut as directed by the Engineer. The existing pipe shall be plugged with concrete where specified on the Plans. The catch basin, including grates and excess pipe, shall be disposed of by the Contractor. The hole where the catch basin was removed shall be backfilled with Type 'C' borrow and compacted in accordance with Section 208.04.

Method of Measurement:

The quantity of catch basins removed will be measured as the actual number of catch basins removed and accepted.

Basis of Payment:

The quantity of catch basins removed will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for removal and disposal of the catch basin, including grates, excavation, backfilling the hole, all materials, including backfill, plugging the existing pipes, and for all labor, equipment, tools and incidentals necessary to complete the item.

6/11/02

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

Description:

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

Materials:

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

Construction Methods:

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

Method of Measurement:

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

Basis of Payment:

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

6/27/01

709518 - SANITARY CLEANOUT

Description:

This item shall consist of furnishing all materials and constructing sanitary cleanouts in accordance with this special provision, as shown on the Plans and as directed by the Engineer.

Materials and Construction Methods:

Materials and construction methods shall conform to the applicable requirements of Section 709 of the Standard Specification, requirements of the utility owner, and the notes and details on the Plans. All materials required for the completion of the sanitary cleanout shall be furnished and installed under this item, including wyes, riser pipes, covers, handholes, elbows, ferrules, plugs, gravel, and concrete for anchors and pads.

Basis of Payment:

The payment for the sanitary cleanout shall be made at the contract unit price bid per Each and constructed and accepted in place in accordance with the Plans and Special Provisions. Price and payment shall constitute full compensation for furnishing and installing all materials, excavation, backfill, backfilling, disposal of surplus materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

8/15/05

710503 - REPAIRING EXISTING CATCH BASINS
710505 - REPAIRING EXISTING MANHOLES

Description:

This work consists of repairing existing catch basins (drainage inlets) and manholes as indicated on the Plans and/or as directed by the Engineer.

Note: Drainage inlets and manholes which require adjusting and repairing shall be paid for under items 710001 and 710002, respectively.

Materials:

Portland Cement Concrete Masonry shall conform to the requirements of Section 812. The composition of the mix shall be determined as defined in Section 812, Class B.

Brick and mortar used in any brick work under these items shall conform with the requirements of Section 611.

Select borrow used under these items as backfill shall conform with the requirements of Section 209, Type G.

Construction Methods:

Drainage inlets and manholes shall be repaired as necessary prior to the paving operations. Frames, grates and covers of drainage inlets and manholes shall be removed and all masonry found to be in poor condition shall be repaired using materials conforming with the original structure. Repairs for drainage inlets shall also include the P.C.C. curb portion of the repaired drainage inlets. Placement (replacement) of steps shall be in accordance with Section 710 of the Standard Specifications.

The materials necessary to be excavated under this Section shall be removed from the site. All such excavations shall be backfilled with select borrow by methods conforming with Section 209.

Drainage inlets and manholes shall be reset to grade and shall be repaired as necessary, including the P.C.C. curb portion of the drainage inlets prior to the paving operation.

Method of Measurement:

The quantity of catch basins (drainage inlets) and manholes repaired to be paid for under these items as applicable shall be the actual number of drainage inlets and manholes completed and accepted. The unit price bid per Each for Section 710 shall constitute full compensation for repairs from the top of grate to 3 feet (1 meter) below. Repairs below 3 feet (1 meter) and not more than 4.5 feet (1.5 meters) shall be paid for at 1.5 times the unit price bid for Section 710. Repairs that are more than 4.5 feet (1.5 meters) below the top of grate shall be paid for at two (2) times the unit price bid for Section 710. In no case, regardless of the depth of repairs shall the payment exceed twice the unit price bid for Section 710.

Included in the bid price for the item shall be the cost of furnishing the material and construction of the P.C.C. curb portion of the drainage inlet.

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Basis of Payment:

The quantity of catch basins (drainage inlets) and manholes repaired, as provided above, shall be paid for at the Contract unit price per Each bid for "Repairing Existing Catch Basins" and/or "Repairing Existing Manholes" as required by the Contract, which price and payment shall constitute full compensation for excavating, removing the grates, covers and portions of structures, furnishing and placing all materials, backfill and backfilling, resetting the grates to proper grades, labor, equipment, tools and incidentals necessary to complete the work.

11/8/01

710511 - REMOVE AND REPLACE EXISTING CATCH BASIN HOOD

Description:

This work consists of the removal of the existing catch basin hood and the construction of a new catch basin hood of Portland Cement Concrete Masonry with reinforcement in close conformity with notes and details on the Plans, the Standard Construction Details directions from the Engineer.

This work may also require repair or replacement of the first course of brick as directed by the Engineer.

Note: Catch basins which require repair beyond the work that is outlined in this Special Provision, shall be paid for under Item 710503.

Materials:

Portland Cement Concrete Masonry shall conform to the requirements of Section 812. The composition of the mix shall be determined as defined in Section 812, Class B.

Brick and mortar used in any brick work under this item shall conform with the requirements of Section 611.

Select borrow used under these items as backfill shall conform with the requirements of Section 209, Type C.

Construction Methods:

The existing catch basin hood shall be removed and reconstructed to conform to the original structure. The frame and grate shall be reset to grade. If directed by the Engineer, the first course of brick shall be repaired or replaced. Included in the repair of the hood is the removal and replacement of the curb to the first joint beyond the hood $\pm 10'$ (± 3 m).

Method of Measurement:

The quantity of catch basin hoods removed and replaced will be measured as the actual number of catch basin hoods completed and accepted.

Basis of Payment:

The quantity of catch basin hoods removed and replaced, will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for excavating, removing and disposing of the existing hood with curb, removal and approved disposal of any unsuitable or surplus excavated material, removing the frame, grates, and portions of the structure as required, furnishing and placing all materials, backfill and backfilling, resetting the frame, grates, covers and portions of the structure with curb as required, labor, equipment, tools and incidentals necessary to complete the work.

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9/25/02

REMOVE AND REPLACE EXIST. CATCH BASIN HOOD

710511-2

**718501 - TRENCH DRAIN, 12" WIDE
718503 - TRENCH DRAIN, 10" WIDE
718505 - TRENCH DRAIN, 30" WIDE
718506 - TRENCH DRAIN, 20" WIDE
718510 - TRENCH DRAIN, 6" WIDE**

Description:

This work consists of furnishing all materials and constructing drain at the location(s) as called for on the Plans, and shall include excavation and backfilling with required material, aggregate base course, concrete with reinforcement, installing trench frames and grates conforming to the details shown on the Plans.

Materials:

Portland Cement Concrete Class B shall conform to the requirements of Section 812 of the Standard Specifications.

Reinforcing bars and wire mesh as called for by the Contract shall conform to the respective requirements of Sections 603, and 824.

Trench drain castings shall be as manufactured by Neenah Foundry Company (Catalog number specified on the Plan), or approved equal. All required hardware shall be of the type as recommended by the manufacturer.

Construction Methods:

The excavation shall be made to the required depth, and the subgrade for the drain shall be compacted to a firm and even surface. Aggregate shall be placed in the excavated trench, and shall be compacted to a firm and unyielding surface to the satisfaction of the Engineer. After placing the concrete and wire reinforcement, the trench frame shall be embedded as shown on the plan and as directed by the Engineer. Curing of concrete shall conform to the applicable requirements of Section 501.

Method of Measurement:

The quantity of trench drain will be measured as the actual number of linear feet (meters) of drain installed in place and accepted, measured from end to end of drain.

Basis of Payment:

The quantity of trench drain will be paid for at the Contract unit price per linear foot (meter) of specified width. Price and payment will constitute full compensation for excavation, aggregates, concrete, bar reinforcement, wire reinforcement, furnishing and installing trench frames, grate(s) and related hardware, backfilling and disposal of surplus and discarded materials, for all labor, equipment, tools and incidental to complete the work.

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1/30/03

TRENCH DRAIN

718501-2

727522 - DECORATIVE FENCE

Description:

This work consists of furnishing all materials and erecting the aluminum decorative fence in accordance with these specifications and as shown on the Plans.

The fencing system shall be Industrial Strength Aluminum Decorative Fence as manufactured by Jerith Manufacturing Company, 3901 G Street, Philadelphia, PA 19124. Telephone number 1-800-344-2242. The fence shall be Jerith Style # 202 with a nominal height of 72". The color of the fence system shall be black.

Or the fencing system may be manufactured by Specrail, P.O. Box 6308, 129 Leader Hill Drive, Hamden, CT 06517. Telephone number 1-800-245-6256. The fence shall be industrial grade, Style # 9-STORRS with a nominal height of 72". The color of the Specrail fence system shall be black.

Or any equivalent manufactured fencing system approved by the Engineer.

Materials:

Aluminum Extrusions: All posts and rails used in the fence system shall be made of 6105T5 in accordance with ASTM B221, or Aluminum alloy having a minimum strength of 35,000 psi (241 MPa) and pickets shall have a minimum strength 15,000 psi (172 MPa).

Fasteners: All screws shall be 302 stainless steel self-drilling head. All screws shall be painted to match the finish of fence.

Accessories: Aluminum castings shall be used for all post caps, brackets, scrolls, finishes and other miscellaneous hardware.

Finish:

Pretreatment: A three stage non-chrome pretreatment shall be applied. The first step shall be a chemical cleaning, followed by a water rinse. The final stage shall be a dry-in-place activator which produces a uniform chemical conversion coating for superior adhesion. Screws shall be plated with zinc dichromate to ensure corrosion resistance.

Coating Fence materials shall be coated with FencCoat, a TGIC polyester powder coat finish system applied by Keith Manufacturing Company. Epoxy powder coatings, baked enamel or acrylic paint finishes are not acceptable. The FencCoat finish shall have a cured film thickness of at least 50 µm. In addition, the screw heads shall be painted to match the color of the fence.

Tests: The cured FencCoat finish shall meet the following: 1) Humidity resistance of 3,000 hours using ASTM D2247. 2) Salt spray resistance of 3,000 hours using ASTM B117. 3) Accelerated

weathering for 1,000 hours under Method 5152 of Federal Test Method 141 shall show no adhesion loss , with only a slight fading, chalking and water staining. 4) Outdoor weathering shall show no adhesion loss, checking or crazing, with only slight fade and chalk when exposed for 3 years in Florida facing south at 45° angle. 5) Minimum hardness of 2H using ASTM D3363.

