MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF HIGHWAY DEVELOPMENT
707 NORTH CALVERT STREET
BALTIMORE, MARYLAND 21202

November 28, 2016

Contract No.: HO1415170
F.A.P. No.: Not Applicable
Description: MD 32 – MD 108 to North of Linden Church Road Step 2: Request of Proposals (RFP) – Price Proposals

ADDENDUM NO. 3

To All Prospective Proposers:

Please be advised that the Price Proposal Submittal Date for this contract is still scheduled for **December 6, 2016.**

The attention of prospective proposers is directed to the following revisions, additions and/or deletions to the Step 2: Request for Proposals (RFP) – Price Proposals.

STEP 2: REQUEST FOR PROPOSALS – PRICE PROPOSALS

Page No.	Description
92	REVISED TC 2.07.03"RFP Package" to add "Pavement and Geotechnical Design Guide Information" to "F. Appendices".
127-130	REVISED TC 3.05.15 "Stormwater Management and Erosion and Sediment Control Design and Approvals" to revise the requirements; REVISED TC 3.05.16 "Surface Storm Drainage Design" to revise the requirements; DELETED TC3.05.17 "Erosion and Sediment Control Design and Approvals".
131	REVISED TC 3.05.20 "Design Review and Coordination" to revise the Administration's review time for structure submittals from 21 calendar days to 14 calendar days.
133	REVISED TC 3.05.22 "Environmental Permits" to revise the approval agencies for Erosion and Sediment Control Approval and Stormwater Management Permit from SHA-PRD to SWM/ESC Approval Authority.
145	REVISED TC 3.07.01.05 "Erosion and Sediment Control Plans" to replace the "PRD" with "SWM/ESC Approval Authority".
148-149	REVISED TC 3.07.03.1 "Stormwater Management Report" to add the requirement on Electronic and Hard Copies of all items, and replace "SHA-PRD" with "SWM/ESC" in TC 3.07.03.1.2 "SWM Report Contents".

157-161	REVISED TC 3.08 "Guidelines and References" to delete "MDE-Guidelines for Construction on Nontidal Waters and Floodplains", "MDE- Maryland Erosion and Sediment Control Guidelines for State and Federal Projects, Published January 1990, Revised January 2004", "MDE- Maryland Storm Water Design Manual, October 2000, Revised May 2009", "MDE- Nontidal Wetland and Waterway Construction Permit Application and Authorization for MD 404", "MDE- Stormwater Management Guidelines for State and Federal Projects, 2010", "SHA- Grass Channel Credit Paper", "SHA- Guidelines for Preparing Stormwater Management Concept Reports, April 2003", "SHA- SHA Stormwater Site Development Criteria – Review Guidelines, 2010", "SHA- Storm Water Management Safety Policy", "SHA- Stormwater Management, Erosion and Sediment Control and Waterway Construction Permit Issues and Approaches", "SHA- Stormwater NPDES Program – Standards Procedures Manual, 1981 or as amended herein and any revisions thereof", and "SHA- SWM Concept Report".
167	REVISED TC 3.10.03.01 "General" to revise the shoulder guidance.
217-218A	REVISED TC 3.12.05.02.03 "Sign Design and Construction Requirements" to provide additional clarification for all new signs and existing signs; ADDED TC 3.12.05.02.05 "Sign Layout and Overhead Sign Requirements".
226-226A	REVISED TC 3.12.08.01.03 "Existing Lighting Design and Construction Requirements" to provide additional clarification for lighting requirements; REVISED TC 3.12.08.01.05 "Sign Lighting Design and Construction Requirements" to provide additional clarification for sign lighting criteria.
265-276	REPLACED TC 3.14 "Geotechnical Performance Specification" to remove the "Draft" watermark.
310	REVISED TC 3.17.03.03 "Stormwater Management" to add "For SWM design, the Design Build Team is to use the NOAA 14 rainfall data and distribution".
311	REVISED TC 3.17.03.03.02 "Water Quality Bank" to replace "SHA PRD" with "SWM/ESC Approval Authority".
314	REVISED TC 3.17.03.04 "Erosion and Sediment Control" to replace "PRD" with "SWM/ESC Approval Authority".
315	REVISED TC 3.17.03.05 "Stormwater Facility Maintenance" to replace "Administration's Highway Hydraulics Division" with "SWM/ESC Approval Authority".
318	REVISED TC 3.19.04 "Erosion and Sediment Control b - Plan Adjustments and Revisions".

451 REVISED Category 300 "Stormwater Management Facility As-Built Certification" to delete "MDE" from "Construction".

454 REVISED Category 300 "Stormwater Management Facility As-Built Certification" to replace "Maryland Department of the Environment" with "SWM/ESC Approval Authority" in "Submission Requirements" and "Payment Schedule".

820-821 DELETED Section 921 – Miscellaneous for Geotextiles.

NOTICE TO PROSPECTIVE PROPOSERS

The attention of prospective proposals is directed to the following revisions, additions and/or deletions to the Additional Information on ProjectWise:

ADDED "MD 32 Wetland Impact Plate Calculations_10-18-2016" at the following location on ProjectWise:
pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\E. Reforestation Permit & Wetland Plates\4. Wetland Impact Plates Design files\MD32 Wetland Impact Plate Calculations_10-18-2016\

ADDED "Pavement & Geotechnical Design Guide - Revised Shoulder Guidance.pdf" at the following location on ProjectWise:
pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\F. Appendices\8. Pavement and Geotechnical Design Guide Information\

ADDED "HO141 PRD Comments_11012016.pdf" at the following location on ProjectWise:
pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\I. Conceptual Stormwater Management and Drainage Information\1. Concept Stormwater Management Report\

ADDED "055_10 FT x 4 FT BOX CULVERT_STA156+50_input.hy8" and "Stage-Storage Comps_HW Pool #3D_Sta156+50.xlsx" at the following location on ProjectWise:
pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\I. Conceptual Stormwater Management and Drainage Information\2. S-4 Calculation\

Questions relating to this Addendum No. 3 may be directed in writing to:

Jason A. Ridgway, P.E.
Director, Office of Highway Development
Maryland Department of Transportation
State Highway Administration
e-mail address: HO1415170_MD_32@sha.state.md.us

During the Price Proposal Phase, only e-mailed inquires will be accepted. No requests for additional information or clarification to any other Department or Administration office, consultant, or employee will be considered.

FOR/ GREGORY I. SLATER, DEPUTY ADMINISTRATOR FOR PLANNING, ENGINEERING, REAL ESTATE, AND EVNIRONMENT.

THIS ADDENDUM IS ISSUED TO CLARIFY, ADD TO, DELETE FROM, CORRECT AND/OR CHANGE THE CONTRACT DOCUMENTS TO THE EXTENT INDICATED AND IS HEREBY MADE PART OF THE SAID CONTRACT DOCUMENTS. COMAR 21.05.02.08 REQUIRES THAT ALL ADDENDA ISSUED BE ACKNOWLEDGED; THEREFORE, PRIOR TO SUBMITTING YOUR PRICE PROPOSAL, ATTACH THE ADDENDUM RECEIPT VERIFICATION FORM TO THE FRONT OF THE PRICE PROPOSAL FORM PACKET. FAILURE TO DO SO MAY RESULT IN THE PRICE PROPOSAL BEING DECLARED UNACCEPTABLE.

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF HIGHWAY DEVELOPMENT
707 NORTH CALVERT STREET
BALTIMORE, MARYLAND 21202

November 1, 2016

Contract No.: HO1415170
F.A.P. No.: Not Applicable
Description: MD 32 – MD 108 to North of Linden Church Road Step 2: Request of Proposals (RFP) – Price Proposals

ADDENDUM NO. 2

To All Prospective Proposers:

Please be advised that the Price Proposal Submittal Date for this contract is still scheduled for **December 6, 2016.**

The attention of prospective proposers is directed to the following revisions, additions and/or deletions to the Step 2: Request for Proposals (RFP) – Price Proposals.

STEP 2: REQUEST FOR PROPOSALS – PRICE PROPOSALS

Page No.	Description
51	REVISED "Notice to Contractor Incentive-Disincentive" provision to remove any limitation on the Disincentive deduction.
62	REVISED Joint Permit Application to update "2 - Project Description".
68-77	REPLACED "Wetland Impact Plates".
160	REVISED TC 3.08 "Design-Build Guidelines and References" to update the dates for SHA's "Pavement and Geotechnical Design Guide" and SHA's "Sediment and Stormwater Guidelines and Procedures for State Highway Administration.
164-165	REVISED TC 3.09.07 "Pedestrian and Bicycle Facilities" to include requirements for bicycle prohibition along MD 32.
228-228A	ADDED TC 3.12.09 "Bicycles" to include requirements for bicycle prohibition along MD 32.
314	REVISED TC 3.17.03.03.04 "SWM Specific Engineering Criteria Structural BMPs" to add bullet H..
323	REVISED TC 3.20.05 "Permits and Approvals A" to update bullet A-3.

328-329 REVISED TC 3.20.08.04.02 "Best Management Practices for Work in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains" to update bullets D and I.

331 REVISED TC 3.20.08.04.07 "Temporary Impacts – Stream, Wetland and Floodplain Restoration Efforts" to update bullet G.

371 REVISED TC 7.05(a) "Current Estimate" to add "Landscaping Items of Work".

376 REVISED TC 7.11 "Construction Progress Payment Breakdown" to revise "Section 7000".

868-869C REPLACED CP – Proposal Form Package – State "Contract Provision Buy America".

NOTICE TO PROSPECTIVE PROPOSERS

The attention of prospective proposals is directed to the following revisions, additions and/or deletions to the Additional Information on ProjectWise:

ADDED Response Letter to SHA-Plan Review Division Comments on the SWM Concept Report, latest submittal of SWM Concept Report to PRD at the following location on ProjectWise:
pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\I. Conceptual Stormwater Management and Drainage Information\1. Concept Stormwater Management Report\

ADDED "FINAL 2012-1115 Form Single Lane Application Guidelines" at the following location on ProjectWise:
pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\F. Appendices\3. Traffic Control Device Design Request\

Questions relating to this Addendum No. 2 may be directed in writing to:

Jason A. Ridgway, P.E.
Director, Office of Highway Development
Maryland Department of Transportation
State Highway Administration
e-mail address: HO1415170_MD_32@sha.state.md.us

During the Price Proposal Phase, only e-mailed inquires will be accepted. No requests for additional information or clarification to any other Department or Administration office, consultant, or employee will be considered.

GREGORY I. SLATER, DEPUTY ADMINISTRATOR FOR PLANNING, ENGINEERING, REAL ESTATE, AND EVNIRONMENT.

THIS ADDENDUM IS ISSUED TO CLARIFY, ADD TO, DELETE FROM, CORRECT AND/OR CHANGE THE CONTRACT DOCUMENTS TO THE EXTENT INDICATED AND IS HEREBY MADE PART OF THE SAID CONTRACT DOCUMENTS. COMAR 21.05.02.08 REQUIRES THAT ALL ADDENDA ISSUED BE ACKNOWLEDGED; THEREFORE, PRIOR TO SUBMITTING YOUR PRICE PROPOSAL, ATTACH THE ADDENDUM RECEIPT VERIFICATION FORM TO THE FRONT OF THE PRICE PROPOSAL FORM PACKET. FAILURE TO DO SO MAY RESULT IN THE PRICE PROPOSAL BEING DECLARED UNACCEPTABLE.

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF HIGHWAY DEVELOPMENT
707 NORTH CALVERT STREET
BALTIMORE, MARYLAND 21202

October 18, 2016

Contract No.: HO1415170
F.A.P. No.: Not Applicable
Description: MD 32 – MD 108 to North of Linden Church Road Step 2: Request of Proposals (RFP) – Price Proposals

ADDENDUM NO. 1

To All Prospective Proposers:

Please be advised that the Price Proposal Submittal Date for this contract is still scheduled for **December 6, 2016.**

The attention of prospective proposers is directed to the following revisions, additions and/or deletions to the Step 2: Request for Proposals (RFP) – Price Proposals.

STEP 2: REQUEST FOR PROPOSALS – PRICE PROPOSALS

Page No.	Description
51-53	REPLACED "Notice to Contractor Incentive-Disincentive" provision.
93-94	REVISED 2.07.03 RFP Package materials Items I. through N.
141	REVISED 3.06.06 "Conduct Progress Meetings" to note "The Design-Build Team shall prepare all meeting minutes and distribute them to the attendees and team members for review and comment within one week of the meeting."
306	REVISED 3.17.03.01.01 "Surface Drainage Design – General Requirements A".
313	REVISED 3.17.03.03.03 "SWM Specific Engineering Criteria Structural BMPs M."
391	REVISED "Temporary Lane or Shoulder Closure Schedule".

NOTICE TO PROSPECTIVE PROPOSERS

The attention of prospective proposals is directed to the following revisions, additions and/or deletions to the Additional Information on ProjectWise:

ADDED SHA-Plan Review Division comments on the SWM Concept Report, FEMA CLOMAR Draft Report, and Structure Hydraulic Reports at the following location on ProjectWise: pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\I. Conceptual Stormwater Management and Drainage Information\1. Concept Stormwater Management Report\

ADDED Right-of-Way Plats No. 60588 through 60594, 60596 and 60597 at the following location on ProjectWise: pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\D. Right-of-Way\3. Proposed Right-of-Way Plats\

ADDED "MD 32 Phase 1 - Pavement Construction History.pdf" at the following location on ProjectWise: pw:\\SHAVMPWX.shacadd.ad.mdot.mdstate:SHAEDMS01\Documents\Design-Build\HO1415170\F. Appendices\1. Pavement and Geotechnical Data\MD 32 Phase 1 - Pavement Construction History.pdf

Questions relating to this Addendum No. 1 may be directed in writing to:

Jason A. Ridgway, P.E.
Director, Office of Highway Development
Maryland Department of Transportation
State Highway Administration
e-mail address: HO1415170_MD_32@sha.state.md.us

During the Price Proposal Phase, only e-mailed inquires will be accepted. No requests for additional information or clarification to any other Department or Administration office, consultant, or employee will be considered.

for

GREGORY I. SLATER, DEPUTY ADMINISTRATOR FOR PLANNING, ENGINEERING, REAL ESTATE, AND EVNIRONMENT.

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Maryland Department of Transportation

State Highway Administration
Baltimore, Maryland

Contract No. HO1415170

MD 32 - MD 108 TO NORTH OF LINDEN CHURCH ROAD

Howard County

Competitive Sealed Proposals Procurement
Step 2: Request for Proposals (RFP) – Price Proposals
Design-Build

Minority Business Enterprises are encouraged to respond to this Solicitation Notice.

The State Highway Administration will only be responsible for the completeness of documents, including all addenda, obtained directly from the Administration.
Failure to complete and include the Addendum Receipt Verification Form may cause the proposal to be irregular.

VENDOR I.D. NUMBER

_____

S.H.A. USE ONLY

TABLE OF CONTENTS

CONTRACT PROVISIONS

TABLE OF CONTENTS

SPECIAL PROVISIONS

GENERAL PROVISIONS

TERMS AND CONDITIONS

TABLE OF CONTENTS

TABLE OF CONTENTS

CATEGORY 100 PRELIMINARY

TABLE OF CONTENTS

CATEGORY 200 GRADING

CATEGORY 300 DRAINAGE

TABLE OF CONTENTS

TABLE OF CONTENTS

CATEGORY 600 SHOULDERS

CATEGORY 700 LANDSCAPING

TABLE OF CONTENTS

CATEGORY 800 TRAFFIC

TABLE OF CONTENTS

CATEGORY 900 MATERIALS

TABLE OF CONTENTS

SECTION 950 TRAFFIC MATERIALS

TABLE OF CONTENTS

PROPOSAL FORM PACKET

NOTICE TO ALL HOLDERS OF THIS CONTRACT DOCUMENT

MARYLAND MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MdMUTCD) REQUIREMENTS

The 2011 Maryland Manual on Uniform Traffic Control Devices (MdMUTCD) is the legal State standard for traffic control devices. All traffic control devices (temporary or permanent) utilized on Administration projects shall be in conformance with the requirements provided in the 2011 Edition of the Administration's MdMUTCD for Streets and Highways.

NOTICE TO ALL HOLDERS OF THIS CONTRACT DOCUMENT

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) REPORT 350 AND THE MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) IMPLEMENTATION SCHEDULE FOR DEVICES USED IN THE MAINTENANCE OF TRAFFIC

Except as otherwise specified in this Section, all items for the maintenance of traffic, including those listed under the following categories, shall be crashworthy in conformance with Level 3 or other Level as specified by the Engineer in conformance with the safety crash testing and performance criteria published in the National Cooperative Highway Research Program (NCHRP) Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features" or the Manual for Assessing Safety Hardware (MASH). When conformance with NCHRP Report 350 or MASH is required, the Contractor shall provide the Engineer with the manufacturers' certifications that the devices comply with the specified criteria.

Unless specifically waived by an attachment to these Contract Provisions, devices must be approved by the Office of Traffic and Safety.

Category 1 Devices

These devices are cones, tubular markers, flexible delineator posts, and drums, all without any accessories or attachments, which are used for channelization and delineation.

Category 2 Devices

These devices are Type I, II, and III barricades; portable sign supports with signs; intrusion alarms; and drums, vertical panels, and cones, all with accessories or attachments.

Category 3 Devices

(a) Truck Mounted Attenuators (TMAs) and Trailer Truck Mounted Attenuators (TTMAs).

(b) Temporary Barrier.

(1) Concrete Barrier.

(2) Traffic Barrier W Beam and Water Filled Barrier.

(3) Steel/Aluminum Barrier.

(c) Temporary End Treatments.

Category 4 Devices

These devices are area lighting supports, arrow panels, and portable variable message signs that are usually portable or trailer-mounted.

WORK ZONE DEVICES	IMPLEMENTATION SCHEDULE TO CONFORM TO NCHRP REPORT 350 OR MASH CRITERIA
CATEGORY 1 Cones, tubular markers, flexible delineator posts, and drums (all without any accessories or attachments)	All devices shall conform to NCHRP Report 350 or MASH criteria.
CATEGORY 2 Type I, II, and III barricades; portable signs supports with signs; intrusion alarms; and drums, vertical panels, and cones (all with accessories or attachments)	All devices shall conform to NCHRP Report 350 or MASH criteria.
CATEGORY 3 (a) Truck Mounted Attenuators (TMAs); Trailer Truck Mounted Attenuators (TTMAs) (b) Temporary Barriers (1) Concrete Barrier (2) Traffic Barrier W Beam and Water Filled Barrier (3) Steel/Aluminum Barrier (c) Temporary End Treatments	All devices shall conform to NCHRP Report 350 or MASH criteria.
CATEGORY 4 Portable trailer mounted devices including area lighting supports, arrow panels, and changeable message signs	The Contractor may use devices that do not conform to NCHRP Report 350 or MASH criteria, until compliance dates are established. Use of these devices shall comply with the provisions of Part 6 of the MUTCD.

OCCUPYING WETLANDS/WATERWAYS FOR DESIGN-BUILD

The Contractor is hereby alerted to the importance of preserving waterways and wetland areas. The Administration, in conjunction with the various environmental agencies, has developed these Contract Documents so as to minimize or eliminate disturbance and damage to existing waterways and wetland areas. Any design changes must result in further avoidance and minimization of disturbance of wetlands and waterways. In order to accomplish this, the following must be rigidly adhered to:

(a) Prior to performing any work on the project, the areas of wetland will be identified and marked by orange safety fence or as directed by the Engineer. All personnel of the Contractor or sub-contractors shall be alerted to these designated areas.

(b) The Contractor or sub-contractors shall not impact any wetland or waterway, whether it be permanently or temporarily unless otherwise stipulated in the permit and approved as an authorized action by the appropriate regulatory agency. No fill shall be placed in these areas without an appropriate permit. No storage of equipment or materials will be allowed in wetlands.

(c) The Contractor or sub-contractor shall not impact a wetland or waterway that is not covered by an existing wetland permit.

(d) If the Contractor impacts any wetland or waterway for which they do not have a wetland permit, they shall be responsible for contacting the State Highway Administration's Environmental Programs Division prior to restoring the wetland areas and mitigating the wetland impacts to the full satisfaction of the environment regulatory agencies, which could include monetary compensation.

(e) The cost of restoration and mitigation of the impacted areas shall be at no additional cost to the Administration.

(f) The Design-Builder will prepare permit modifications at the conclusion design and at the conclusion of construction. The modification will be based on surveyed as-built plans and will include standard 8.5"x 11.0" plates and a revised Joint State/Federal Nontidal Wetlands and Waterways Permit application.

(g) This Contract will include the oversight of an Environmental Monitor supplied by the Administration. His duties will be to make sure the Contractor abides by all conditions in the environmental permits. He will also assist the Contractor in developing ideas to minimize impacts to the wetlands. The Contractor will still be responsible for all violations occuring as stated above.

The importance of not abusing waterways and wetland areas cannot be overemphasized. It is possible that abuse of waterways and wetland areas could jeopardize the operation of the total Contract and could be cause for a shut-down. If a shut-down occurs because of the Contractor's failure to secure the required permits(i.e. the Contractor's method of work includes impacts not approved by previously acquired permits), the Contractor's negligence or operations, all costs and damages to the Contractor and to the State will be at the Contractor's expense. Non-compliance with these requirements will not be considered for an extension of Contract time.

BEST MANAGEMENT PRACTICES FOR WORKING IN NONTIDAL WETLANDS, WETLAND BUFFERS, WATERWAYS, AND 100-YEAR FLOODPLAINS

1. NO EXCESS FILL, CONSTRUCTION MATERIAL, OR DEBRIS SHALL BE STOCKPILED OR STORED IN NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR THE 100-YEAR FLOODPLAIN.

2. PLACE MATERIALS IN A LOCATION AND MANNER WHICH DOES NOT ADVERSELY IMPACT SURFACE OR SUBSURFACE WATER FLOW INTO OR OUT OF NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR THE 100-YEAR FLOODPLAIN.

3. DO NOT USE THE EXCAVATED MATERIAL AS BACKFILL IF IT CONTAINS WASTE METAL PRODUCTS, UNSIGHTLY DEBRIS, TOXIC MATERIAL, OR ANY OTHER DELETERIOUS SUBSTANCE. IF ADDITIONAL BACKFILL IS REQUIRED, USE CLEAN MATERIALS FREE OF WASTE METAL PRODUCTS, UNSIGHTLY DEBRIS, TOXIC MATERIAL, OR ANY OTHER DELETERIOUS SUBSTANCE.

4. PLACE HEAVY EQUIPMENT ON MATS OR SUITABLY OPERATE THE EQUIPMENT TO PREVENT DAMAGE TO NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, WATERWAYS, OR THE 100-YEAR FLOODPLAIN.

5. REPAIR AND MAINTAIN ANY SERVICEABLE STRUCTURE OR FILL SO THERE IS NO PERMANENT LOSS OF NONTIDAL WETLANDS, NONTIDAL WETLAND BUFFERS, OR WATERWAYS, OR PERMANENT MODIFICATION OF THE 100-YEAR FLOODPLAIN IN EXCESS OF THAT LOST UNDER THE ORIGINALLY AUTHORIZED STRUCTURE OR FILL.

6. RECTIFY ANY NONTIDAL WETLANDS, WETLAND BUFFERS, WATERWAYS, OR 100-YEAR FLOODPLAIN TEMPORARILY IMPACTED BY ANY CONSTRUCTION.

7. ALL STABILIZATION IN THE NONTIDAL WETLAND AND NONTIDAL WETLAND BUFFER SHALL CONSIST OF THE FOLLOWING SPECIES:

   ANNUAL RYEGRASS (LOLIUM MULTIFLORUM), MILLET (SETARIA ITALICA), BARLEY (HORDEUM SP.), OATS (UNIOLA SP.)AND/OR RYE (SECALE CEREALE). THESE SPECIES WILL ALLOW FOR THE STABILIZATIONOF THE SITE WHILE ALSO ALLOWING FOR THE

   VOLUNTARY REVEGETATION OF NATURAL WETLAND SPECIES. OTHER NON-PERSISTENT VEGETATION MAY BE ACCEPTABLE, BUT

MUST BE APPROVED BY THE NONTIDAL WETLANDS AND WATERWAYS DIVISION. KENTUCKY 31 FESCUE SHALL NOT BE UTILIZED IN WETLAND OR BUFFER AREAS. THE AREA SHOULD BE SEEDED AND MULCHED TO REDUCE EROSION AFTER CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED.