Non-shrink grout shall be used to fill sleeve. The grout shall have a minimum compressive strength of 5,000 psi (34.5 MPa) at seven days when tested as specified in AASHTO T-106. The non-shrink grout shall have a minimum expansion of 0.0 percent after seven days when tested as specified in AASHTO T-160.

If the Contractor selects any material that differs from the above special provision, the material shall be pre-approved by the Engineer before installation.

Construction:

- 1) During the construction of retaining wall, the 4" (100 mm) diameter steel pipe sleeve at 12" (300 mm) long shall be formed in the top of the wall at spacing of 6' (1.800 m) on center maximum. The inside of the sleeve shall be free of any cement.
- 2) Set fence post in the sleeve at 6' (1.800 m) on center maximum as specified in the Contract drawings.
- 3) Insert stringer ends into pre-punched post and fasten with specified screws.
- 4) Center and align posts, temporarily securing them in place with bracing. Place non-shrink grout around posts. The Contractor shall be responsible for ensuring proper consolidation of the non-shrink grout, and obtaining positive drainage away from the post. Recheck vertical and top alignment of posts, and make necessary corrections.

Method of Measurement:

The quantity of decorative fence will be measured in linear meters of decorative fence installed and accepted. Measurement will be made from center of end post to center of end post.

Basis of Payment:

The quantity of decorative fence will be paid for at the Contract unit price per linear meter. Price and payment will constitute full compensation for furnishing and installing all materials including grout, fittings and hardware and for all labor, equipment, tools and incidentals required to complete the work.

END OF SECTION 727522

**734012 - REFERTILIZATION AND LIMING,
PERMANENT GRASS SEEDING, DRY GROUND
734013 - PERMANENT GRASS SEEDING, DRY GROUND
734015 - PERMANENT GRASS SEEDING, WET GROUND
734016 - PERMANENT GRASS SEEDING, SUBDIVISION
734017 - TEMPORARY GRASS SEEDING, DRY GROUND
734018 - TEMPORARY GRASS SEEDING, WET GROUND
734019 - PERMANENT GRASS SEEDING, WET GROUND
734020 - TEMPORARY GRASS SEEDING, WET GROUND**

Section 734 is modified as follows:

Subsection 734.02 - Soil Supplements

Delete paragraphs (b) through (e) in their entirety and insert the following:

- (b) (1) Permanent Grass Seeding - Dry Ground, Wet Ground and Subdivision;
Temporary Grass Seeding - Dry Ground, Fertilizer Requirements:**
- 70 lbs. Nitrogen (N), 50% by weight of the nitrogen content shall be available from ureaformaldehyde.
- 42 lbs. Available phosphate: Phosphorous pentoxide (P₂O₅) shall be the sum of the water soluble and the citrato- soluble phosphate.
- 28 Lbs. Water soluble potash: Potassium Oxide (K₂O)
- (2) Permanent Crownvetch Seeding:**
- 152 lbs. Nitrogen (N), 100 % by weight of the nitrogen content shall be available from ureaformaldehyde.
- 100 lbs. Available phosphate: phosphorous pentoxide (P₂O₅) shall be the sum of the water soluble and the citrato - soluble phosphate.
- 100 lbs. Water soluble potash: Potassium Oxide (K₂O)
- (c)** Commercial fertilizer shall be furnished in containers plainly marked with the chemical analysis of the product or, if provided in bulk, a certificate guaranteeing the fertilizer analysis must accompany each delivery to the project. No fertilizer shall be used which has not been

marketed in accordance with the state and federal laws.

- (d) The Ureaformaldehyde specified above shall meet the following requirements:

The water insoluble Nitrogen shall be at least sixty percent (60%) of the total nitrogen. The activity index of the water insoluble nitrogen shall be either (1) not less than forty percent (40%) by the American Association of Official Analytical Chemists, International (AOAC) method for Ureaformaldehyde Products or (2) not less than fifty percent (50%) by the AOAC International alkaline permanganate method or (3) eighty percent (80%) by the neutral permanganate method.

- (e) Wood Cellulose fiber. Wood cellulose fiber shall be a processed wood product having uniform fiber characteristics which will remain in uniform suspension in water under agitation and will blend with seed, fertilizer and other additives to form a homogeneous slurry.

The fiber shall perform satisfactorily in hydraulic seeding equipment without clogging or damaging the system. The slurry shall contain a green dye that will provide easy visual inspection for uniformity of application.

Subsection 734.03 - Grass and Agricultural Seeds

Add the following to paragraph (b):

- (3) No Johnsongrass seed (*Sorghum halapense*) or Canada Thistle (*Cirsium arvense*) shall be allowed under the maximum allowable percentage of weed seeds as specified in subsection 734.03 Seeding Chart, in accordance with Section 1, Title 3, Chapter 24 of the Delaware Code.

Delete paragraphs (c) through (e) and last paragraph in their entirety and insert the following seeding chart:

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			Modification Factors for Seeding Rate in Pounds Per Acre				Modification Factors for Seeding Periods		
Species	Max % Weeds Seeds ⁷	Min. % Purity	Germ %	Seeding Rate LBS Per Acre	Seeding Period A: 2/16 to 4/15	Seeding Period B: 4/16 to 8/15	Seeding Period C; 8/16 to 2/15	North District	Central and South Districts
Permanen t Grass Seeding - <u>Dry</u> <u>Ground</u> Hard fescue blend ² (Festuca trachyphylla)	0.15	98	85	100.0	Add 5.0 lb/ac. Redtop (Agrostis alba)	Add 4.0 lb/ac. Korean or Kobe Lezpedeza (Lespedeza stipulacea)	Add 5.0 lb/ac. Redtop (Agrostis alba) +65 lb/ac. Winter Rye (Secale cereale) from 10/15 to 3/1		Add 3.0 lb/ac. Weeping Lovegrass (Eragrostis curvula) during Seeding Period B ⁸
	0.15	98	90	10.0					
	Perennial Ryegrass (Lolium perenne)								
Total Seed Quantity per Acre				110.0	115.0	114.0	180.0		117.0
Permanen t Crownvet ch <u>Seeding</u> Crownvetch (Coronilla varia) variety : Penngift	0.35	99	70 ³	30.0		Add 4.0 lb/ac. Korean or Kobe Lezpedeza (Lespedeza stipulacea)	Add 5.0 lb/ac. Redtop (Agrostis alba) +65 lb/ac. Winter Rye (Secale cereale) from 10/15 to 3/1		
	0.15	95	90	22.0					
	Annual Ryegrass (Lolium multiforum)								
Total Seed Quantity per Acre				52.0		56.0	122.0		
Permanen t Grass Seeding - <u>Wet</u> <u>Ground</u> ⁴ Redtop (<u>Agrostis</u> alba) Creeping Bentgrass (<u>Agrostis</u> palustris)	0.75	95	90	40.0	Add 65 lb/ac. Winter Rye (Secale cereale) from 10/15 to 3/1		Add 65 lb/ac. Winter Rye (Secale cereale) from 10/15 to 3/1		
	0.75	98	90	25.0					
	0.50	98	85	35.0					
	0.50	98	80	25.0					

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			Modification Factors for Seeding Rate in Pounds Per Acre				Modification Factors for Seeding Periods		
Species	Max % Weeds Seeds ⁷	Min. % Purity	Germ %	Seeding Rate LBS Per Acre	Seeding Period A: 2/16 to 4/15	Seeding Period B: 4/16 to 8/15	Seeding Period C; 8/16 to 2/15	North District	Central and South Districts
Sheep Fescue ⁵ (<i>Festuca ovina</i>) Rough - Stalked Bluegrass (<i>Poa trivialis</i>)									
Total Seed Quantity per Acre				125.0	190.0		190.0		
Permanen t Grass Seeding - Subdivisio n	0.15	98	85	100.0				Add 50.0 lb./ac. Kentucky Bluegrass (<i>Poa pratensis</i>) during Seeding Periods A ¹ ,B ¹ and C. ¹	
Hard Fescue blend ² (<i>Festuca trachyphylla</i>)	0.15	98	90	10.0					
Perennial Ryegrass (<i>Lolium perenne</i>)									
Total Seed Quantity per Acre				110.0				160.0	
Temporar y Grass Seeding- Dry Ground	0.15	95	90	40.0	Add 65 lb/ac. Winter Rye (<i>Secale cereale</i>)		Add 65 lb/ac. Winter Rye (<i>Secale cereale</i>) from 10/15 to 2/15		
Annual Ryegrass (<i>Lolium multiflorum</i>)									
Total Seed Quantity per Acre				40.0	105.0		105.0		
Temporar y Grass Seeding-	1.00	90	90	40.0	Add 65 lb/ac. Winter Rye		Add 65 lb/ac. Winter Rye		

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			Modification Factors for Seeding Rate in Pounds Per Acre				Modification Factors for Seeding Periods		
Species	Max % Weeds Seeds ⁷	Min. % Purity	Germ %	Seeding Rate LBS Per Acre	Seeding Period A: 2/16 to 4/15	Seeding Period B: 4/16 to 8/15	Seeding Period C; 8/16 to 2/15	North District	Central and South Districts
Wet <u>Ground</u> ⁶ Annual Barnyard grass/Duck millet (Echinocloa spp.)					(Secale cereale)		(Secale cereale)		
Total Seed Quantity per Acre				40	105.0		105.0		

¹ The seed shall be a blend of certified Bluegrass varieties with no one variety representing more than 25% by weight of the total, at least one variety must be a Mid-Atlantic ecotype.

² Combination of improved certified varieties with SR 3000 representing a minimum of 50% by weight of the total.

³ Germination shall include a total 60% minimum quick germination or normal sprouts plus a minimum of 20% hard seed.

⁴ Permanent seeding - wet ground should be used on saturated or seasonally flooded areas as dictated by defined wetland limits on construction plans.

⁵ Festuca ovina shall be an improved variety of sheep fescue as approved by the Department. Selection should be based on performance within the Mid-Atlantic region as determined by the most current National Turfgrass Evaluation Program Progress Report.

⁶ Wet bare ground, leaf litter covered or partially vegetated retention ponds or flooded sites in general may be seeded with temporary seeding - wet ground, no wood fiber mulch shall be added to the hydro seeder. In addition, no mulching item should be included with this seeding. Unless indicated on the plans, Echinocloa spp. is equivalent to E. muricata, E. crusgalli, or E. Walteri. No fertilizer or limestone shall be applied with this seeding.

⁷ No Johnsongrass seed (Sorghum halapense) or Canada Thistle (Cirsium arvense) shall be allowed under the maximum allowable percentage of weed seeds.