8. AFTER INSTALLATION HAS BEEN COMPLETED, MAKE POST CONSTRUCTION GRADES AND ELEVATIONS THE SAME AS THE ORIGINAL GRADES AND ELEVATIONS IN TEMPORARILY IMPACTED AREAS.

9. TO PROTECT AQUATIC SPECIES, IN-STREAM WORK IS PROHIBITED AS DETERMINED BY THE CLASSIFICATION OF THE STREAM:

   A. USE I WATERS: IN-STREAM WORK SHALL NOT BE CONDUCTED DURING THE PERIOD MARCH 1 THROUGH JUNE 15, INCLUSIVE DURING ANY YEAR.
   B. USE III WATERS: IN-STREAM WORK SHALL NOT BE CONDUCTED DURING THE PERIOD OCTOBER 1 THORUGH APRIL 30, INCLUSIVE, DURING ANY YEAR.
   C. USE IV WATERS: IN-STREAM WORK SHALL NOT BE CONDUCTED DURING THE PERIOD MARCH 1 THROUGH MAY 31, INCLUSIVE, DURING ANY YEAR.

10. STORMWATER RUNOFF FROM IMPERVIOUS SURFACES SHALL BE CONTROLLED TO PREVENT THE WASHING OF DEBRIS INTO THE WATERWAY.

11. CULVERTS SHALL BE CONSTRUCTED AND ANY RIPRAP PLACED SO AS NOT TO OBSTRUCT THE MOVEMENT OF AQUATIC SPECIES, UNLESS THE PURPOSE OF THE ACTIVITY IS TO IMPOUND WATER.

AFFIRMATIVE ACTION REQUIREMENTS
UTILIZATION OF MINORITY BUSINESS ENTERPRISES
FOR STRAIGHT STATE CONTRACTS
(Where the Contractor's bid exceeds $50,000)

A. General

For the purpose of these requirements, the following terms as defined below shall apply:

Administration Representative – A Minority Business Enterprise (MBE) Officer of an Administration who enforces the laws and regulations pertaining to minority business enterprise and Contract compliance.

Affirmative Actions – Specific steps taken to eliminate discrimination and its effects, to ensure nondiscriminatory results and practices in the future, and to involve minority businesses fully in contracts and programs.

Business Enterprises – A legal entity which is organized in any form other than as a joint venture (e.g., sole proprietorship, partnership, corporation, etc.) to engage in lawful commercial transactions.

Certified Business – A business which by order of the Chair/MBE Advisory Council or his/her designee, has been certified as a bona fide MBE.

Director, Office of Equal Opportunity – The individual designated for the Administration's overall MBE compliance.

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

Minority Business Enterprise (MBE) – Any legal entity, other than a joint venture, organized to engage in commercial transactions which is at least 51 percent owned and controlled by one or more minority persons, or a nonprofit entity organized to promote interests of the physically or mentally disabled.

MBE Directory – A compilation of businesses certified by MDOT as minority or socially and economically disadvantaged businesses. The directory will be published annually with quarterly supplements. It will also be provided in automated format and on the Internet to be updated as changes are made.

MBE Program – A program developed by MDOT to implement the requirements of Title 14, Subtitle 3 of the State Finance Procurement Article, Annotated Code of Maryland and Title 10, Subtitle 3 of the State Finance Procurement Article of the Annotated Code of Maryland for Leases of State-Owned Property.

MBE Participation Packet – The documents submitted by the bidder or proposer pursuant to the appropriate special bid provisions. The MBE Participation Packet shall consist of the MBE Utilization Affidavit and the MBE Participation Schedule, both of which must be submitted with your bid or initial price proposal. The MBE Participation Packet also includes the following documents which are submitted after bids or proposals are opened: MDOT Outreach Efforts Compliance Statement (Form MDOT-OP-014-2), the MDOT MBE Subcontractor Project Participation Affidavit (Form MDOT-OP-015-2), the MDOT Joint Venture Disclosure Affidavit (Form D-EEO-006) and the Minority Contractor Unavailability Certificate (Form OOC46).

Minority or Minority Person for Straight State Contracts - Member of one of the following socially and economically disadvantaged groups:

1. African American – An individual having origins in any of the Black racial groups of Africa;

2. American Indian/Native American – An individual having origins in any of the original peoples of North America and who is a documented member of a North American tribe, band, or otherwise organized group of native people who are indigenous to the continental United States or who otherwise have a special relationship with the United States or a state through treaty, agreement, or some other form of recognition. This includes an individual who claims to be an American Indian/Native American and who is regarded as such by the American Indian/Native American community of which he/she claims to be a part, but does not include and individual of Eskimo or Aleutian origin;

3. Asian – An individual having origins in the far East, Southeast Asia, or the Indian Subcontinent and who is regarded as such by the community of which the person claims to be a part;

4. Hispanic – An individual of Mexican, Puerto Rican, Cuban, Central or South American, Portuguese or other Spanish culture or origin regardless of race, and who is regarded as such by the community or which the person claims to be a part;

5. Women – This category shall include all women, regardless of race or ethnicity, although a woman who is also a member of an ethnic or racial minority group may elect that category in lieu of the gender category; or

6. Physically or Mentally Disabled – An individual who has an impairment that substantially limits one or more major life activity, who is regarded generally by the community as having such a disability, and whose disability has substantially limited his or her ability to engage in competitive business.

B. MBE and Good Faith Effort Requirements

1. This contract includes an MBE participation goal for subcontracting, and/or procurement of materials, and/or services. Bidders/Offerors must make a good faith effort to meet the MBE participation goal **before bids or proposals are due**, including outreach efforts. A bid or initial proposal must include both a completed and executed Certified MBE Utilization and Fair Solicitation Affidavit and MBE Participation Schedule. The failure of a bidder to complete and submit the Certified MBE Utilization and Fair Solicitation

Affidavit and MBE Participation Schedule shall result in a determination that the bid is not responsive. The failure of an offeror to complete and submit the Certified MBE Utilization and Fair Solicitation Affidavit and MBE Participation Schedule shall result in a determination that the proposal is not susceptible of being selected for award.

2. In making a good faith effort to achieve the MBE goal, prior to completing the Certified MBE Utilization and Fair Solicitation Affidavit and MBE Participation Schedule and prior to submitting a bid or initial proposal bidders (or offerors) including those bidders or offerors that are certified MBEs must:

a. Identify specific work categories within the scope of the procurement appropriate for subcontracting and/or procurement of materials and/or services;

b. **Solicit certified MBEs in writing at least 10 days before bids or initial proposals are due,** describing the identified work categories and providing instructions on how to bid on the subcontracts and/or procurement of materials and/or services;

c. Attempt to make personal contact with the certified MBEs solicited and to document these attempts;

d. Assist certified MBEs to fulfill, or to seek waiver of, bonding requirements; and

e. Attend prebid or other meetings the procurement agency schedules to publicize contracting opportunities to certified MBEs.

3. The bidder shall seek commitments from minority business enterprises by subcontracting and/or procurement of materials and/or services, the combined value of which equals or exceeds the established Contract goal of **16** percent of the total value of the prime Contract. The Administration has further established that, within this Contract goal, there shall be a sub-goal of a minimum of **7** percent participation by firms classified as African American-owned firms, a sub-goal of **0** percent participation by firms classified as Woman-owned firms, a sub-goal of a minimum of **0** percent participation by firms classified as Hispanic American-owned firms, and a sub-goal of a minimum of **0** percent participation by firms classified as Asian American-owned firms. A bidder may count toward its MBE goals expenditures for materials and supplies obtained from MBE regular dealers and/or manufactures provided that the MBE assume the actual and contractual responsibility for the provision of the materials and supplies. The bidder may count its entire expenditure to a MBE manufacturer (i.e., a supplier that produces goods from raw materials or substantially alters them before resale). The bidder may count sixty (60) percent of its expenditures to a MBE regular dealer, that is not a manufacturer, provided that the MBE supplier performs a commercially useful function in the supply process. The apparent low bidder shall submit to the Administration, within ten (10) business days after notification that it is the apparent low bidder, an acceptable Affirmative Action Plan for the utilization of Minority Business Enterprises in this Contract. The Contract will not be awarded without the bidder's Affirmative Action Plan being approved by the Administration.

The Design-Builder's good faith efforts to achieve the overall contract goal shall include a good faith effort to achieve DBE participation in professional services (including design, supplemental geotechnical investigations, surveying and other preliminary

engineering; quality control as defined in the Contract; environmental compliance activities; utility coordination; permitting; and public information) for this contract of no less than **30** percent of the portion of the contract price allocable to professional services.

4. The Affirmative Action Plan shall include as a minimum:

a. The name of an employee designated as the bidder's Minority Business Liaison Officer.

b. A complete MBE Subcontractor Project Participation Affidavit (MDOT-OP 015-2), of minority business enterprises, from among those whose names appear in the MDOT MBE Directory or who are otherwise certified by MDOT as being minority business enterprises. Except as permitted by law and approved by the Administration, the MBE Subcontractor Project Participation Affidavit (MDOT-OP 015-2) submitted after the opening of bids or proposals shall include all MBE firms identified on the MBE participation schedule submitted with the bid or initial proposal with a percentage of participation that meets or exceeds the percentage of participation indicated in the bid or initial proposal. The MBE Subcontractor Project Participation Affidavit (MDOT-OP 015-2) shall be completed and signed by the Bidder and MBE for each business listed in the MBE Participation Schedule.

c. A completed Outreach Efforts Compliance Statement (MDOT-OP 014-2).

5. When a bidder intends to attain the appropriate goal for minority business enterpriseparticipation by use of a joint venture, the bidder shall submit a Joint Venture Disclosure Affidavit (MDOT D-EEO-006-A) showing the extent of the MBE participation. If a bidder intends to use a joint venture as a subcontractor to meet its goal, the affidavit shall be submitted through the bidder by the proposed subcontractor and signed by all parties.

6. When the proposed MBE participation does not meet the MBE Contract goals, information sufficient to demonstrate that the bidder has made good faith efforts to meet these goals shall be required.

7. Request for Exception to the MBE Goal

If the bidder is unable to secure from MBEs by subcontracting and/or by procurement of materials and/or services, commitments which at least equal the appropriate percent of the value of the prime Contract at time of bid, the bidder shall request, in writing, waiver of the unmet portion of the goal. This request must be initiated by checking the appropriate box on the Certified MBE Utilization and Fair Solicitation Affidavit submitted with the bid or initial proposal.

The waiver may be granted by the Administrator. To obtain approval of a waiver, the bidder shall submit the following:

a. A detailed statement of efforts made prior to bid to contact and negotiate with MBEs including the dates, names, addresses, and telephone numbers of MBEs who were contacted; a description of the information provided to the MBEs regarding the work

to be performed, anticipated schedule for portions of the work to be performed; and a detailed statement of the reasons why additional prospective agreements with MBEs were not reached;

b. A detailed statement of the efforts made to select portions of the work proposed to be performed by MBEs in order to increase the likelihood of achieving the stated goals;

c. For each MBE that the Contractor considers not qualified, but from which a bid has been received, a detailed statement of the reasons for the bidder's conclusion; and

d. For each MBE contacted but unavailable, a Minority Contractor Unavailability Certificate, (OOC46), signed by the minority business enterprise, or a statement from the bidder stating that the MBE refused to sign the Certificate.

8. Guidance concerning good faith efforts

The following is a list of the types of actions and factors that will be used to determine the bidder's or offeror's good faith efforts to obtain MBE participation. It is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases.

(1) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of certified MBEs who have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the MBEs to respond to the solicitation. The bidder must determine with certainty if the MBEs are interested by taking appropriate steps to follow up initial solicitations.

(2) Selecting portions of the work to be performed by MBEs in order to increase the likelihood that the MBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MBE participation, even when the bidder or offeror might otherwise prefer to perform these work items with its own forces.