⁸ Add 3.0 lb/ac. Weeping Lovegrass on all slopes 3:1 or steeper and greater than 10' vertically in height throughout the Central and South Districts during all seeding periods to Permanent Grass Seeding - Dry Ground, Permanent Crownvetch Seeding - and Permanent Grass Seeding - Wet Ground.

Subsection 734.04 - Seed Inoculant

Permanent Crownvetch Seeding

Subsection 734.05 – General

Permanent Seeding - Wet Ground and Temporary Grass Seeding - Wet Ground where specified for dry application by the pound shall be seeded through a hand spinner type spreader. Areas specified for this method of application will be remote sites not otherwise accessible with wet application equipment.

Subsection 734.06 - Seeding Flat Areas (4:1 slopes or flatter)

- (a) General: All topsoil placement and grading where specified shall be completed before seeding. This shall apply to the following specified seeding:

Permanent Grass Seeding -Dry Ground, Permanent Grass Seeding - Wet Ground
Permanent Grass Seeding - Subdivisions, Temporary Grass Seeding - Dry Ground, and
Temporary Grass Seeding - Wet Ground.

- (b) Seedbed Preparation for Dry Ground Areas with Topsoil. The area to be seeded shall be thoroughly loosened to a depth of not less than six (6) inches (150mm). The topsoil shall be original surface friable loam topsoil (in accordance with Section 732) of uniform quality free from gravel and stones retained on a two (2) inch (50 mm) sieve, heavy clay, frozen clods, lumps, roots, sticks, and foreign materials harmful to plant growth such as two (2) inch (50mm) or larger fragments of hot-mix, pavement and surface treatment; and if shaped to the prescribed grade, it shall be a satisfactory seedbed and require no further work.

However, when the area to be seeded is partially sodded, barren, weedy, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily removed; and the soil shall then be scarified or otherwise loosened to a depth of not less than 6". Clods and lumps shall be broken. Rubbish, rocks, fragments 2" or larger of hot-mix, concrete, surface treatment, and other extraneous matter shall be removed clear of the site.

No seedbed preparation is required for Wet Ground Applications or Temporary Grass Seeding - Dry Ground

- (c) Quantities of material: The quantity of limestone as specified according to Subsection 734.02 (a) shall be applied at the rate of 3000 pounds per acre (2760 kg/ha). Fertilizer, wood fiber and other required seeding agents shall be applied in accordance with

Subsection 734.0. The quantity of seed applied shall be in accordance with the seeding chart under Subsection 734.03 Grass, and Agricultural Seeds.

- (d) Application equipment: All wet application equipment shall have a tank equipped with an agitation system capable of keeping all the solids in a state of complete suspension at all time during the seeding operation. All dry application equipment to include drop or hopper type spinner spreaders and drills shall require that all seed be blended by the seed supplier and so certified prior to dumping or loading to reduce seed segregation.
- (e) Wet application of lime, fertilizer, wood cellulose fiber, seed, inoculant and any coloring or binding agents:

The Contractor shall apply all ingredients specified for any given seeding operation according to both manufacture's equipment and material specifications and as set forth according to individual seeding requirements as specified under Subsection 734.02.

Permanent Grass Seeding -Dry Ground: Shall be utilized in accordance with Section 734 on all sites not delineated or defined as wetlands that are flatter than 3:1 in grade.

Permanent Grass Seeding -Wet Ground: Shall be utilized in accordance with Section 734 on all sites delineated or defined as wetland on the plans with the exception of dry fill such as stormwater pond embankments and dikes or regraded areas comprised of fill above the original wetland profile. Areas specified for Permanent Grass Seeding-Wet Ground shall not be topsoiled. Permanent dry fill areas above the original wetland profile, as described above, shall be seeded under Permanent Grass Seeding -Dry Ground.

In stormwater management ponds with permanent pools Permanent Grass Seeding - Wet Ground shall be used on the slope between the permanent pool water level and the contour line two (2) feet above the water level. In ponds without permanent pools, this seeding mix shall be applied from the pond bottom to the elevation reached during flood routing one (1.0) inch (25mm) of runoff (water quality extended detention).

Temporary Grass Seeding - Dry Ground: Shall be utilized in accordance with Subsection 734.02 on all sites that represent dry ground areas disturbed during actual construction and/or prior to the establishment of permanent grades as determined by the Engineer in the field.

Temporary Grass Seeding - Wet Ground: Shall be utilized on wet, bare ground, leaf litter covered or partially vegetated retention ponds, traps, basins and all intermittently flooded sites during construction.

- (f) Dry application of lime, fertilizer and seed: Only the ingredients described shall be applied by dry application. All lime, fertilizer and seed shall be applied each as a separate operation when utilizing dry methods of application. Dry application of lime, fertilizer and seed shall apply to all forms of seeding as described according to Subsection 734.06 (e)
- (g) Responsibility for Seeded Areas: The Contractor shall perform all seeding and mulching in accordance with the specifications in the presence of the Engineer. If all work as noted is performed in complete accordance with the specifications to the satisfaction of the Engineer, all seeding and mulching so approved shall be accepted for payment.

The Department retains the right to request that the Contractor reseed any and all areas where a satisfactory stand of grass and/or Crownvetch as determined by the Engineer does not exist at the time of the final inspection. The payment for any and all such reseeding shall be performed at the expense of the Department at the unit price bid for seeding and mulching under the contract.

If reseeding is determined to be necessary by the Engineer, the Contractor shall be required to initiate required work as specified within five (5) working days of a verbal or written request from the Engineer. Any reseeding required when and where it is recorded that the Contractor failed to respond, shall be reseeded at the Contractor's expense.

Subsection 734.07 - Seeding Slopes (3:1 or steeper)

Replace entire subsection with the following:

- (a) General: Permanent Crownvetch Seeding, Permanent Grass Seeding - Dry Ground or Temporary grass Seeding - Dry Ground shall be utilized on areas steeper than 3:1
- (b) Seedbed preparation: All slopes shall be tilled and scarified across the slope, or tracked to prevent gully and sheet erosion to the satisfaction of the Engineer.
- (c) Quantities of material: The quantity of limestone as specified according to Subsection 734.02 (a) shall be applied at the rate of 3000 pounds per acre(2760 kg/ha) for all seeding except Permanent Crownvetch Seeding which shall be applied at a rate of 7500 pounds per acre (6900 kg/ha). Fertilizer, wood cellulose fiber and other required seeding agents shall be applied in accordance with Subsection 734.02. Refertilization and liming when specified for use shall be applied in accordance with Subsection 734.02 (a) and (b)(1).

The quantity of seed applied shall be in accordance with the seeding chart under 734.03

grass, legume and agricultural seed.

- (d) Application equipment: All wet application equipment shall have a tank equipped with an agitation system capable of keeping all the solids in a state of complete suspension at all times during the seeding operation. All dry application equipment to include drop or hopper type spinner spreaders and drills shall require that all seed be blended by the seed supplier and so certified prior to dumping or loading to reduce seed segregation.
- (e) Wet application of lime, fertilizer, wood cellulose fiber, seed, inoculant and any coloring or bindings agents: The Contractor shall apply all ingredients specified for the above described seeding according to both manufacturer's equipment and materials specifications and as set forth according to individual seeding requirements as specified under subsection 734.02.

Permanent Crownvetch Seeding shall be utilized in accordance with Section 734 on all sites 3:1 or steeper such as fill embankments or berms that are not mowable. Areas specified for crownvetch shall not be topsoiled. Landlocked or isolated small areas such as guardrail end terminal slopes shall be seeded with crownvetch rather than other normally specified seeding to facilitate maintenance.

The only exception shall apply to slopes equal to or steeper than 3:1 in urban areas, where at the designer's discretion, Permanent Grass Seeding; Dry Ground may be selected in lieu of Permanent Crownvetch Seeding. In this setting, topsoil will not be required but refertilization and liming shall be required in accordance with Section 734.02 six months from the date of the initial seeding. If this date occurs when the ground is frozen, as determined by the Engineer, refertilization and liming shall be delayed.

Dry application of lime, fertilizer and grass seed shall be as per Subsection 734.06 paragraph (f).

Dry application of lime, fertilizer, crownvetch seed and inoculant: All lime, fertilizer and crownvetch seed shall be applied each as a separate operation when utilizing dry methods of application. Inoculant shall be pre-mixed with the crownvetch seed at triple the normal rate of inoculant in the presence of the Inspector. The inoculant and crownvetch seed must be mixed with an approved wetting or bonding agent.

- (f) Responsibility for Seeded Areas: Shall be as per Subsection 734.06 paragraph (g)

Subsection 734.08 - Method of Measurement

The quantity of a refertilization and the type of seeding as described herein under this Section, shall be measured in square yard of surface area applied.

An exception to this is Permanent Grass Seeding - Wet Ground and Temporary Grass Seeding - Wet Ground when specified for dry application. In this case the items will be measure in total number of pounds of grass seed.

Where units are expressed in total square yards, this value shall be measured on the ground surface of seeded areas.

Subsection 734.09 - Basis of Payment

The quantity of a refertilization and seeding of the types described herein, in excess of contract scope, will be paid for at the Contract unit price bid per square yard. Price and payment will constitute full compensation for preparing the ground, furnishing and placing all materials and for all labor, equipment, tools, and incidentals required to complete the work.

An exception to this is Permanent Grass Seeding - Wet Ground and Temporary Grass Seeding - Wet Ground when bid by the pound. In this case price and payment will constitute full compensation for furnishing and placing all material, and for all labor, equipment, tools, and incidentals required to complete the work.

END OF SECTION 734012

**743526 - TELESCOPING STEEL SIGN POSTS, 9'
743527 - TELESCOPING STEEL SIGN POSTS, 10'
743528 - TELESCOPING STEEL SIGN POSTS, 11'
743529 - TELESCOPING STEEL SIGN POSTS, 12'**

Description:

This work consists of designing, furnishing all materials, fabricating and installing telescoping steel sign posts, including any and all bolts, nuts and hardware, in accordance with these special provisions, the locations, notes and details on the Plans and as directed by the Engineer.

Materials:

The sign posts shall be square tubes formed from Galvanized Sheet Structure (Physical) Quality, ASTM A446, Grade A, Coating designation G90, Regular Spangle or formed from Hot Rolled Carbon Sheet Steel Structural (Physical) Quality, ASTM A570, Grade 30.

Cold rolled steel is to be hot dipped galvanized conforming to the latest revision of ASTM A525, coating designation G90, with regular spangle. The coating shall form an excellent bond with the steel surface so as not to be affected by subsequent forming operations. Exposed edges shall be protected against corrosion by sacrificial action when zinc is present on intimate adjacent areas.

Hot rolled steel, after forming, is to be hot dipped galvanized conforming to the latest revision of AASHTO M 111/M 111M with a minimum coating of 0.90 oz. per square foot (270 gm per square meter) when tested according to ASTM A90. All holes and end openings shall be free of excess amounts of zinc, so as to provide ease of assembly for the various components.

These specifications do not provide for any other alternate coating system/combination, but, is intended to be a hot dipped galvanized zinc coating.

Permissible Tolerances:

(1) Wall thickness shall be $0.1084" \pm 0.008"$ ($2.73 \text{ mm} \pm 0.20 \text{ mm}$). (The thickness includes both the base metal and the galvanized coating).

(2) Nominal Outside Dimensions, inches (millimeters):

$$2 \times 2 \pm 0.088 \text{ (} 51 \times 51 \pm 2.2 \text{)}$$

2 1/4 x 2 1/4 ± 0.010 (57 x 57 ± 2.5)

2 1/2 x 2 1/2 ± 0.010 (63 x 63 ± 2.5)

Measurements for outside dimensions shall be made at least 2" (50 mm) from end of tube.

(3) Convexity and concavity to be measured in the center of the flat sides, tolerances being ± 0.010" (± 0.25 mm) applied to the specific size determined at the corner.

(4) Permissible variation tolerance in straightness is 1/16" in 3 feet (1.7 mm in 1 meter).

(5) Length tolerance on standard length members with holes shall be no more than 2 1/8" (54 mm) longer.

<u>Nominal Outside Dimension, in (mm)</u>	<u>Squareness Tolerance, in (mm)</u>	<u>Twist Permissible in 3 ft, in (1 m, mm)</u>
2 x 2 (51 X 51)	± 0.012 (± 0.30)	0.062 (1.72)
2 1/4 x 2 1/4 (57 X 57)	± 0.014 (± 0.36)	0.062 (1.72)
2 1/2 x 2 1/2 (63 X 63)	± 0.015 (± 0.38)	0.075 (2.08)

Holes:

All four sides are to have evenly spaced 7/16" (11 mm) diameter holes on 1" (25 mm) centers the entire length of the tube.

Tolerance on hole size is ± 1/64" (± 0.4 mm). Tolerance on hole spacing is ± 1/8" in 20 feet (± 3 mm in 6 m).

Fabrication: The furnished members shall be straight and shall have a smooth uniform finish. It shall be possible to telescope consecutive sizes of tubes freely for 9' (2.7 m), 10' (3 m), 11' (3.3 m), and 12' (3.6 m) with a minimum amount of play. All holes and cut off ends shall be free from burrs.

Corner Radii: Standard corner radius shall be 5/32" @ 1/64" (4 mm @ 0.4 mm).

Weld Flash: Weld flash on corner welded square tubing shall permit 9/64" (3.6 mm) radius gauge to be placed in the corner.

Fasteners: The fasteners to be supplied under this specification shall be 5/16" (8 mm) Grade 5 UNC corner bolts with cadmium or zinc plating.

Packaging: Posts shall be securely wired or strapped in bundles containing not more than 2000 lb (900 kg) of posts or anchors of the same length and section weight. The posts shall be nested and fastened in such a manner that they will not slip. Care shall be taken in shipping to minimize the rubbing of posts against each other with resulting damage. Excessive damage to the finish of the posts in shipping will be cause for rejection of the damaged posts as determined by the Engineer.

Special Instructions: The vendor must certify that the posts meet the criteria for yielding sign supports as established by the Federal Highway Administration.

Construction Methods:

Telescoping steel posts shall be driven and erected for location marker signs in accordance with the details on the plans and as directed by the Engineer.

Should it be necessary to field cut a post, the cut end shall be placed below the ground surface. Any parts of steel posts from which galvanizing has been removed down to bare metal shall be regalvanized or painted with paint approved by the Engineer.

Methods of Measurement:

The quantity of telescoping steel sign post will be measured as the number of each size which are installed and accepted.

Basis of Payment:

The quantity of telescoping steel sign post, in excess of contract scope, will be paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing all materials, equipment, labor, excavation, backfill, backfilling, tools, and incidentals necessary to complete the work.

END OF SECTION 743526

746553 - POLE BASE, SPECIAL

Description:

This work consists of furnishing all materials including anchor bolts and constructing pole base(s) in accordance with the notes and details on Plans and as directed by the Engineer.

Materials and Construction Methods:

All materials required for constructing the pole base shall conform to the applicable requirements of Section 746 of the Standard Specifications, the Standard Construction Details, and notes on the Plans.

If size and material requirements for anchor bolts are not shown on the Plans, the Contractor shall submit shop drawings with this information for approval. In general, the anchor bolts with nuts, etc. shall satisfy AASHTO design specifications and meet the requirements of ASTM A687 for studs and ASTM A563 Grade DH for nuts.

Construction method shall be performed in accordance with the applicable requirements of Section 746.

Method of Measurement and Basis of Payment:

Method of Measurement and Basis of Payment will be in accordance with Subsections 746.04 and 746.05 respectively.

1/9/03

- 748506 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 4"**
- ~~748507 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 6"~~
- ~~748508 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"~~
- ~~748509 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"~~
- 748510 - PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT**
- ~~748535 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 4"~~
- ~~748536 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 6"~~
- ~~748537 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 8"~~
- ~~748538 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 10"~~
- ~~748539 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 12"~~
- ~~748540 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 16"~~
- ~~748548 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"~~
- ~~748549 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"~~
- ~~748557 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"~~
- ~~748559 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 5"~~
- ~~748568 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 9"~~
- ~~748569 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 14"~~

Description:

This work consists of striping layout, furnishing and applying white or yellow, epoxy reflectorized pavement markings or black epoxy contrast pavement markings at the locations and in accordance with the patterns indicated on the Plans, or as directed by the Engineer, and in accordance with these specifications.

The white/yellow epoxy marking material shall be hot-applied by spray methods onto bituminous and/or Portland cement concrete pavement surfaces as required by the Plans. Following an application of double drop glass beads of two sizes and upon curing, the resultant epoxy marking shall be an adherent reflectorized stripe of the specified thickness and width that is capable of resisting deformation by traffic. All marking materials shall be certified lead free and free of cadmium, mercury, hexvalent chromium, and other toxic heavy metals.

The black epoxy marking shall be a two-component, hot-spray applied epoxy resin pavement marking material to be used for pavement marking on Portland cement concrete pavement surfaces. Following an aggregate drop, and upon curing, it shall produce an adherent stripe of specified thickness and width capable of resisting wear from traffic. Black contrast pavement markings will be required on all Portland cement concrete pavements.

Materials Requirements:

A. White and Yellow Reflectorized Epoxy

1. Epoxy Composition Requirements:

The epoxy resin composition shall be specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures. The type and amounts of epoxy resins and curing agents shall be at the option of the manufacturer, providing the other composition and physical requirements of this specification are met.

The epoxy marking material shall be a two-component (Part A and Part B), 100% solids type system formulated and designed to provide a simple volumetric mixing ratio (e.g. two volumes of Part A to one volume of Part B).

Component A of both white and yellow shall conform to the following requirements:

% BY WEIGHT		
	WHITE:	YELLOW:
Pigments	Titanium Dioxide - 18% Min. (ASTM D476, Type II)	Organic Yellow - 6%-10%
Epoxy Resin	75% Min., 82% Max.	70% Min., 77% Max.

The entire pigment composition shall consist of either titanium dioxide and/or organic yellow pigment. No extender pigments are permitted. The white pigment upon analysis, shall contain a minimum of 16.5% TiO₂ (100% purity).

Epoxy Content-WPE (Component A) - The epoxy content of the epoxy resin will be tested in accordance with ASTM D1652 and calculated as the weight per epoxy equivalent (WPE) for both white and yellow. The epoxy content will be determined on a pigment free basis. The epoxy content (WPE) shall meet a target value provided by the manufacturer and approved by the Department's Material and Research Section (from now on will be addressed as Department). A ± 50 tolerance will be applied to the target value to establish the acceptance range.

Amine Value (Component B) - The amine value of the curing agent shall be tested in accordance with ASTM D2074-66 to determine its total amine value. The total amine value shall meet a target value provided by the manufacturer and approved by the Department. A ± 50 tolerance will be applied to the target value to establish the acceptance range.

Toxicity - Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property.

Viscosity - Formulations of each component shall be such that the viscosity of both components shall coincide (within 10%) at a recommended spray application.

2. Physical Properties of Mixed Composition:

Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73 ± 5F. (23 ± 3C).

- a. Color. The white epoxy composition when applied at a minimum wet film thickness of 20±1 mils (500 µm) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

The yellow epoxy composition when applied at a minimum wet film thickness of 20±1 mils (500 µm) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

- b. Directional Reflectance. The white epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 84% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

The yellow epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 55% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

- c. Drying Time (Laboratory). The epoxy composition, when mixed in the proper ratio and applied at a 20±1 mils (500 µm) minimum wet film thickness, and immediately dressed with large reflective glass spheres (Federal Spec. Type 4) at a rate of 12 lb/gal (1.4 kg/l) of epoxy pavement marking materials, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 lb/gal (1.4 kg/L) of epoxy pavement marking material, shall exhibit a no-track condition in 15 minutes or less (ASTM D711). A Bird Applicator or any other doctor blade shall be used to produce a uniform film thickness.

- d. Drying Time (Field). When installed at a minimum wet film thickness of 20±1 mils (500 or 625 um) and reflectorized with glass spheres, the maximum drying times shall correspond to these temperatures:

80F (27C)	10 minutes
70F (21C)	10 minutes
60F (16C)	15 minutes
50F (10C)	25 minutes
40F (4C)	45 minutes
35F (2C)	60 minutes

The composition shall dry to "no-tracking" in approximately 10 minutes, and after thirty (30) minutes shall show no damaging effect from traffic. Dry to "no-tracking" shall be considered as the condition where no visual deposition of the epoxy marking to the pavement surface is observed when viewed from a distance of 100 feet (30 meters), after a passenger car is passed over the line. Regardless of the temperature at the time of installation, the installation contractor shall be responsible for protection of the markings material until dry to a non-tracking state.

- e. Abrasion Resistance. The wear index of the composition shall not exceed 82 when tested in accordance with ASTM C501 using a CS-17 wheel and under a load of 1000 grams for 1000 cycles.
- f. Tensile Strength. The tensile strength of the epoxy composition shall not be less than 6000 psi (41 MPa) when tested in accordance with ASTM D638 using a Type IV specimen [0.125" \pm 0.010" (3.18 \pm 0.25 mm) thick]. Tests shall be conducted at an ambient temperature of 75 \pm 5F (24 \pm 3C). The testing machine shall operate at a speed of 0.20" (5.1 mm) per minute.