(3) Providing interested MBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(4) (a) Negotiating in good faith with interested MBEs. It is the bidder's or offeror's responsibility to make a portion of the work available to MBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE subcontractors and suppliers, so as to facilitate MBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of MBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for MBEs to perform the work.

(b) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including MBE subcontractors, and would take a

firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using MBEs is not in itself sufficient reason for a bidder's failure to meet the contract MBE goal, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidders and offerors are not, however, required to accept higher quotes from MBEs if the price difference is excessive or unreasonable.

(5) Not rejecting MBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The contractor's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the contractor's efforts to meet the project goal.

(6) Making efforts to assist interested MBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.

(7) Making efforts to assist interested MBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

(8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of MBEs.

(9) In determining whether a bidder or offeror has made good faith efforts, the Administration may take into account the performance of other bidders or offerors in meeting the contract goal. For example, when the apparent successful bidder or offeror fails to meet the contract goal, but others meet it, the Administration may reasonably raise the question of whether, with additional reasonable efforts, the apparent successful bidder or offeror could have met the goal. If the apparent successful bidder or offeror fails to meet the goal, but meets or exceeds the average MBE participation obtained by other bidders or offerors, the Administration may view this, in conjunction with other factors, as evidence of the apparent successful bidder or offeror having made good faith efforts.

9. Bidder Use of MBE Special Services

The bidder shall consider, whenever possible, utilizing the services of minority-owned banks. Most minority banks are full-service corporations that can provide an array of financial services such as Treasury and Tax Loan fund accounts, time and demand deposit accounts, payroll services and if needed, organization investment counseling. It

is the policy of MDOT to encourage its Contractors to utilize, on a continuing basis, MBE banks.

10. Bidder Records

The bidder shall maintain records showing actions which have been taken to comply with procedures set forth herein.

11. Bidders Cooperation

The bidder shall cooperate with the Administration representative in any review of the Contractor's procedures and practices, with respect to the MBEs, which the Administration's representative may, from time to time, conduct.

12. Bidder MBE Modifications

During the life of the Contract, all plans to modify the approved MBE participation program will require the approval of the Administrator or his authorized representative. This will include any changes to items of work to be sublet or materials and services to be obtained which differs from those in the original MBE participation program. All requests for revisions shall be directed to the appropriate District Engineer for disposition.

The low bidder's failure to participate in any of the above proceedings or failure to furnish information after written request may result in rejecting the bid and non-award of the Contract.

C. RECORDS AND REPORTS

1. The Contractor shall keep such records as are necessary to determine compliance with its Minority Business Enterprise utilization obligations. The records kept by the Contractor shall be designed to include:

a. The name of minority and non-minority subcontractors and suppliers, the type of work materials or services being performed on or incorporated in this project, the monetary value of such work materials or services, the terms of performance and/or delivery, copies of all cancelled checks paid to subcontractors and suppliers and a record of all payments made to subcontractors and suppliers.

b. Documentation of all correspondence, contacts, telephone calls, etc., to obtain the services of minority business enterprises on this project.

c. The progress and efforts made in seeking out minority contractor organizations and individual minority contractors for work on this project.

2. The Contractor shall submit reports, on a monthly basis, of those contracts and other business transactions executed with minority business enterprises, with respect to the records referred to in C. 1., above, in such form, manner and content as prescribed by the Administration. The reports shall be due monthly on the 15th calendar day of each month. If the Contractor cannot submit their report on time, the Contractor shall notify

the Administration's representative and request additional time to submit the report. Failure of the Contractor to report in a time manner may result in a finding of noncompliance. Additional report may be required by the Administration upon request.

3. To insure compliance with the certified MBE Contract participation goal, the Contractor shall:

a. Submit monthly reports listing all unpaid invoices over 30 days, from certified MBE subcontractors, and the reason payment has not been made.

b. Include in its agreement, with certified MBE subcontractors a, requirement that MBE subcontractors are to submit monthly, to the Administration, a report identifying the prime Contractor and listing the following:

(1) Payment received from the prime Contractor, in the proceeding 30 days;

(2) Invoices for which the subcontractor has not been paid.

4. All such records and reports shall be retained for a period of three years following acceptance of final payment and shall be available for inspection by the Maryland Department of Transportation and this Administration.

D. ADMINISTRATIVE PROCEDURES FOR ENFORCEMENT

1. Whenever the Administration believes the prime Contractor or any subcontractor may not be operating in compliance with the terms of these provisions, the Administration's representative will conduct an investigation. If the Administration representative finds the prime Contractor or any subcontractor is not in compliance with these provisions, the representative will make a report of noncompliance and notify such Contractor in writing of the steps that will, in the judgement of the Administration, bring the Contractor into compliance. If the Contractor fails or refuses to comply fully with such steps, the Administration's representative will make a final report of the noncompliance to the Administrator, who may direct the imposition of one or more of the sanctions listed below:

a. Suspension of work on the project, pending correction;

b. Withholding payment or a percentage thereof, pending correction;

c. Referral of MBEs to the MDOT office of MBE, for review for decertification, for review/referral to the Attorney General's Office for review/initiation of debarment or for review for criminal prosecution through the MDOT Office of General Counsel;

d. Initiation of suspension in accordance with COMAR regulations;

e. Referral to the Attorney General's Office for review for debarment or for criminal prosecution through the MDOT Office of General Counsel;

f. Any other action as appropriate, within the discretion of the Administrator.

2. If the documents used to determine the status of a MBE contains false, or misleading or misrepresenting information, the matter will be referred to the MDOT Office of the General Counsel for appropriate action. In addition, when directed by the Administrator, the Contractor shall terminate, without liability to the Administration, its contract with a firm, which for any reason, is either no longer certified or no longer eligible to do business in the State. The Contractor shall promptly submit plans for maintaining the required MBE participation on the project or appropriate request for waiver of all or part of the Contract goal with appropriate documentation to support Good Faith Efforts (as established by COMAR including the MDOT MBE/MBE Program Manual). The program and all revisions require the Administrator's approval.

3. Liquidated Damages. This contract requires the contractor to make good faith efforts to comply with the Minority Business Enterprise ("MBE") Program and contract provisions. The State and the Contractor acknowledge and agree that the State will incur damages, including but not limited to loss of goodwill, detrimental impact on economic development, and diversion of internal staff resources, if the Contractor does not make good faith efforts to comply with the requirements of the MBE Program and MBE contract provisions. The parties further acknowledge and agree that the damages the State might reasonably be anticipated to accrue as a result of such lack of compliance are difficult to ascertain with precision.

Therefore, upon a determination by the State that the Contractor failed to make good faith efforts to comply with one or more of the specified MBE Program requirements or contract provisions, the Contractor agrees to pay liquidated damages to the State at the rates set forth below. The Contractor expressly agrees that the State may withhold payment on any invoices as a set-off against liquidated damages owed. The Contractor further agrees that for each specified violation, the agreed upon liquidated damages are reasonably proximate to the loss the State is anticipated to incur as a result of such violation.

a. Failure to submit each monthly payment report in full compliance with COMAR 21.11.03.13B (3): $23.00 per calendar day until the monthly report is submitted as required.

b. Failure to include in its agreements with MBE subcontractors a provision requiring submission of payment reports in full compliance with COMAR 21.11.03.13B (4): $82.00 per week per MBE subcontractor.

c. Failure to comply with COMAR 21.11.03.12 in terminating, canceling, or changing the scope of work/value of a contract with an MBE subcontractor and/or amendment of the MBE participation schedule: the difference between the dollar value of the MBE participation commitment on the MBE participation schedule for that specific MBE firm and the dollar value of the work performed by that MBE firm for the contract.

d. Failure to meet the Contractor's total MBE participation goal and subgoal

commitments: the difference between the dollar value of the total MBE participation commitment on the MBE participation schedule and the MBE participation actually achieved.

Notwithstanding the use of liquidated damages, the State reserves the right to terminate the contract and exercise all other rights and remedies provided in the contract or by law.

E. SUBCONTRACTING.

Subcontracting by the Prime Contractor. Form B Request for Approval of Subcontractor shall be used by the Prime Contractor to request approval of a Subcontractor and also to ensure that a formal Subcontract has been or will be written and kept on file by the Prime Contractor. Completion and submittal of the form by the Prime Contractor acknowledges that the Administration's Contracting Officer may require the submission of the written Subcontract for review by the Administration and/or FHWA.

Lower Tier Subcontracting by an Approved Subcontractor. Form B Subcontractor's Request for Approval of Lower Tier Subcontractor shall be used by an Approved Subcontractor to request approval of a Lower Tier Subcontractor and also to ensure that a formal Subcontract has been or will be written and kept on file by the Subcontractor. Completion and submittal of the form by the Subcontractor acknowledges that the Administration's Contracting Officer may require the submission of the written Subcontract for review by the Administration and/or FHWA.

Form Acquisitions. Maryland State Highway Administration Form B may be acquired through the Administration's Contracts Award Team or District Office. All questions should be directed to the Office of Construction, Contracts Award Team.

It is the Administration's intention to randomly select during each calendar quarter a representative sample of written Subcontracts for review. This review will be conducted by the Office of Construction's Contracts Award Team.

NOTICE TO CONTRACTORS
CONCERNING THE MBE/DBE GOAL ON THIS CONTRACT

The Maryland Department of Transportation is committed to providing the maximum amount of contracting opportunities to certified Minority Business Enterprises (MBEs) and Disadvantaged Business Enterprises (DBEs). The previously established policy excluded consideration of the cost of supplying structural steel for MBE/DBE participation since there were no structural steel manufacturers certified by MDOT. This exemption is no longer applicable since MBE/ DBE firms have been certified under this category.

The Administration reserves the right to verify the accuracy of the dollar value included on the Contractor's Affirmative Action Plan, including the value associated with the manufacture, supply, and installation of structural steel.

CONTRACT PROVISIONS
MBE DUAL CERTIFICATION

Effective on October 1, 2009, Minority Business Enterprise (MBE) firms may elect to be dually certified as woman-owned businesses and as members of an ethnic or racial category. For purposes of achieving any gender or ethnic/racial MBE participation subgoals in a particular contract, an MBE firm that has dual certification may participate in the contract either as a woman-owned business or as a business owned by a member of a racial or ethnic minority group, **but not both**.

(a) A firm must be listed in the MDOT MBE/DBE Directory with the gender category in order to be used to meet the gender subgoal.

(b) A firm must be listed in the MDOT MBE/DBE Directory with an ethnic/racial category in order to be used to meet the ethnic/racial subgoal.

(c) A firm must be listed in the MDOT MBE/DBE Directory with both the gender and ethnic/racial categories in order for a contractor to have the option of selecting which of those categories it will use for the firm on a State contract.

(d) Contractors should designate whether the MBE firm will be used as a woman-owned business or as a business owned by a member of a racial/ethnic group before calculating the percentage of MBE participation goals and subgoals they intend to meet.

Maryland's MBE/DBE Directory will reflect the dual certification status beginning October 1, 2009. You can access the MBE/DBE Directory at http://mbe.mdot.state.md.us.

CONTRACT PROVISIONS

APPRENTICESHIP TRAINING FUND

Effective July 1, 2013 State Law requires all contractors and subcontractors working on State prevailing wage projects with prevailing wage determinations to register (Apprenticeship Training Fund Site) with the Division of Labor and Industry Prevailing Wage Unit prior to the commencement of work and to make certain contributions toward improving and expanding apprenticeship programs in the State. In addition, registered apprenticeship programs and organizations that have registered apprenticeship programs that have been selected by contractors and subcontractors for contributions also are required to register with the Division of Labor and Industry Prevailing Wage Unit.

The State Apprenticeship Training Fund requires contractors and some subcontractors on public work contracts to make contributions to: (1) a registered apprenticeship program, (2) an organization that operates registered programs, or (3) the State Apprenticeship Training Fund.

The following information concerning the requirements of the apprenticeship training fund program are being provided for informational purposes only. It is the contractor's responsibility to contact the Maryland Department of Labor, Licensing and Regulation (DLLR), prior to commencement of any work, to determine how these provisions are being implemented and enforced by DLLR.

Definitions. The following terms have the meanings indicated.

(a) Terms Defined.

(1) "Approved apprenticeship program" means an apprenticeship program or an organization with an apprenticeship program which has been registered with, and approved by, the Maryland Apprenticeship and Training Council or the United States Department of Labor.