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing, shall not be less than 24 hours nor more than 96 hours.

Test specimens for tensile strength determination will be prepared as follows:

A 1/8 inch (3 mm) thick sheet of epoxy material is cast from a reservoir-type mold, fabricated from polytetrafluorethylene (PTFE), 1/8" deep x 10" x 10" (3 mm deep x 250 mm x 250 mm).

Prior to casting, the mold is sprayed with a suitable release agent. A sufficient amount of epoxy composition is mixed in the proper proportions (A:B) and poured level with the top of the mold. Care should be taken so as not to decrease or exceed the 1/8" (3 mm) thickness.

After a period of 1 to 4 hours, the material will have set into a semi-rigid sheet that is flexible enough to die-cut yet rigid enough to retain its shape. While the material is in this "plastic" state, five (5) specimens shall be die-cut and then placed on a flat, smooth, PTFE surface for the completion of the specified conditioning period.

- g. Compressive Strength. The compressive strength of the epoxy composition shall not be less than 12,000 psi (83 MPa) when tested in accordance with ASTM D695 except that a compression tool shall not be necessary. The test specimen shall be a right cylinder [0.50 inch diameter by 1.0 inch length (12 mm diameter by 25 mm length)]. Tests shall be conducted at an ambient temperature of 75 \pm 5F (24 \pm 3C).

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing shall not be less than 24 hours nor more than 96 hours.

Test specimens for compressive strength determinations will be prepared as follows:

Five molds will be prepared from 1/2" (12 mm) I.D., 1/16" (1.5 mm) wall thickness acrylic tubing, cut in 1 1/2" (38 mm) lengths. After spraying the inside of the mold with a suitable release agent,⁽¹⁾ the cylindrical tubes are placed in a vertical position on a PTFE sheet base. A sufficient amount of epoxy composition is thoroughly mixed in the proper proportions (A:B) and poured into the mold to a depth of approximately 1 1/4" (32 mm). After a minimum of 72 hours curing, the specimens are removed from the molds and machined to a length of 1" ± 0.002" (25 mm ± 0.05 mm).

- h. Hardness. The epoxy composition when tested in accordance with ASTM D2240 shall have a Shore D hardness of between 75 and 100. Samples shall be allowed to dry for not less than 24 hours nor more than 96 hours prior to testing.

B. Reflective Glass Spheres/Beads

Reflective glass spheres for drop-on application shall conform to the following requirements:

The glass spheres shall be colorless; clean; transparent; free from milky or excessive air bubbles; and essentially clean from-surface scarring or scratching. They shall be spherical in shape and at least 80% of the glass beads shall be true spheres when tested in accordance with ASTM D1155. At least 80% of the Type IV beads shall be true spheres as measured by the visual method.

The refractive index of the spheres shall be a minimum of 1.50 as determined by the liquid immersion method at 77F (25°C).

The silica content of the glass spheres shall not be less than 60%.

The crushing resistance of the spheres shall be as follows: A 40 lb. (18 kg) dead weight, for 20 to 30 (850 µm to 600 µm) mesh spheres shall be the average resistance when tested in accordance with ASTM D1213.

The glass spheres shall have the following grading when tested in accordance with ASTM D1214.

<u>M247 AASHTO Type 1 Glass Spheres</u>		
<u>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>

#20 (850µm)	0	100
#30 (600µm)	5-25	75-95
#50 (300µm)	40-65	15-35
#100 (150µm)	15-35	0-5
Pan	0-5	

Type 4 Large Spheres

U.S. Standard Sieve

	<u>% Retained</u>	<u>% Passing</u>
#10 (2000 µm)	0	100
#12 (1680 µm)	0-5	95-100
#14 (1410 µm)	5-20	80-95
#16 (1190 µm)	40-80	10-40
#18 (1000 µm)	10-40	0-5
#20 (850 µm)	0-5	0-2
Pan	0-2	

The AASHTO M247 Type 1 glass spheres shall be treated with a moisture-proof coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The moisture-resistance of the glass spheres shall be determined in accordance with AASHTO M247 test method 4.4.1.

Type IV glass spheres shall be treated with an adhesion coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The adhesion coating property of the Type IV beads shall be tested in accordance with the dansyl-chloride test.

C. Black Epoxy Contrast Markings

Epoxy Resin Requirements: The two-component, 100% solids, paint shall be formulated and designed to provide a simple volumetric mixing ratio (e.g. 2 part component A to 1 part component B) specifically for service as a hot-spray applied binder for black aggregate in such a manner as to produce maximum adhesion. The material shall be composed of epoxy resins and pigments only.

The paint shall be well mixed in the manufacturing process and shall be free from defects and imperfections that may adversely affect the serviceability of the finished product. The paint shall not thicken, curdle, gel, settle excessively, or otherwise display any objectionable properties after storage. Individual components shall not require mixing prior to use when stored for a maximum of 6 months.

The overall paint composition shall be left to the discretion of the manufacturer, but shall meet the following requirements:

Composition:	<u>Component</u>	<u>Percent By Weight</u>
	Carbon Black (ASTM D476 Type III)	7±2 percent, by weight
	Talc	14±2 percent, by weight
	Epoxy Resin	79±4 percent, by weight

D. Black Aggregate

The moisture resistant aggregate shall meet the gradation requirements (AASHTO T27) as follows:

<u>Sieve Size</u>	<u>Percent Retained</u>
#30	18-28%
#40	60-80%
#50	2-14%

The moisture resistant aggregate shall have a ceramic coating. The aggregate shall be angular with no dry dispensement pigment allowed.

<u>Hardness:</u>	The black aggregate hardness shall be 6.5-7 on Moh's Mineral Scale.
<u>Porosity:</u>	The black aggregate porosity shall be less than two (2) percent.
<u>Moisture Content:</u>	The black aggregate moisture content shall be less than a half (.5) percent.

E. Packaging and Shipment

Epoxy pavement marking materials shall be shipped to the job site in strong substantial containers. Individual containers shall be plainly marked with the following information:

- a. Name of Product
- b. Lot Number
- c. Batch Number
- d. Test Number
- e. Date of Manufacture
- f. Date of expiration of acceptance (12 months from date of manufacture)
- g. The statement (as appropriate)
Part A - Contains Pigment & Epoxy Resin
Part B - Contains Catalyst
- h. Quantity
- i. Mixing proportions, Application Temperature and Instructions
- j. Safety Information

k. Manufacturer's Name and Address

Reflective glass spheres shall be shipped in moisture resistant bags. Each bag shall be marked with the name and address of the manufacturer and the name and net weight of the material.

F. The Department reserves the right to randomly take a one-quart sample of white, yellow and hardener, of the epoxy material or glass spheres without prior notice for testing to ensure the epoxy material meets specifications.

Epoxy Application Equipment:

Application equipment for the placement of epoxy reflectorized pavement markings shall be approved by the Department, prior to the start of work.

At any time throughout the duration of the project, the Contractor shall provide free access to his epoxy application equipment for inspection by the Engineer or his authorized representative.

In general, the application equipment shall be a mobile, truck mounted and self contained pavement marking machine, specifically designed to apply epoxy resin materials and reflective glass spheres in continuous and skip-line patterns. The application equipment shall be maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. In addition, the truck mounted unit shall be provided with accessories to allow for the marking of legends, symbols, crosswalks, and other special patterns.

The Engineer may approve the use of a portable applicator in lieu of truck mounted accessories, for use in applying special markings only, provided such equipment can demonstrate satisfactory application of reflectorized epoxy markings in accordance with these specifications.

The applicator shall be capable of installing up to 20,000 lineal feet (6,100 lineal meters) of epoxy reflectorized pavement markings in an 8-hour day and shall include the following features:

1. The applicator shall provide individual material reservoirs, or space, for the storage of Part A and Part B of the epoxy resin composition; for the storage of water; and for the storage of reflective glass spheres.
2. The applicator shall be equipped with heating equipment of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application and for heating water to a temperature of approximately 140F (60C).
3. The glass spheres shall be gravity dropped upon 20 mils (500 um) of epoxy pavement markings to produce a wet-night-reflective pavement marking. The large spheres (Federal Spec. Type 4) shall be applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO

M-247 Type 1 glass spheres applied rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. This application rate and the following gradation shall conform to FHWA's FP-96: Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (pages 757-761 Type 3 and Type 4 Beads).

4. The applicator shall be equipped with metering devices or pressure gauges, on the proportioning pumps. Metering devices or pressure gauges shall be visible to the Engineer.
5. The applicator shall be equipped with all the necessary spray equipment, mixers, compressors, and other appurtenances to allow for the placement of epoxy reflectorized pavement markings in a simultaneous sequence of operations as described below in Construction Details, D. Applications of Epoxy Reflectorized Pavement Markings of this Special Provisions.

Construction Details.

- A. General: All pavement marking and patterns shall be placed as shown on the Plans or as directed by the Engineer.

Before any pavement markings work is begun, a schedule of operations shall be submitted for the approval of the Engineer. This schedule shall be submitted 2 weeks prior to the application of the striping.

At least five (5) days prior to starting striping the Contractor shall provide the Engineer with the epoxy manufacturer's written instructions for use. These instructions shall include but not be limited to: mixing ratios, application temperatures, and recommendations for use of water spray.

The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of traffic flow shall not be allowed.

The Contractor shall be responsible for removing, to the satisfaction of the Engineer, tracking marks, spilled epoxy or epoxy markings applied in unauthorized areas.

The hot water spray shall not be used in conjunction with markings applications on any pavement surface, or on any existing durable type marking, unless specifically recommended by the manufacturer of the epoxy material.

- B. Atmospheric Conditions: Epoxy pavement markings shall only be applied during conditions of dry weather and on substantially dry pavement surfaces. At the time of installation the pavement surface temperature shall be a minimum of 35F (2C) and the ambient temperature shall be a minimum of 35F (2C) and rising. The Engineer shall be the sole determiner as to when atmospheric conditions and pavement surface conditions are such to produce satisfactory results.
- C. Surface Preparations: The Contractor shall clean the pavement or existing durable marking to the

satisfaction of the Engineer.

Surface cleaning and preparation work shall be performed only in the area of the epoxy markings application.