(2) "Commissioner" means the Commissioner of Labor and Industry.

(3) "Covered craft" means a classification of workers listed in the prevailing wage determination applicable to a prevailing wage project.

(4) "Fund" means the State Apprenticeship Training Fund.

Hourly Contribution Rate.

(a) If a contractor participates in an apprenticeship training program for each covered craft, the contractor satisfies their obligation under State Finance and Procurement Article, §17-

603(a)(1), Annotated Code of Maryland, by making contributions of at least 25 cents per person per hour.

(b) If a subcontractor participates in an apprenticeship training program for each covered craft, the subcontractor satisfies their obligation under State Finance and Procurement Article, §17-604(a)(1), Annotated Code of Maryland, by making contributions of at least 25 cents per person per hour.

(c) Contractors and subcontractors that do not participate in an apprenticeship training program shall pay at least 25 cents per person per hour for each employee in each covered craft on the prevailing wage project to a registered apprenticeship program, an organization that has a registered apprenticeship program, or the Fund.

(d) Contractors and subcontractors who make contributions to the Fund shall do so on a monthly basis.

(e) Contractors and subcontractors who make contributions to a registered apprenticeship program or an organization that has a registered apprenticeship program shall make contributions on a monthly basis or consistent with a collective bargaining agreement or other contractual arrangement.

(f) If there is a prevailing wage determination that includes a fringe benefit contribution for apprenticeship that exceeds 25 cents per hour, a contractor or subcontractor that makes contributions to the Fund shall pay to the employee wages in the amount that the fringe benefit contribution for apprenticeship exceeds 25 cents per hour.

Contractor and Subcontractor Registration.

(a) Contractors performing work on a prevailing wage project shall complete the registration process at the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage.

(b) Subcontractors who are performing work valued at $100,000 or more on a prevailing wage project shall complete the registration process at the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage.

(c) Prior to the commencement of work, a registered contractor or registered subcontractor shall log onto the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage and complete the required project log information including:

(1) The prevailing wage project number;

(2) Contract value;

(3) Identification of subcontractors to perform work on the project and subcontract value amount;

(4) Designation of the program or Fund where the contractor or subcontractor will make contributions; and

(5) Any other information that the Commissioner requires.

Contractor and Subcontractor Notification to Subcontractors.

(a) Contractors and subcontractors who hire subcontractors performing work valued at $100,000 or more on a public work contract subject to the Maryland Prevailing Wage Law shall provide the subcontractors with written notice of the following requirements:

(1) Subcontractors shall complete the registration process at the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage;

(2) Prior to the commencement of work, a subcontractor shall log onto the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage and complete the required project log information including:

(a) The prevailing wage project number;

(b) Contract value;

(c) Identification of all subcontractors to perform work on the project and subcontract value amount;

(d) Designation of the program or Fund where the subcontractor will make contributions; and

(e) Any other information that the Commissioner requires; and

(f) Subcontractors performing work on a prevailing wage project valued at $100,000 or more are required to make payments to approved apprenticeship programs or to the Fund for each employee employed in classifications listed on the prevailing wage determination.

(b) Contractors and subcontractors shall retain a copy of the written notice required in §A of this regulation that was provided to covered subcontractors for inspection and review by the Commissioner for 3 years after the completion of their work on a public work project.

Contractor and Subcontractor Obligations Related to Contributions.

Contractors and subcontractors are required to:

(a) Indicate on their prevailing wage payroll record their contributions under State Finance and Procurement Article, §17-603 or 17-604, Annotated Code of Maryland; and

(b) Certify that the contributions were received by an approved apprenticeship program or the Fund.

Notification to Division of Labor and Industry of Changes to Designated Approved Apprenticeship Programs or Fund.

(a) Contractors and subcontractors shall log onto the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage and indicate each approved apprenticeship program or the Fund to which it will make contributions.

(b) If a contractor or subcontractor intends to change a designation, it shall log onto the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage to indicate the change in designation 30 days prior to that change.

Approved Apprenticeship Program Obligations.

(a) Upon notice from the Division of Labor and Industry that the approved apprenticeship program has been designated for contributions by a contractor or subcontractor, an approved apprenticeship program shall register on the Division of Labor and Industry's website at https://www.dllr.state.md.us/prevwage.

(b) An approved apprenticeship program shall complete the requested information on contributions received from contractors and subcontractors for each covered craft for each prevailing wage project at the Division of Labor and Industry's website at http://www.dllr.state.md.us/prevwage on or before the last day of the month immediately following each calendar quarter.

(c) Certify that all funds received are used solely for the purpose of improving or expanding apprenticeship training in the State.

Audit of an Approved Apprenticeship Program. The Commissioner may require an independent audit by a certified public accountant of an approved apprenticeship program to verify that contributions received are used consistent with this subtitle.

Enforcement Procedures.

(a) The Commissioner may investigate whether State Finance and Procurement Article, Title 17, Subtitle 6, Annotated Code of Maryland, has been violated:

(1) On the Commissioner's own initiative;

(2) On receipt of a written complaint; or

(3) On referral from another State agency.

(b) The Commissioner may require a contractor, subcontractor, or an approved apprenticeship program to produce records as part of its investigation.

(c) The Commissioner may enter a place of business to:

(1) Interview individuals; or

(2) Review and copy records.

(d) If after an investigation, the Commissioner determines that there is a violation of State Finance and Procurement Article, Title 17, Subtitle 6, Annotated Code of Maryland, or a regulation adopted to carry out the title, the Commissioner shall issue an administrative charge that shall:

(1) Describe in detail the nature of the alleged violation;

(2) Cite the provision of law or regulation that is alleged to have been violated; and

(3) State the penalty, if any.

(e) Within a reasonable amount of time after the issuance of the administrative charge, the Commissioner shall send a copy of the administrative charge to the alleged violator by certified mail with notice of the opportunity to request a hearing.

(f) Within 15 days after the alleged violator receives the administrative charge, the employer may submit a written request for a hearing on the administrative charge and proposed penalty.

(g) If a hearing is not requested within 15 days, the administrative charge, including any penalties, shall become a final order of the Commissioner.

(h) If there is a request for a hearing, the Commissioner may delegate the hearing to the Office of Administrative Hearings in accordance with State Government Article, Title 10, Subtitle 2, Annotated Code of Maryland.

(i) A proposed decision of an administrative law judge shall become a final order of the Commissioner unless, within 15 days of the issuance of the proposed decision:

(1) The Commissioner orders review of the proposed decision; or

(2) The alleged violator submits to the Commissioner a written request for review of the proposed decision.

(j) After review of the proposed decision under §I of this regulation, with or without a hearing on the record, the Commissioner shall issue an order that affirms, modifies, or vacates the proposed decision.

MBE/DBE COMPLIANCE FIELD MEETING

A MBE/DBE compliance Field Meeting will be conducted to review the responsibilities of the Administration and the Contractor's personnel relative to MBE/DBE Compliance and documentation. The meeting will be held within two weeks after starting work on the project.

The Construction Project Engineer, who will notify the following of the date, time and location, will arrange the meeting. At least one week advanced notice will be required.

(a) Administrative Representatives.

(1) Director, Office of Equal Opportunity or Designee

(2) District Equal Opportunity Officer

(3) Regional Constructional Engineer

(4) Construction Project Engineer

(5) Construction Inspection Division Inspector

(b) Contract Representatives.

(1) Superintendent - Prime Contractor

(2) Equal Opportunity Officer - Prime Contractor

(3) Owner/Superintendent/Foreman MBE/ DBE - Subcontractor

The Construction Project Engineer and Equal Opportunity Representative will jointly conduct the meeting. The Contractor shall notify the appropriate subcontractors and ensure their attendance.

TRAFFIC CONTROL PLAN CERTIFICATION FOR DESIGN-BUILD

PRIOR TO THE COMMENCEMENT OF WORK ON THIS PROJECT, THE SUCCESSFUL BIDDER WILL BE REQUIRED TO COMPLETE A TRAFFIC CONTROL PLAN CERTIFICATION, CONTAINING THE INFORMATION SHOWN BELOW. THE CERTIFICATION FORM WILL BE PROVIDED TO THE SUCCESSFUL BIDDER UPON AWARD OF THE CONTRACT.

The Administration's Traffic Control Plan (TCP) has been reviewed and the following course of action shall be followed:

Option 1 ___ See Note Below
The TCP is accepted and shall be used on this project.

Option 2 ___ See Note Below
The TCP is accepted; however, revisions and/or additions shall be submitted for approval in conformance with the Administration's Specifications 104.01.

Option 3
The TCP is not accepted and revision shall be submitted for approval in accordance with the Administration's Specifications 104.01.

It is understood that the effective implementation of the approved TCP is the responsibility of the Contractor. Minor modifications may be made by the Traffic Manager if field conditions warrant and prior concurrence is obtained from the Engineer. Significant changes to the TCP will be submitted to the Engineer in writing, for approval, in conformance with the Administration's Specifications 104.01.

_____ _____
(DATE) (SIGNATURE)

_____
(PRINT SIGNATURE)

_____
(TITLE)

Note: Option 1 and 2 shall not be used on this project.
This is a Design-build project and the Design-Build Team must prepare a TCP based on the requirements in the Administrations Specifications 104.01.

PREVAILING WAGE INSTRUCTIONS FOR THE CONTRACTOR

PAYROLLS.

Non-Federally Funded Contracts. The Division of Labor and Industry, Prevailing Wage Unit is requiring that all certified payroll records be submitted electronically. For instructions on how to register and submit go online to www.dllr.state.md.us/prevwage and follow the instructions for registering. The regulation addressing this change can be found at COMAR 21.11.11.02. For Non-Federally funded projects, which include prevailing wage rates**,** the prime Contractor and each subcontractor, shall submit the certified payroll electronically and provide one hard scopy to the Project Engineer. All wages shall be paid in conformance with the State Finance and Procurement Article, Section 17-201-17-226 of the Annotated Code of Maryland and the Fair Labor Standards Amendments of 1974 (P.L. 93259). If the award amount of a Non-Federally funded job is less than $500,000, the project will be exempt from prevailing wage requirements.

A review has been made of the wage conditions in the locality and, based on the information available, the wage rates and fringe payments listed are determined by the Commissioner of the Department of Labor and Industry to be prevailing for the Contract for the described classes of labor in conformance with the law. It shall be the responsibility of the Contractor to fully comply with the law and to contact the Office of the Commissioner of Labor and Industry for interpretation of the provisions of the law.

Federally Funded Contracts. For Federally funded projects, the prime Contractor and each subcontractor shall submit one copy of the certified payroll to the Project Engineer.

General Requirements for Federally and Non-Federally Funded Contracts. All payrolls are subject to the following requirements:

(a) All payrolls shall be numbered, beginning at No. 1, and consecutively numbered through the end of the Contract.

(b) Contract and FAP numbers shall be shown on all payrolls (as applicable).

(c) All payroll submissions shall include:

(1) Federally Funded – employees' full name, classification, and Individual Identifying Number (IIN) e.g. (last four digits of social security number). Refer to FHWA 1273 (IV),(3),(b)1) for further requirements related to weekly payrolls.

(2) Non-Federally Funded – employees' full name, classification, address and social security number.

(d) All payrolls shall show the employee's basic hourly wage rate, overtime rate (if applicable), and the number of hours worked (tabulated both daily and weekly).

(e) When fringe benefits are required, indicate separately the amount of employer contributions to fringe benefit funds and/or programs. The fringe benefits shall be individually identified, but may be tabulated on a separate sheet. When required fringe benefits are paid in cash, add the required fringe benefit amount to the basic hourly rate to obtain the total prevailing wage rate for the employee.

(f) The employee's net pay and the itemized deductions shall be included in all payrolls.

(g) A Contractor may make deductions that are required by law or required by a collective bargaining agreement (between the Contractor and a bona fide labor organization). Deductions are also permitted if they are identified in a written agreement between the employee and employer that was made at the beginning of employment, provided that the Contractor presents the agreement to the Administration before the employee begins working on the Contract. Each payroll shall also include the U.S. Department of Labor and Hour Public Contracts Division Statement of Compliance Form WH-347 (or its equivalent), signed by an appropriate official of the Contractor/subcontractor. The Contractor's name, address, and telephone number shall also be shown.

(h) On Non-Federally funded projects, all apprentices shall be registered with the Maryland Apprenticeship and Training Council.

(i) Contractors employing a classification of worker for which a wage rate was not included on the original wage decision, shall submit to either the Wage and Hour Team (Federally Funded) or Department of Labor and Licensing (DLLR), (Non-Federally Funded), a request for an additional classification and rate prior to the employee's employment at the project.

(j) Payrolls for Non-Federally Funded projects shall be submitted within 14 calendar days after the end of each payroll period.

(k) Payrolls for Federally Funded projects shall be submitted within 7 calendar days after the end of each payroll period.

(l) Contractors and Subcontractors are required to maintain complete social security numbers and home addresses for employees. Government agencies are entitled to request or review all relevant payroll information, including social security numbers and addresses of employees. Contractors and Subcontractors are required to provide such information upon request.

OVERTIME.

Non-Federally Funded Contracts. Overtime rates shall be paid by the prime Contractors and subcontractors under their Contracts and agreements with their employees, which in no event shall be less than time and a half the prevailing hourly rate of wages for all hours worked in excess of ten hours in any one calendar day or forty hours in any one calendar week and work performed on Sundays and legal holidays.

Fringe benefits shall be paid for all hours worked, including the overtime hours. However, the fringe benefit amounts may be excluded from the half time premium due as overtime compensation.

Federally Funded Contracts. Overtime rates shall be paid as specified in Form FHWA 1273. Fringe benefits shall be paid for all hours worked, including the overtime hours. However, the fringe benefit amounts may be excluded from the half time premium due as overtime compensation.

PENALTIES.

Non-Federally Funded Contracts. When the Contractor is delinquent in submitting payroll records, processing of partial payment estimates will be held in abeyance, pending receipt of the records. The Contractor shall be liable to the Administration for liquidated damages in the amount of $10.00 for each calendar day the records are late.

The Contractor shall be liable to the Administration for liquidated damages in the amount of $20.00 for each day that an employee is paid less than the prevailing wage.

Federally Funded Contracts. When the Contractor is delinquent in submitting payroll records, processing of partial payment estimates will be held in abeyance pending receipt of the records.

ADDITIONAL CLASSIFICATIONS.

Federally Funded Contracts. If the wage determination lacks a necessary classification the Prime Contractor is responsible to submit the request for the additional classification, with a proposed rate, to the State Highway Administration's Wage and Hour Team. The request is to include a copy of the projects wage determination.

Non-Federally Funded Contracts. If the wage determination lacks a necessary classification the Prime Contractor is responsible to submit the request for the additional classification, with a proposed rate, to the Department of Labor and Licensing (DLLR).

INQUIRIES.

Request for information or questions shall be addressed to:

Maryland State Highway Administration
Office of Construction
Wage and Hour Team
7450 Traffic Drive, Building #4
Hanover, MD 21076
or
Email: wageandhourteam@sha.state.md.us

Maryland Division of Labor & Industry

STATE OF MARYLAND

DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. Eutaw Street, Room 607
Baltimore, MD 21201
(410) 767-2342

06/02/2016

REQUEST FOR ADVERTISEMENT AND NOTICE TO PROCEED

Brett Deane - Procurement Officer
State Highway Administration
707 North Calvert Street, Mail Stop-C102
Baltimore, MD 21202

Re: 4 Lane Divided Highway Construction

Project No: HO1415170

Enclosed please find the Prevailing Wage Determination and Instructions for Contractors for the project referenced above.

Upon advertisement for bid or proposal of this project, you are requested to submit to this office the date and name of publication in which such advertisement appeared.

Once awarded, you are further directed to submit to this office, the NOTICE TO PROCEED for the project, complete with the date of notice, the name of the general contractor, and the dollar amount of the project. In addition, we ask that a representative of the prevailing wage Unit be invited to attend the Pre-Construction Conference.

Any questions concerning this matter may be referred to PrevailingWage@dllr.state.md.us

Sincerely,

Enclosures
Wage Determination
Instruction for the Contractor

Prevailing Wage Unit

PREVAILING WAGE INSTRUCTIONS FOR THE CONTRACTOR & SUBCONTRACTOR

The contractor shall electronically submit completed copies of certified payroll records to the Commissioner of Labor & Industry, Prevailing Wage Unit by going on-line to https://www.dllr.state.md.us/prevwage and following the instructions for submitting payroll information (NOTE: A contractor must register prior to submitting on-line certified payroll information).

If you have technical questions regarding electronic submittal, contact the Department at prevailingwage@dllr.state.md.us.

All certified payroll records shall have an accurate week beginning and ending date. The contractor shall be responsible for certifying and submitting to the Commissioner of Labor and Industry, Prevailing Wage Unit all of their subcontractors' payroll records covering work performed directly at the work site. By certifying the payroll records, the contractor is attesting to the fact that the wage rates contained in the payroll records are not less than those established by the Commissioner as set forth in the contract, the classification set forth for each worker or apprentice conforms with the work performed, and the contractor or subcontractor has complied with the provisions of the law.

A contractor or subcontractor may make deductions that are (1) required by law; (2) required by a collective bargaining agreement between a bona fide labor organization and the contractor or subcontractor; or (3) contained in a written agreement between an employee and an employer undertaken at the beginning of employment, if the agreement is submitted by the employer to the public body awarding the public work and is approved by the public body as fair and reasonable.

A contractor or subcontractor is required to submit information on-line on their fringe benefit packages including a list of fringe benefits for each craft employed by the contractor or subcontractor, by benefit and hourly amount. Where fringe benefits are paid in cash to the employee or to an approved plan, fund, or program, the contribution is required to be indicated.

Payroll records must be electronically submitted and received within 14 calendar days after the end of each payroll period. If the contractor is delinquent in submitting payroll records, processing of partial payment estimates may be held in abeyance pending receipt of the records. In addition, if the contractor is delinquent in submitting the payroll records, the contractor shall be liable to the contracting public body for liquidated damages. The liquidated damages are $10.00 for each calendar day the records are late.

Only apprentices registered with the Maryland Apprenticeship and Training Council shall be employed on prevailing wage projects. Apprentices shall be paid a percentage of the determined journey person 's wage for the specific craft.

Overtime rates shall be paid by the contractor and any subcontractors under its contracts and agreements with their employees which in no event shall be less than time and one-half the prevailing hourly rate of wages for all hours worked in excess of ten (10) hours in any one calendar day; in excess of forty (40) hours per workweek; and work performed on Sundays and legal holidays.

Contractors and subcontractors employing a classification of worker for which a wage rate was not issued SHALL notify the Commissioner of Labor & Industry, Prevailing Wage Unit, for the purpose of obtaining the wage rate for said classification PRIOR TO BEING EMPLOYED on the project. To obtain a prevailing wage rate which was NOT listed on the Wage Determination, a contractor or subcontractor can look on the DLLR webpage under prevailing wage.

Contractors and subcontractors shall maintain a valid copy of proper State and county licenses that permit the contractor and a subcontractor to perform construction work in the State of Maryland. These licenses must be retained at the worksite and available for review upon request by the Commissioner of Labor and Industry’s designee.

**Each contractor under a public work contract subject to Section 17-219 shall:

1. Post a clearly legible statement of each prevailing wage rate to be paid under the public work contract; and
2. Keep the statement posted during the full time that any employee is employed on the public work contract.
3. The statement of prevailing wage rates shall be posted in a prominent and easily accessible place at the site of the public work.

****Penalty - Subject to Section 10-1001 of the State Goverment Article, the Commissioner may impose on a person that violates this section a civil penalty of up to $50.00 per violation.**

Under the Maryland Apprenticeship and Training Council requirements, consistent with proper supervision, training and continuity of employment and applicable provisions in collective bargaining agreements, a ratio of one journey person regularly employed to one apprentice shall be allowed. No deviation from this ratio shall be permitted without prior written approval from the Maryland Apprenticeship and Training Council.

Laborers may NOT assist mechanics in the performance of the mechanic's work, NOR USE TOOLS peculiar to established trades.

ALL contractors and subcontractors shall employ only competent workers and apprentices and may NOT employ any individual classified as a HELPER or TRAINEE on a prevailing wage project.

The State Apprenticeship and Training Fund (Fund) law provides that contractors and certain subcontractors performing work on certain public work contracts are required to make contributions toward apprenticeship. See §17-601 through 17-606, State Finance and Procurement, Annotated Code of Maryland. Contractors and subcontractors have three options where they can choose to make their contributions: (1) participate in a registered apprenticeship training program; (2) contribute to an organization that has a registered apprenticeship training program; or (3) contribute to the State Apprenticeship and Training Fund.

The Department of Labor, Licensing and Regulation (DLLR) is moving forward with final adoption of regulations. The regulations were published in the December 14, 2012 edition of the Maryland Register.

IMPORTANT: Please note that the obligations under this law will become effective on JULY 1, 2013. This law will require that contractors and certain subcontractors make contributions toward apprenticeship and report those contributions on their certified payroll records that they submit pursuant to the prevailing wage law.

The Department is offering outreach seminars to any interested parties including contractors, trade associations, and any other stakeholders. Please contact the Department at prevailingwage@dllr.state.md.us or (410) 767-2968 for seminar times and locations. In addition, information regarding this law will be provided at pre-construction meetings for projects covered by the Prevailing Wage law.

For additional information, contact:
Division of Labor and Industry
Maryland Apprenticeship and Traning
1100 North Eutaw Street, Room 606
Baltimore, Maryland 21201
(410) 767-2246
E-Mail Address: matp@dllr.state.md.us.

STATE OF MARYLAND

DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. Eutaw Street, Room 607
Baltimore, MD 21201
(410) 767-2342

The wage rates to be paid laborers and mechanics for the locality described below is announced by order of Commissioner of Labor and Industry.

It is mandatory upon the successful bidder and any subcontractor under him, to pay not less than the specific rates to all workers employed by them in executing contracts in this locality. Reference: Annotated Code of Maryland State Finance and Procurement, Section 17-201 thru 17-226.

These wage rates were taken from the locality survey of 2015 for Howard County, issued pursuant to the Commissioner's authority under State Finance and Procurement Article Section 17-209, Annotated Code of Maryland or subsequent modification.

**Note: If additional Prevailing Wage Rates are needed for this project beyond those listed below, contact the Prevailing Wage Unit. Phone: (410) 767-2342, email: prevailingwage@dllr.state.md.us.