At the time of application all pavement surfaces and existing durable markings shall be free of oil, dirt, dust, grease and similar foreign materials. The cost of cleaning these contaminants shall be included in the bid price of this item. Also, the item shall include the cost of removal of the curing component in the area of the epoxy markings application, if concrete curing compounds on new portland cement concrete surfaces have been used. Waterblasting will not be permitted for removal.

- D. Application of White/Yellow Epoxy Reflectorized Pavement Markings: White/yellow epoxy reflectorized pavement markings shall be placed at the widths and patterns designated on the Contract Plans.

Markings operations shall not begin until applicable surface preparation work is completed, and approved by the Engineer.

White/yellow epoxy pavement markings shall be applied at a minimum uniform thickness of 20 mils (500 μm) on all Portland cement concrete and bituminous concrete pavement, including Stone Matrix Asphalt.

Large reflective glass spheres (Federal Spec. Type 4) shall be applied at the rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. Glass spheres shall uniformly cover the length and width of the pavement marking.

- E. Application of Black Epoxy Contrast Pavement Markings: Black epoxy contrast pavement markings shall be placed at the widths designated on the Contract Plans.

Markings operations shall not begin until applicable surface preparation work is completed, and approved by the Engineer.

Black epoxy contrast pavement markings shall be applied at a minimum uniform thickness of 20 mils (500 μm) on all Portland cement concrete surfaces followed by a single drop of graded black aggregate.

The width of black epoxy line shall be applied for the following situations:

Center Skip Line - On Portland cement concrete pavements a black contrast skip line shall be 10 feet (3 m) in length of the same width as the white epoxy reflectorized skip. It is to lead the white skip and stop at the beginning of the white skip. The black contrast skip is to have a single application of graded black aggregate.

Edge Lines - All edge lines on Portland cement concrete pavements shall have a base of black contrast markings which is 4 inches (100 mm) wider than the reflective white or yellow marking. The black contrast marking is to be applied first with a single drop of graded black aggregate. Once it has cured sufficiently so as not to track, the reflectorized white or yellow line is to be applied on top of it. The reflective line is to be centered along the black contrast line such that a minimum of 2 inches (50 mm) of black contrast marking is visible on either side of the reflective marking.

- F. Defective Epoxy Pavement Markings: Epoxy reflectorized pavement markings, which after application and curing are determined by the Engineer to be defective and not in conformance with this specification, shall be repaired. Repair of defective markings shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Engineer as follows:

1. Insufficient film thickness [(less than 20±1 mils (500 µm) as applicable] and line widths; insufficient glass bead coverage or inadequate glass bead retention.

Repair Method: Prepare the surface of the defective epoxy marking by shot blasting, sand blasting, or water blasting. No other cleaning methods will be allowed. Surface preparation shall be performed to the extent that a substantial amount of the reflective glass spheres are removed and a roughened epoxy marking surface remains.

Immediately after surface preparation remove loose particles and foreign debris by brooming or blasting with compressed air.

Repair shall be made by re-striping over the cleaned surface, in accordance with the requirements of this specification and at a full 20±1 mils (500 µm) minimum line thickness as applicable.

2. Uncured or discolored epoxy (brown patches); insufficient bond to pavement surface (or existing durable marking).

Uncured epoxy shall be defined as applied material that fails to cure (dry) in accordance with the requirements of this specification under MATERIALS, A, 2d. DRYING TIME (FIELD); or applied material that fails to cure (dry) within a reasonable time period under actual field conditions, as defined by the Engineer.

Discoloration (brown patches) shall be defined as localized areas or patches of brown or grayish colored epoxy marking material. These areas often occur in a cyclic pattern and also, often are not visible until several days or weeks after markings are applied.

Repair Method: The defective epoxy marking shall be completely removed and cleaned to the underlying pavement surface to the satisfaction of the Engineer.

The extent of removal shall be the defective area plus any adjacent epoxy pavement

marking material extending one foot (300 mm) any direction.

After surface preparation work is complete, repair shall be made by re-applying epoxy over the cleaned pavement surface in accordance with the requirements of this specification.

3. Reflectivity for epoxy resin paint.

After satisfactory completion of all striping work and written notification from the Contractor, the Department shall test the striping to ensure it has the minimum reflectivity. The testing will be completed within 30 calendar days from notification. The Contractor may request that tests be conducted on completed phases or portions of the work. Approval of such a request will be at the discretion of the Engineer. Testing will be done using a LTL-X Retrometer (30 meter geometry). Five readings will be taken per line per mile (1.6 km). Projects less than 1 mile (1.6 km) in length will have a minimum of 5 readings per line. These readings will then be averaged for the overall project average.

The required average minimum initial reflectivity reading in millicandellas shall be:

White 450
Yellow 325

Any single reading shall not be less than 350 millicandellas for white and 250 millicandellas for yellow. Without exception, any pavement markings installed that does not meet the above average minimum initial reflectivity numbers shall be removed and replaced, at the installation contractor's expense.

Other defects not noted above, but determined by the Engineer to need repair, shall be repaired or replaced as directed by and to the satisfaction of the Engineer.

All work in conjunction with the repair or replacement of defective epoxy reflectorized pavement markings shall be performed by the Contractor at no additional cost to the State.

Method of Measurement:

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) will be measured by the number of linear feet (meters) of pavement striping line and number of square feet (meter) of symbol installed on the pavement and accepted in accordance with the Plans.

Basis of Payment:

The quantity of permanent pavement striping (white, yellow, or black epoxy resin paint) payment will be paid for at the Contract unit price per linear foot (meter) for 3", 4", 5", 6", 8", 9", 10", 12", 14", 16"

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(75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 225 mm, 250 mm, 300 mm, 350 mm, or 400 mm) line and the Contract unit price per square foot (meter) of symbol. The quantity of permanent pavement marking (white, yellow, or black epoxy resin paint) will be paid for at the Contract unit price per linear foot (meter) of line and the Contract unit price per square foot (meter) of symbol. Price and payment shall include striping layout, cleaning and preparing the pavement surface, and placing all materials, for all labor, tools, equipment and incidentals necessary to complete the work.

NOTE:

For information only:

The following manufacturers are known to us which manufacturer Epoxy Resin Paint for Pavement Striping. The Department does not endorse or require the use of any of the manufacturers listed below. However, a bidder wishes to use another manufacturer's product, it shall be submitted for review and approval prior to submitting a bid proposal. Should the product be deemed unacceptable by the Department, the successful bidder will be required to use only an approved product.

1. POLY CARB, Inc.
33095 Bainbridge Road
Solon, Ohio 44139
Tel. 1-800-CALLMIX
2. IPS - Ennis Paint
P.O. Box 13582
Research Triangle Park, North Carolina 27709
Tel. 1-877-477-7623
3. Epoplex
One Park Avenue
Maple Shade, NJ 08052
Tel. 1-800-822-6920
4. Or an approved equal.

2/14/12

749500 - SIGN PANEL

Description:

This work consists of furnishing all materials, fabrication, and erection of new sheet aluminum or extruded aluminum sign panels, complete with demountable copy, connections to supports, and other incidentals as are shown on the Plans, or described in the special provisions.

The item shall also include removing and transporting of the existing sign panels before fabricating and erecting new sign panels, if such requirement is specified on the Plans.

Design:

Sign panels and their connections to supports shall be designed for applicable loadings and allowable stresses specified for supports. All panels, stiffeners and subframing shall conform with any pertinent requirements set forth in the 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals" with subsequent revisions. No method of stiffening will be allowed which would require rivets, bolts, screws, or nuts perforating the message face. The Contractor shall submit detail drawings showing the details for fabrications of the panels and support connections for prior approval.

Sheet Aluminum:

Sign panel sections shall be fabricated of standard width, readily available, aluminum sheets not less than 3'-0" (0.9 m) wide and not more than 5'-6" (1.7 m) wide, except that not more than one sheet of 2'-0" (0.6 m) minimum width will be permitted.

Sections 12' (3.6 m) and under: Sign panel sections including those over 12' (3.6 m) in height shall run from the top edge to the bottom edge of the sign face without horizontal joints in the aluminum sheets.

Sections 12' (3.6 m) and Over: Sign panel sections over 12' (3.6 m) in height shall be fabricated of two or more sheets with horizontal joints which butt and fasten securely together and may be disassembled for simplified handling and erection in the field. Each horizontal joint in sign panel sheets shall be located at point of contraflexure in the sign face.

Fasteners and Backing Strips: Sign panel sections shall be provided with suitable fastenings, as shown on the Plans, to permit easy attachment to the supporting frames and these fastenings shall be so designed as to carry the full design load with a factor of safety of 1.6 against the minimum yield stress of the materials.

Sign panel sections shall be provided with backing strips at the joints, held firmly in place to keep the abutting panel sections in proper alignment. All sign panel fastenings and backing strips, excepting the fastening of letters, symbols and border to the sign face, shall be applied without causing visible projections or indentations on the sign face. Each sign panel section shall be designed to engage and hang from two or more horizontal structural members of the supporting frame. The method of fastening to obtain secure close butt joints between panels may vary as recommended by the fabricator. Shop drawings will be required showing proposed method of attachment for approval of the Engineer.

Supporting Frame: The supporting sign frame shall consist of horizontal and vertical stringers as shown on the Plans. The horizontal members of the supporting sign frame shall be fabricated of new material in one piece. Where large signs necessitate splicing the stringers, such splices shall be located at points of contraflexure and shall be held to a minimum, but splice must develop full section of member.

Extruded Aluminum:

Extruded aluminum sign panels shall have demountable copy. After installation of the signs is completed, they will be inspected. If specular reflection is apparent on any sign, its positioning shall be adjusted by the Contractor, as directed by the Engineer.

Sign Panel Size: Sizes of sign panels having demountable copy have been based on the 3M Company spacing charts. All letters shall be placed in accordance with manufacturer's spacing charts. Overall horizontal and vertical dimensions shall be in 6" (150 mm) increments.

Materials:

The sign sheeting shall be wide angle, prismatic, retroreflective sheeting. The coefficients of retroreflection, R_A , shall not be less than the minimum values specified in the following table when tested in accordance with ASTM E 810 except that the angle of rotation shall be as specified:

Minimum Coefficient of Retroreflection R_A
(Candelas per lux per square meter)

Observation Angle?	Entrance Angle?	White	Yellow	Blue	Green
0.20	-4	430	350	20	45
0.33	-4	300	250	15	33

Observation Angle?	Entrance Angle?	White	Yellow	Blue	Green
0.20	-4	430	350	20	45
0.50	-4	250	200	10	25
1.00	-4	80	65	4	10
0.20	30	235	190	11	24
0.33	30	150	130	7	18
0.50	30	170	140	7	19
1.00	30	50	40	2.5	5
0.20	40*	150	125	6	15
0.33	40*	85	75	4	8
0.50	40*	35	30	1.5	3.5
1.00	40*	20	17	0.7	2.0

*To be measured at 90° rotation

Sheet Aluminum:

Sign panels shall be of the aluminum sheet type conforming to ASTM Designation B209 (alloy 6061-T6 or 5052-H38). The minimum panel sheet thickness shall be 0.125" (3.2 mm). Stringers or horizontal structural sign supporting members and vertical connections shall be fabricated of 6061-T6 or 6062-T6 ASTM B221 aluminum alloy. All sign panels shall be fully reflectorized unless otherwise indicated on the Plans.