Name and Title of Requesting Officer: Brett Deane - Procurement Officer

Department, Agency or Bureau: State Highway Administration

707 North Calvert Street, Mail Stop-C102 Baltimore, MD 21202

Project Number: HO1415170

Determination Number: 29371

Location and Description of work:

Howard County: 4 Lane Divided Highway Construction of MD 32 from MD 108 to the Linden Church Road Interchange

Date of Issue: Jun 02, 2016

HIGHWAY CONSTRUCTION

CLASSIFICATION	MODIFICATION REASON	BASIC HOURLY RATE	BORROWED FROM	FRINGE BENEFIT PAYMENT
CARPENTER	AD	$26.21		$12.95
CARPENTER - SHORING SCAFFOLD BUILDER	AD	$26.21		$12.95
CEMENT MASON	AD	$24.61	013	$12.74
ELECTRICIAN	AD	$35.60	003	$16.56
IRONWORKER - REINFORCING	AD	$27.98	510	$18.89
IRONWORKER - STRUCTURAL	AD	$27.98	510	$18.89
MILLWRIGHT	AD	$29.46		$13.20
PAINTER - BRIDGE	AD	$33.73		$9.90
PILEDRIVER	AD	$26.21	510	$12.95
POWER EQUIPMENT OPERATOR - ASPHALT DISTRIBUTOR	AD	$23.08	003	$11.35
POWER EQUIPMENT OPERATOR - BACKHOE	AD	$26.95	003	$11.65

POWER EQUIPMENT OPERATOR - BOOM TRUCK	AD	$30.45	003	$12.15	
POWER EQUIPMENT OPERATOR - BROOM / SWEEPER	AD	$26.05		$11.65	
POWER EQUIPMENT OPERATOR - BULLDOZER	AD	$26.95	003	$11.65	
POWER EQUIPMENT OPERATOR - CONCRETE CURB AND GUTTER PAN	AD	$24.85		$11.80	a
POWER EQUIPMENT OPERATOR - CRANE	AD	$31.00		$15.35	a
POWER EQUIPMENT OPERATOR - DRILL - RIG	AD	$39.16	005	$14.10	
POWER EQUIPMENT OPERATOR - EXCAVATOR	AD	$26.95		$11.65	a
POWER EQUIPMENT OPERATOR - FORKLIFT	AD	$26.95	025	$11.65	
POWER EQUIPMENT OPERATOR - GRADALL	AD	$27.95		$11.65	a
POWER EQUIPMENT OPERATOR - GRADER	AD	$27.95	003	$11.65	a
POWER EQUIPMENT OPERATOR - GUARD RAIL POST DRIVER	AD	$24.85	025	$11.55	
POWER EQUIPMENT OPERATOR - LOADER	AD	$26.95		$11.65	a
POWER EQUIPMENT OPERATOR - MECHANIC	AD	$26.95	510	$11.65	
POWER EQUIPMENT OPERATOR - MILLING MACHINE	AD	$26.95		$11.65	a
POWER EQUIPMENT OPERATOR - OILER	AD	$20.00	005	$15.37	
POWER EQUIPMENT OPERATOR - PAVER	AD	$26.05		$11.65	a
POWER EQUIPMENT OPERATOR - ROLLER - ASPHALT	AD	$26.05		$11.65	
POWER EQUIPMENT OPERATOR - ROLLER - EARTH	AD	$26.05	510	$11.65	
POWER EQUIPMENT OPERATOR - SCREED	AD	$26.76	003	$7.97	
POWER EQUIPMENT OPERATOR - SKID STEER (BOBCAT)	AD	$23.99		$11.65	a
POWER EQUIPMENT OPERATOR - SKIDDER	AD	$17.25	005	$6.47	
POWER EQUIPMENT OPERATOR - TRENCHER	AD	$30.68	005	$3.61	
POWER EQUIPMENT OPERATOR-VACCUM TRUCK	AD	$33.25	510	$2.63	
STEAMFITTER/PIPEFITTER	AD	$36.87	025	$18.48	
TRUCK DRIVER - A FRAME	AD	$22.97	005	$7.03	
TRUCK DRIVER - DUMP	AD	$18.50	005	$3.04	
TRUCK DRIVER - DUMP - ARTICULATING	AD	$23.00	003	$6.25	
TRUCK DRIVER - FLATBED	AD	$20.53	025	$0.00	
TRUCK DRIVER - LOWBOY	AD	$23.24	510	$5.83	
TRUCK DRIVER - TACK/TAR TRUCK	AD	$23.24	003	$8.16	
TRUCK DRIVER - TRACTOR TRAILER	AD	$26.95	003	$11.55	
TRUCK DRIVER - WATER	AD	$21.67	510	$4.90	
LABORER GROUP II					
LABORER - ASPHALT RAKER	AD	$21.14	003	$10.39	
LABORER - COMMON	AD	$21.14	003	$10.39	
LABORER - CONCRETE PUDDLER	AD	$21.14	003	$10.39	
LABORER - CONCRETE TENDER	AD	$21.14	003	$10.39	
LABORER - CONCRETE VIBRATOR	AD	$21.14	003	$10.39	
LABORER - DENSITY GAUGE	AD	$21.14	003	$10.39	
LABORER - FIREPROOFER - MIXER	AD	$21.14	003	$10.39	
LABORER - FLAGGER	AD	$21.14	003	$10.39	
LABORER - GRADE CHECKER	AD	$21.14	003	$10.39	
LABORER - HAND ROLLER	AD	$21.14	003	$10.39	
LABORER - JACKHAMMER	AD	$21.14	003	$10.39	
LABORER - LANDSCAPING	AD	$21.14	003	$10.39	

LABORER - LAYOUT	AD	$21.14	003	$10.39
LABORER - LUTEMAN	AD	$21.14	003	$10.39
LABORER - MORTAR MIXER	AD	$21.14	003	$10.39
LABORER - PLASTERER - HANDLER	AD	$21.14	003	$10.39
LABORER - TAMPER	AD	$21.14	003	$10.39
LABORERS GROUP I				
LABORER - AIR TOOL OPERATOR	AD	$29.63	003	$6.55
LABORER - ASPHALT PAVER	AD	$29.63	003	$6.55
LABORER - BLASTER - DYNAMITE	AD	$29.63	003	$6.55
LABORER - BURNER	AD	$29.63	003	$6.55
LABORER - CONCRETE SURFACER	AD	$29.63	003	$6.55
LABORER - HAZARDOUS MATERIAL HANDLER	AD	$29.63	003	$6.55
LABORER - MASON TENDER	AD	$29.63	003	$6.55
LABORER - PIPELAYER	AD	$29.63	003	$6.55
LABORER - SCAFFOLD BUILDER	AD	$29.63	003	$6.55

FRINGE REFERENCES AS NOTED:

a. PAID HOLIDAYS: New Year Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day & Christmas Day.

b. PAID VACATIONS: Employees with 1 year service - 1 week paid vacation;
2 years service - 2 weeks paid vacation;
10 years service - 3 weeks paid vacation.

Incidental Craft Data: Caulker, Man Lift Operator, Rigger, Scaffold Builder, and Welder receive the wage and fringe rates prescribed for the craft performing the operation to which welding, scaffold building, rigging, operating a Man Lift, or caulking is incidental.

These **Informational Prevailing Wage Rates** may not be substituted for the requirements of pre-advertisement or onsite job posting for a public work contract that exceeds $500,000 in value and either of the following criteria are met: (1) the contracting body is a unit of State government or an instrumentality of the State and there is any State funding for the project; or (2) the contracting body is a political subdivision, agency, person or entity (such as a county) and the State funds 50% or more of the project.

Modification Codes:

(AD) 17-209 Annual Determination from Survey Wage Data Received
(CH) 17-211 Commissioners' Hearing
(CR) 17-208 Commissioners' Review
(SR) 17-208 Survey Review by Staff

Each "Borrowed From" county is identified with the FIPS 3-digit county code unique for the specific jurisdiction in Maryland.

For additional information on the FIPS (Federal Information Processing Standard) code, see http://www.census.gov/datamap/fipslist/AllSt.txt

The Prevailing Wage rates appearing on this form were originally derived from Maryland's annual Wage Survey. The Commissioner of Labor & Industry encourages all contractors and interested groups to participate in the voluntary Wage Survey, detailing wage rates paid to workers on various types of construction throughout Maryland.

A mail list of both street and email addresses is maintained by the Prevailing Wage Unit to enable up-to-date prevailing wage information, including Wage Survey notices to be sent to contractors and other interested parties. If you would like to be included in the mailing list, please forward (1) your Name, (2) the name of your company (if applicable), (3) your complete postal mailing address, (4) your email address and (5) your telephone number to PWMAILINGLIST@dllr.state.md.us. Requests for inclusion can also be mailed to: Prevailing Wage, 1100 N. Eutaw Street - Room 607, Baltimore MD 21201-2201.

CONTRACTOR AFFIRMATIVE ACTION PROGRAM

1. GENERAL

a. The Contractor shall cooperate with the Maryland Department of Transportation in carrying out its equal opportunity obligations and in the Department's review of the Contractor's activities performed under this contractual agreement.

b. All contractors shall comply with the Governor's Code of Fair Practices, Promulgated July, 1976. The Contractor shall include these requirements in every subcontract with such modifications of language as is necessary to make these provisions binding on the subcontractor.

c. All contractors shall comply with Maryland Department of Transportation Minority Business Enterprise Program requirements.

2. APPLICABILITY

a. The Maryland Department of Transportation Contractor Affirmative Action/Equal Employment Opportunity Program requirements are applicable to all contractors doing business with the Maryland Department of Transportation.

b. The Maryland Department of Transportation Minority Business Enterprise Program requirements are applicable to construction contracts in excess of $100,000.

3. DEFINITIONS

a. Affirmative Actions - The efforts exerted toward achieving equal employment opportunity through positive, aggressive and continuous results-oriented measures to correct past and present discriminating practices and their effects on the conditions and privileges of employment.

b. Contractor/Subcontractor - The individual, partnerships, firm or corporation undertaking the execution of work under the terms of a contract and acting directly or through his agents or employees.

c. Corrective Action - A contractor's written and signed commitment outlining specific actions to be taken with time limits, goals, etc., to correct a violation of applicable EEO regulations.

d. Discrimination - A distinction in treatment, whether intentional or unintentional, based on political or religious opinion or affiliation, race, color, creed or national origin or sex, physical or mental handicap or age, except where sex, handicap or age involves a bona fide job requirement.

e. Equal Employment Opportunity Officer - A designated employee of the Contractor whose responsibility it shall be to implement and maintain the Affirmative Action Plan.

f. "Good Faith Effort" - A results-oriented positive action designed to achieve Affirmative Action objectives or goals.

g. Personnel Actions - All decisions respecting employment including, but not limited to hiring, upgrading, demotion, transfer, recruitment or advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training to include apprenticeship, pre-apprenticeship or on-the-job training.

4. LEGAL MANDATES

a. Title VI, Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin in all programs and activities which receive Federal Financial Aid. Employment discrimination is prohibited if a primary purpose of Federal assistance is a provision of employment, e.g., apprenticeship, training, work study, or similar programs. Revised guidelines in 1973 prohibit discriminatory employment practices in all programs if such practices cause discrimination in services provided to beneficiaries of the program.

b. Title VII, Civil Rights Act of 1964 (as amended by the Equal Employment Opportunity Act of 1972). Title VII prohibits discrimination because of race, color, religion, sex or national origin, in any term, condition, or privilege of employment.

c. Executive Order 11246 (as amended). This order, issued by the President in 1965, requires Equal Employment Opportunity/Affirmative Action Programs by all Federal contractors and subcontractors. It also requires that firms with contracts over $50,000.00 and 50 or more employees develop and implement written programs, which are to be monitored by the Federal Office of Contract Compliance. Specific requirements for such result oriented programs are identified in the Revised Order # 4 issued by the Federal Office of Contract Compliance, U.S. Department of Labor. These requirements include identifying areas of minority and female under-utilization, numerical promotional and hiring goals, and other actions to increase minority employment in classifications where they are currently under-utilized.

d. The Age Discrimination Act of 1967 prohibits employers of 25 or more persons from discriminating against persons 40-65 years of age in any area of employment due to their age.

e. National Labor Relations Act of 1935. Discrimination on the basis of race, religion, sex, or national origin constitutes an unfair labor practice. It shall be unlawful under this Act for employers to participate with unions in the commission of any discriminatory practices or to practice discrimination in a manner which gives rise to racial, or other division, amongst employees to the detriment of organized union activity. It shall be unlawful for unions to exclude individuals discriminatorily from union memberships, thereby causing them to lose job opportunities, to discriminate in the representation of union members or non-members in collective bargaining, in the processing of grievance, or in any other respect which may cause or attempt to cause employers to enter into discriminatory agreements, or otherwise discriminate against members and non-members.

f. Governor's Code of Fair Practices for the State of Maryland (Amended). The Governor of Maryland issued a revised Code of Fair Practices which was promulgated March 3, 1988, in recognition of the State's responsibility to root out the evils of discrimination on the basis of race, color, creed, national origin, sex and age. This Code was amended so as to be in compliance with Federal mandates regulating laws pertinent to Equal Employment Opportunity/Affirmative Action.

g. Rehabilitation Act of 1973 (Public Law 93-112). This law provides a statutory basis for the Rehabilitation Services Administration and to authorize programs to promote and expand employment opportunities in the public and private sectors for handicapped individuals.

h. Article 78A, Section 7A, Annotated Code of Maryland provides for nondiscrimination in State construction contracts and subcontracts. This provision obligates the Contractor not to discriminate in any manner against any employee or applicant for employment because of race, creed, color, or national origin and obligates subcontractors to the same.

i. Other Laws. Employment discrimination has also been ruled by courts to be prohibited by the Civil Rights Acts of 1866 and 1870, the equal protection clause of the Fourteenth Amendment of the Constitution of the United States, and the Equal Pay Act of 1963. Action under these laws on behalf of individuals or groups may be taken by individuals, private organizations, trade unions, or other groups.