Where aluminum studs welded to the sign sheet material are shown on the Plans, stud material shall be ASTM B316 aluminum alloy 1100-H18 welded to the sign sheets by the capacitor discharge method. All sign hardware shall be stainless steel or galvanized steel or 2024-T4 aluminum alloy ASTM B211 or ASTM B221. Hardware for attachment to overhead members shall be Type 304 passivated stainless steel, except that stainless steel lockwashers shall be Type 302 stainless steel alloy. Steelshapes for Connection to the sign support structure shall conform to the requirements of ASTM AASHTO M270 Grade 36 (Grade 250) and galvanized to the requirements of ASTM Designation A123.

Extruded Aluminum:

Extruded Aluminum Sign Panels and Edge Strip. Extruded aluminum sign panels and edge strip shall conform to B221, alloy 6063 T6.

Hardware: hardware shall be clear anodized, conforming to one of the following: B209, alloy 2024 T4; B211, alloy 2024 T4, 6262 T9, 6061 T6, 7075 T6 or 2017 T4.

Sheet and Extruded Aluminum:

The front faces of the sign panels shall be degreased by one of the following methods:

1. Vapor degreasing by total immersion in a saturated vapor of trichlorethylene or perchloroethylene. Trademark printing shall be removed with lacquer thinner or by a controlled alkaline cleaning system.
2. Alkaline degreasing by total immersion in a tank containing alkaline solutions controlled and titrated to the solution manufacturer's specification. Rinse thoroughly with clean running water.

Immersion time shall depend upon the amount of grease or dirt present and the gage of the metal, and shall be sufficient to effect complete removal of all corrosion, white rust, and dirt.

Following degreasing, the front faces shall be etched by one of the following methods:

1. Acid etching in a 6 to 8 percent phosphoric acid solution at 100°F (38°C), or proprietary acid etching solution. Rinse thoroughly with cold, then hot running water.
2. Alkaline etching in an approved alkaline etching material that is controlled by titration. The etching time, temperature, and concentration shall be as specified by the solution manufacturer. Smut shall be removed with an acidic chromium compound type solution as specified by the solution manufacturer, and shall be rinsed thoroughly with clean running water.

The surface etch shall provide a clean mat, or non-glare finish, suitable for the application of the retroreflective sheeting. This finish shall also be suitable for the uncovered reverse sides of the signs. Any protective film or coating applied to resulting from chemical action on the aluminum surface shall be light, tight, and free from all powdery residue.

As an alternate to the above etching systems, any one of the following metal preparation systems, employing a chemical conversions coating, may be used providing it complies fully with the recommendations and specifications furnished by the respective preparation manufacturer:

1. "Alodine" 1200 or 1200S, by Amchem Products, Inc.
2. "Bonderite" 723 with Process Specification No. 249, by Parker Rust Proof Company.
3. "Chromicoat", by Oakite Products, Inc.
4. Other approved system(s), producing a conversion coat meeting the requirements of Military Specification MIL-C-5541.

Alternate coats shall be light, tight, and free from any powdery residue.

After degreasing and etching, the panels shall be dried by the use of forced, hot air.

Panels shall not be handled except by device or clean canvas gloves, from the time degreasing is started to the time of application of retroreflective sheeting, nor shall contaminants be permitted to come into contact with the panels during that period.

Construction Methods:

Sign Face Finishing: All retroreflective sheeting, backgrounds, letters, numerals, symbols, and borders shall be clean-cut and sharp, and the messages on all signs shall be as indicated on the plans. Application of retroreflective sheeting to aluminum panels shall be in accordance with sheeting manufacturer's recommendations. Retroreflective sheeting shall be color matched and marked. The height of characters and the alphabet series to be employed for the signs shall conform to the Plans and their references. The alphabet series used on the sign panels shall be those of the publication titled "Standard Alphabets for Highways Signs" of the Federal Highway Administration.

The working drawings prepared by the Contractor shall clearly indicate the proposed spacing of the letters and the locations and arrangements of symbols and borders.

After the panel has been degreased and etched, the retroreflective sheeting shall be applied by a method described elsewhere in these Special Provisions.

No sheeting shall be applied when the temperature is less than 50°F (10°C).

Whenever it is necessary to construct the background of a sign face with two or more pieces of retroreflective sheeting, they must be carefully matched for color prior to application and sign fabrication, to provide uniform appearance and brilliance, day and night. Each full width section of retroreflective sheeting mounted adjacent to another full width section taken consecutively from the same roll shall be rotated and mounted 180 degrees with respect to that adjacent section. This rule shall also be observed as a guide when partial width sheets of retroreflective sheeting are used.

Non-conformance may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting which will render signs unacceptable. The entire background of each sign shall be uniform in color, brilliance, texture, and general appearance as seen in the daytime and under typical automobile illumination at night. No more sections of retroreflective sheeting shall be used for backgrounds than is necessary; remnants, scraps, and odd sized pieces of sheeting shall not be used in the fabrication of any signs manufactured for this contract. Joints between retroreflective sheeting sections shall either butt or overlap no more than 3/8" (9.5 mm). Horizontal joints between retroreflective sheeting sections shall not be allowed.

Sign Panel Erection: Signs shall be slip-sheeted, packed, and shipped in such manner as to ensure arrival at their respective places of erection in an undamaged condition. All signs arriving at the erection site(s) in a condition which in the opinion of the Engineer, renders them unsuitable for use, shall be removed and replaced by the Contractor at his sole expense. Sign Panels shall not be shipped for erection in such a manner that results in horizontal joints of the retroreflective sheeting.

It is not anticipated that there will be any sign panels which are required to be mounted whose messages will be inappropriate to the guiding of traffic at the time of sign erection. However, in the event that the Engineer determines that certain sign messages are inappropriate, the panels of such signs shall be covered by an opaque material, until such time as the sign messages become appropriate. The covering material and the manner of securing the material to the sign panel(s), shall meet with the approval of the Engineer. The Engineer will indicate to the Contractor which signs, if any, must be covered, and when to remove the covers.

Sign Covers: Sign covers shall be 10 ounce (280 g) cotton duck conforming to ASTM D-320, Army Duck, and dyed to a dark green approximating the green for sign backgrounds.

Identification Tags: The Contractor shall furnish and place identification tags or decals which state the Contract number, month and year of erection on the lower reverse side of the panel, near the point closest to the roadway shoulder.

Method of Measurement:

The quantity of sign panels will be measured as the actual number of square feet (meters) of front sign face surface area of all sign panels construction, installed and accepted. The area will be computed from the maximum width and height dimensions of each sign panel, as shown on the Plans, or on the approved sign panel shop drawings, (verified by field measurements). All sign panels will be considered either square or rectangular in shape, as the case may be, and no area deductions will be made for rounding of corners.

Basis of Payment:

The quantity of sign panel will be paid for at the Contract unit price per square foot (meter). Price and payment will constitute full compensation for furnishing, fabricating, and erecting sign panels complete in place and accepted, with retroreflective materials, copy, symbols, borders, connections to supports, degreasing, etching, covering and uncovering sign messages where necessary, and for all labor, materials, tools, equipment, and incidentals required to complete the item.

Unless otherwise indicated on the Plans, the cost of removing and transporting to the nearest highway maintenance yard the existing sign panels and accessories shall also be included under this item if such requirement is indicated on the Plans.

NE - 3/23/01

SECTION 749500

763500 - MAINTENANCE OF TRAFFIC

Description:

This item shall consist of all work performed by the Contractor to maintain vehicular, bicycle and pedestrian traffic, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA) Title II, paragraph 35.130, to ensure the safe passage of all roadway users through work zones.

All work shall be performed in a manner that will ensure the least practicable obstruction to all road users, including vehicular traffic, bicycle traffic and pedestrian traffic. All temporary traffic control and traffic control devices shall comply with the contract documents and with the latest edition of the manual titled "Delaware Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD)," hereafter referred to as the "Delaware MUTCD", including all revisions as of the date of the advertisement of this Contract.

This item shall include installing, maintaining and/or relocating the traffic control devices depicted in the approved Temporary Traffic Control (TTC) Plan, standard Delaware MUTCD TTC Cases and as required by project phasing.

The safety measures outlined within this Contract and the Delaware MUTCD are not necessarily sufficient in every instance to guarantee the protection of the traveling public or the persons working on the project. Therefore, the provisions of this Contract do not relieve the Contractor of the sole responsibility for the safety of all persons working within or traveling through the work zone throughout the duration of the project. The Contractor shall implement any additional safety measures that are not expressly required by the Contract and are necessary to ensure the safety of all persons. The Contractor shall submit to the Engineer justification for deviations from the TTC plan or additions to the TTC plan included in the contract documents. Final approval of the deviations or additions shall rest with the Engineer.

The Department reserves the right to stop the Contractor's operations, if in the opinion of the Engineer:

1. The Contractor's operations are not in compliance with the Delaware MUTCD, the specifications or the Plans.
2. The Contractor's operations are unsafe.

Construction Methods:

If the Contractor desires modifications to the Traffic Control Plan provided in the Contract Documents, the Contractor shall submit a new Traffic Control Plan to the Engineer for approval prior to the start of work at each and every location. The Traffic Control Plan shall be prepared, signed and sealed by a Professional Engineer registered in the State of Delaware and shall be prepared in accordance with all applicable DelDOT standards. The Traffic Control Plan shall be submitted 14 days in advance of starting work. Longitudinal dimensions for maintenance of traffic configurations may be adjusted slightly to fit field conditions as directed by the Engineer.

The Department will not make payment to the Contractor for any and all traffic control devices where the Contractor sets up traffic control to perform work, but fails to perform any work. This does not include long-term traffic set-ups that are installed as part of the maintenance of traffic plans outlined in the contract documents.

Temporary traffic control devices shall be maintained in good condition in accordance with the brochure entitled "Quality Guidelines for Temporary Traffic Control Devices", published by the American Traffic Safety Services Association (ATSSA).

Any existing signs that conflict with any temporary or permanent construction signs shall be covered as needed or as directed by the Engineer. The Contractor shall stake out locations of permanent warning signs in the field and receive approval from the Engineer for the location and method of mounting prior to ordering the signs. The Contractor, with the Engineer, shall inventory all existing signs within the Contract limits. Signs that must remain in place during the project shall be maintained by the Contractor. Any other existing signs shall be removed and properly stored by the Contractor to prevent loss or damage. Immediately prior to the final inspection, the Contractor and the Engineer shall again inventory the traffic signs and account for any lost or damaged signs. The Contractor shall replace or reimburse the Department for any lost or damaged signs.

Access to all businesses and residences within the Project limits shall be maintained throughout the duration of this Contract. Any temporary closure of a driveway or entrance for tie-in purposes shall be coordinated with the Engineer and the property owner in advance of the closure.

Access to all transit stops located within the project limits shall be maintained unless otherwise directed by the Plans or the Engineer. Maintaining access to the transit stop shall include maintaining an area for the transit vehicle to stop to pick-up and drop-off passengers and also an accessible path for pedestrians to safely access the transit stop.

The Contractor shall provide all property owners and residents who live adjacent to the work zone with written notice, 48 hours in advance of the start of construction work. This

notification shall include the scope of work, working hours, anticipated start and completion dates, a summary of construction activities which may interfere with access to the property including a schedule and access coordination plan, Contractor's name and address, and a DelDOT contact phone number. Failure to give proper notice will result in a suspension of the work requiring notice, until proper notice is provided. The Contractor shall provide written verification to the Engineer that the property owners and residents were notified.

All roadway closures or lane closures beyond those specified and approved in the Contract Documents, shall be approved by the Chief Traffic Engineer or Designee a minimum of 48 hours in advance of the proposed restriction.

The Contractor shall notify the Engineer no less than fourteen (14) days prior to the start of any detours and road closures and the Engineer will then notify the following entities:

- Local 911 Center
- Local schools
- Local post offices
- DelDOT's Transportation Management Center (TMC)
- Town Managers
- Local Police
- Local Fire Department and Emergency Medical Services
- DelDOT's Public Information Center
- Delaware Transit Corporation (DTC)

Immediately prior to the implementation of any lane or roadway closures, the Engineer shall notify the DelDOT TMC at (302) 659-4600. Notifications shall also be given to the TMC when the closure is lifted. The Engineer shall notify the TMC and the district Safety Officer if lane closures cannot be removed prior to the end of the allowable work hours.

The Contractor shall notify the local 911 center if access to a fire hydrant is temporarily restricted. The Contractor shall provide written confirmation to the Engineer that the local 911 center was notified.

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

1. If work is being conducted within 200 feet in advance or up to 200 feet beyond an intersection that is controlled by a traffic signal, the Flagger shall direct the flow of traffic in concert with the traffic signal to avoid queuing unless active work prohibits such action. The Flagger shall direct traffic to prevent traffic from queuing through an intersection (i.e., blocking an intersection).

2. If work is being conducted within a signalized intersection or series of signalized intersections, the Contractor shall notify the DeIDOT TMC no less than 24 hours in advance of the operation. If work is being conducted within a signalized intersection, a Traffic Officer may direct traffic against the operation of the traffic signal only until the operation occurring within the intersection is completed. When the operation within the intersection is complete, the Contractor shall notify the DeIDOT TMC that the intersection is no longer impeded by construction activities..
3. Work in the vicinity of traffic signals shall be scheduled to minimize the time during which the signal is operated without detectors. Prior approval of the Engineer shall be required for such work to be scheduled. The Contractor shall submit a schedule to the Engineer for approval seven (7) days in advance of the proposed start date of this work. The DeIDOT Transportation Management Center (TMC) requires 48 hours advance notice of the cutting of a loop detector, and immediate notification once the loop detector has been reinstalled. The Contractor shall coordinate with the Engineer sufficiently in advance of loop detector work to ensure that these requirements are met.
4. When a lane adjacent to an open lane is closed to traffic, the traffic control devices shall be set 2' (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 with minimum restriction to traffic.
5. Lanes shall not be closed unless construction activity requiring lane closure is taking place or will take place within one hour. Lanes shall be reopened immediately upon completion of the work. For moving operations the lane closure shall be shortened as work progresses and as traffic conditions warrant to keep the length of the closure to a minimum. 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 the Contractor's operations and non-payment for non-compliant temporary traffic control and devices if, in the opinion of the Engineer, such operations are impeding traffic unnecessarily.

Any deficiencies related to temporary traffic control that are reported to the Contractor in writing shall be corrected within 24 hours or as directed by the Engineer. Corrective actions on severe deficiencies shall be taken immediately unless otherwise directed by the Engineer. Failure to comply will result in non-payment for all maintenance of traffic items on the Contract for the duration of the deficiency, possible suspension of work until items identified are brought back into compliance and/or the holding of the pay estimate until the deficiencies are corrected.

At the end of each workday, the Contractor shall correct all pavement edge drop-offs in accordance with Table 6G-1 in the Delaware MUTCD. This corrective work shall be accomplished with Temporary Road Material (TRM) unless an alternate method is specified in the Plans. All ruts and potholes shall be filled with TRM as soon as possible, but no later than by the end of each workday. Placement of TRM shall be completed in accordance with the applicable sections of the Delaware Standard Specifications. If temporary elimination of a drop-off hazard cannot be accomplished, then the area shall be properly marked and protected with additional temporary barriers, barricades, warning signs, flashing lights, etc. as required by Section 6G.21 of the Delaware MUTCD.

If an open trench accessible by vehicular traffic cannot be backfilled prior to the end of the working day, steel plates may be used to protect the trench area. Shop drawings for the steel plates shall be submitted to the Engineer for approval at the Preconstruction Meeting. The shop drawing shall show the intended method to brace, sheet, support or shore the excavation and to prevent a trench failure while the walls of the trench are under the load of traffic. The plan should include details of the plating design, the method of fastening plates, plate thickness, span, bearing and the method of preventing the movement of the plates. This design shall be prepared and signed by a Professional Engineer registered in the State of Delaware. Whenever steel plates are placed on a travel lane or shoulder, the associated traffic control related to the use of steel plates shall follow the standards presented in Table 6G-1 of the Delaware MUTCD. The Contractor is required to provide a ramp (wedge) around the steel plate using bituminous temporary roadway material (TRM) placed at a slope of 20 to 1 or flatter. The cost for the wedge material shall be incidental to the item being constructed. If steel plates are used, the cost of furnishing and installing steel plates, bracing, sheeting, supporting or shoring the excavation and the preparation of shop drawings shall be incidental to the item being constructed. Steel plates are not permitted between November 1 and April 1, without the prior approval of the Engineer.

If pavement marking information is not provided in the Plans, the Contractor shall submit detailed drawings (including but not limited to, lane and shoulder widths, turn lane lengths, locations of stop bars, turn arrows, crosswalks and railroad crossings) that depict the existing pavement markings for each project location prior to the Preconstruction Meeting. These drawings will be reviewed by the Department's Traffic Section to determine if any changes to the final pavement markings are required.

At the end of each day's operation and before traffic is returned to unrestricted roadway use, temporary striping shall be applied to locations that require permanent striping. Temporary pavement striping shall match permanent pavement striping as shown on the Plans or as directed by the Engineer. Prior to the start of any activity which will affect the pavement surface and require the placement of temporary striping, the Contractor shall show the Engineer proof that he has scheduled placement of the necessary temporary striping to ensure that the temporary

striping can be completed prior to fully opening the roadway to traffic. The Contractor is responsible for maintaining the temporary markings in good condition such that the pavement is properly delineated at all times. The Contractor shall refresh the temporary pavement markings as required or as directed by the Engineer.

The Contractor shall apply temporary pavement markings in accordance with the requirements of Section 748 of the Delaware Standard Specifications and Part 3 of the Delaware MUTCD. Payment for temporary pavement striping shall be made at the unit price bid for the applicable temporary striping or symbol items. Payment for final striping will be included in the applicable striping item. Temporary pavement markings shall match the Plan dimensions and layout or the approved drawings of the “permanent markings” and shall be installed in accordance with Part 3 of the Delaware MUTCD. All conflicting striping is to be removed as directed by the Engineer according to the specifications for Item 748530 – Removal of Pavement Striping. Painting over the conflicting striping will not be accepted unless specifically allowed by the Plans.

Travel lane and ramp closings on multilane highways and Interstates shall not be permitted during the following holiday periods:

- December 24 through December 27 (Christmas Day)
- December 31 through January 3 (New Years Day)
- Friday prior to Easter through Easter Sunday
- Thursday prior to Memorial Day through the Tuesday following Memorial Day
- Dover International Speedway Race Weekends (Thursday prior to the race event through the day after the race event)
- July 3 through July 5 (Independence Day)
- Thursday prior to Labor Day through the Tuesday following Labor Day
- Wednesday prior to Thanksgiving Day through the Monday following Thanksgiving Day

Additional time restrictions may apply as noted in the project plans or as directed by the Engineer. Any requests to waive any restrictions must be made in writing to the Engineer for review and approval. A copy of the request shall be provided to the District Safety Officer for review.

Certification:

All temporary traffic control devices used on all highways open to the public in this State shall conform to the requirements of the Delaware MUTCD and the National Cooperative Highway Research Program (NCHRP) Report 350 and the memorandum issued August 28, 1998 by the USDOT Federal Highway Administration. The Contractor shall submit certification for

traffic control devices or vendors used specifically on this project prior to the pre-construction meeting.

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 devices, which includes cones, tubular markers, flexible delineator posts 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 (100 lbs.) or less, include Type 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 (100 lbs.), 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. Note that certification compliance to NCHRP Report 350 criteria is not required for Category IV 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.

Basis of Payment:

All required Maintenance of Traffic shall be included in the lump sum bid price.

NOTE

If the Contractor does not complete the contract work within the contract completion time (including approved time extensions), the Contractor shall be responsible for providing the necessary temporary traffic control devices that are required to complete any remaining work. The cost of such temporary traffic control shall be borne by the Contractor. No additional payment will be made to the Contractor to maintain traffic in accordance with the Delaware MUTCD, contract plans and specifications. Traffic Control items shall include, but not be limited to, warning lights, warning signs, barricades, plastic drums, P.C.C. safety barrier,

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flaggers, traffic officers, arrow panels, message boards, portable light assemblies and portable impact attenuators.

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END OF SECTION 763500