5. ASSIGNMENT OF RESPONSIBILITIES

a. The Contractor will designate an Equal Employment Opportunity Officer. He/she will have the responsibility of implementing our Affirmative Action Plan. He/she will coordinate, advise and assist management and other key officials. He/she will render periodic reports to the responsible executives relative to the state of progress and make appropriate recommendations along these lines to the executives relative to the state of progress and make appropriate recommendations along these lines to the executives of this project.

b. The name of the EEO Officer, telephone number and address where he/she can be reached concerning any acts or alleged acts of discrimination, will be posted on the bulletin board at the home office as well as on the bulletin boards on all job sites.

6. DISSEMINATION OF POLICY

a. The Contractor will take appropriate steps to insure that all employees are advised of its policy of nondiscrimination of its interest in actively and affirmatively providing equal employment opportunity for all citizens. The steps include:

(1) Periodic meetings of supervisory and personnel office employees to be conducted at least every six months so that our EEO policy and plan may be revised and explained.

(2) All new supervisory and personnel office employees to be made aware of our EEO policy and plan as soon as practicable, but certainly within thirty (30) days following the date the first reporting for duty.

(3) Making our EEO policy known to all employees, prospective employees, and potential sources of employees, through schools, employment agencies, labor unions, college placement officers, etc., by taking the following actions:

(a) Notices and posters setting forth our EEO policy will be placed in areas readily accessible to employees and applicants for employment.

(b) Our EEO policy and the procedure for implementing the EEO policy will be brought to the attention of employees through meetings, employee handbooks, or other appropriate means.

7. RECRUITMENT

a. The Contractor will include in all advertising the following notation: "An Equal Opportunity Employer." We will insert all such advertisements in newspapers or other publications having large circulation among minorities and females in the area from which the project work is derived.

b. We will, unless precluded by a valid collective bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority and female applicants, including, but not limited to, State employment agencies, school, college, and minority/female organizations, i.e., the Urban League, NAACP, etc. To meet this requirement, we shall identify sources of potential minority/female employees and establish with such sources procedures whereby minority/female applicants may be referred to us for employment consideration.

c. We will develop procedures for promoting the employment of minority/female youth on an after-school, summer and vacation basis.

d. We will encourage our employees to refer minority/female applicants for employment by posting appropriate notices or bulletins in areas accessible to all such employees. In addition, information and procedures with regard to referring minority/female applicants will be discussed with employees.

8. PERSONNEL ACTIONS

a. To avoid discrimination in any of our personnel actions, the following procedures will be followed:

(1) We will conduct periodic inspections of projects sites to insure that working conditions and employee facilities do not indicate discriminatory practices.

(2) We will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

(3) We will periodically review personnel actions in depth to determine whether there is any evidence of discrimination. Where evidence is found, we will promptly take corrective action.

(4) We will investigate all complaints of alleged discrimination and shall attempt to resolve such complaints. Additionally, if the investigation indicates that the discrimination may affect persons other than the complainant, appropriate corrective actions will include other persons. Upon completion of each investigation, we will inform every complainant of all avenues of appeal.

9. TRAINING AND PROMOTION

a. To eliminate any discrimination in training and promotion, the following actions will be taken:

(1) We will assist in locating, qualifying, and increasing the skills of minority/female employees and applicants for employment.

(2) Consistent with our employment requirements and as permissible under State regulations, we will make full use of training programs, i.e., preapprenticeship, apprenticeship, and on-the-job training programs for the geographical area of contract performance.

(3) We will advise employees and applicants for employment of available training programs and entrance requirements for the programs.

(4) We will periodically review the training and promotional potential of minority/female employees and shall encourage eligible employees to apply for such training and promotions.

10. UTILIZATION OF UNIONS

a. In carrying out our Affirmative Action Plan, we will use good faith efforts to obtain the cooperation from unions we rely on, in whole or part, as a source of employees to increase opportunities for minority/female groups. We, either directly or through a contractor's association acting as our agent, will include the procedures set forth below:

(1) Use good faith efforts to develop, in cooperation with the unions, joint training programs aimed at qualifying more minorities/females for membership in the unions and increasing their skills so they may qualify for higher paying employment.

(2) Incorporate an Equal Employment Opportunity clause into all union agreements so that they shall be contractually obligated not to discriminate in the referral of job applicants.

11. UTILIZATION OF SUBCONTRACTORS

a. We will use good faith efforts to employ subcontractors whose employees reflect minority/female groups approximately equal to the number available in the current labor pool population, or owned by minority/female.

b. We will use good faith efforts to assure that all subcontractors comply with equal employment obligations as defined in the amended Code of Fair Practices.

12. RECORDS AND REPORTS

a. In accordance with the Governor's Code, Article III, Section A and C (2), we will keep such records as are necessary to determine compliance with our equal opportunity obligations. The records kept shall be designed to indicate:

(1) The number of minority/female and other persons employed in each work classification of the project.

(2) The progress and efforts being made in cooperation with unions, if any, to increase minority/female employment opportunities.

(3) The progress and efforts being made in locating, hiring, training, qualifying and upgrading minority/female employees.

(4) The progress and efforts being made in securing the services of minority/female subcontractors.

b. All such records will be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the Department of Transportation.

c. We will submit to the Administration a monthly report for the first three months after construction begins and, thereafter, upon request for the duration of the project. This report shall indicate the number of minority/female employees currently engaged in each work classification.

3. MONITORING

a. We will periodically evaluate our Affirmative Action Plan and the results achieved to insure that the plan is in compliance with our commitments.

SUGGESTED GOALS FOR TIMETABLES FOR MINORITY WORKHOUR UTILIZATION

For all trades, the following goals and timetables, as appropriate, for minority-workhour utilization shall be applicable:

(1) Baltimore Metropolitan SMSA - this area (Region 1) includes Anne Arundel, Baltimore, Carroll, Harford, Howard Counties and Baltimore City. The total distribution of work hours (actual work hours performed on the job) for minorities and females shall be consistent with the following utilization goals for minorities and females, respectively, and shall apply to all trades.

	UTILIZATION:
	MINORITIES
From January 1, 1980 to October 3, 1980	23.5% - 27.5%
After October 3, 1980	23.0%
	FEMALES
From August 16, 1979 to August 15, 1980	6.9%
After August 16, 1980	6.9%

(2) Eastern Shore Maryland NON-SMSA - this area (Region II) includes Caroline, Dorchester, Kent, Queen Annes, Somerset, Talbot, Wicomico, and Worcester Counties. The total distribution of work hours (actual work hours performed on the job) for minorities and females, respectively, and shall apply to all trades.

	UTILIZATION:
	MINORITIES
From January 1, 1980 to October 3, 1980	21% - 24%
After October 3, 1980	23.8%
	FEMALES
From August 16, 1979 to August 15, 1980	6.9%
From August 16, 1980	6.9% (3)

(3) Southern Maryland NON-SMSA - this area (Region III) includes Calvert, Frederick, Washington and St. Marys Counties. The total distribution of work hours (actual work hours performed on the job) for minorities and females shall be consistant with the following utilization goals for minorities and females, respectively, and shall apply to all trades.

	UTILIZATION:
	MINORITIES
From January 1, 1980 to October 3, 1980	25%
After October 3, 1980	25.2%
	FEMALES
From August 16, 1979 to August 15, 1980	6.9%
After August 16, 1980	6.9%

(4) Washington, D.C. Metropolitan SMSA - this area (Region IV) includes Charles, Montgomery and Prince Georges Counties. The total distribution of work hours (actual work hours performed on the job) for minorities and females shall be consistant with the following utilization goals for minorities and females, respectively, and shall apply to all trades.

	UTILIZATION:
	MINORITIES
After October 3, 1980	28.0%
	FEMALES
From August 16, 1979 to August 15, 1980	6.9%
After August 16, 1980	6.9%

(5) Western Maryland NON-SMSA - this area (Region V) includes Allegany and Garrett Counties. The total distribution of work hours (actual work hours performed on the job) for minorities and females shall be consistant with the following utilization goals for minorities and females, respectively, and shall apply to all trades.

	UTILIZATION:
	MIN0RITIES
From January 1, 1980 to October 3, 1980	3.0%
After October 3, 1980	4.8%
	FEMALES
From August 16, 1979 to August 15, 1980	6.9%
After August 16, 1980	6.9%

(6) Wilmington Delaware SMSA - this area (Region VI) includes Cecil County only. The total distribution of work hours (actual work hours performed on the job) for minorities and females shall be consistant with the following utilization goals for minorities and females, respectively, and shall apply to all trades.

	UTILIZATION:
	MINORITIES
From January 1, 1978 thru October 3, 1980	15% - 18.5%
After October 3, 1980	12.3%
	FEMALES
From August 16, 1979 to August 15, 1980	6.9%
After August 16, 1980	6.9%

NOTICE TO ALL HOLDERS OF THIS CONTRACT DOCUMENT

HIGH VISIBILITY SAFETY APPAREL POLICY

BACKGROUND. Research indicates that high visibility garments have a significant impact on the safety of employees who work on highways and rights-of-way. In addition, high visibility garments may help to prevent injuries and accidents and to make highway workers more visible to the motoring public, which ultimately improves traffic safety.

STATEMENT OF POLICY.

(a) The High Visibility Safety Apparel Policy provides a standardized apparel program.

(b) The program seeks to improve the visibility of all persons who work on Administration highways and rights-of-way.

(c) All apparel shall contain the appropriate class identification label.

(d) Compliance with this policy is retroactive and becomes effective immediately. All affected employees shall receive high visibility apparel awareness training.

APPLICABILITY. This policy applies to all Administration employees and all other persons who work on Administration highways and rights-of-way. All workers shall wear, at a minimum, Class 2 ANSI/ISEA 107/2004 apparel.

(a) For Administration employees, this apparel shall have a fluorescent yellow-green background material color and be the outermost garment worn.

(b) Retro-reflective material color for Administration employee apparel shall be silver or white and be visible at a minimum distance of 1,000 feet. The retro-reflective safety apparel shall be designed to clearly recognize and differentiate the wearer from the surrounding work environment. The retro-reflective material may be contrasted by fluorescent orange background material not exceeding one and one half inches on either side of the retro-reflective material.

(c) For non-Administration employees, this apparel shall be either fluorescent orange-red or fluorescent yellow-green background material color and be the outermost garment worn.

(d) Retro-reflective material color for non-Administration employee apparel shall either be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and be visible at a minimum distance of 1,000 feet. The retro-reflective safety apparel shall be designed to clearly recognize and differentiate the wearer from the surrounding work environment.

REFERENCES.

(a) ANSI/ISEA 107/2004 standard – American National Safety Institute/International Safety Equipment Association

(b) MUTCD 2003 – Manual for Uniform Traffic Control Devices - Sections 6D.03B and 6E.02

(c) Visibility Research – The VCTR 1989 report concludes that fluorescent colors, when compared with non-fluorescent colors, enhance the daytime conspicuity of worker clothing.

DEFINITIONS.

(a) Apparel – The outermost high-visibility garment worn by employees who work on Administration highways and rights-of-way.

(b) Highways – All roads owned by the Maryland Department of Transportation and maintained by the Administration.

(c) High Visibility – The ability for workers to be distinguishable as human forms to be seen, day and night, at distances that allow equipment operators and motorists to see, recognize, and respond.

SPECIFICATIONS

All work on this project shall conform to the Maryland Department of Transportation, State Highway Administration's Specifications entitled, "Standard Specifications for Construction and Materials" dated July 2008 revisions thereof, or additions thereto, and the Special Provisions included in this Invitation for Bids.

In the following sections of the "Standard Specifications for Construction and Materials." Dated July 2008, the word "Engineer" shall be taken to mean "Design-Build Engineer."

Category 100 Preliminary

Section 101.03.02	¶ 1, Line 1

Category 200 Grading

Section 201.03.04	¶ 6, Line 2
Section 201.03.10	¶ 1, Line 4
Section 204.02.03	¶ 1, Line 1
Section 206.04.02	¶ 5, Line 2

Category 300 Drainage

Section 306.04.03	¶ 1, Line 1
Section 310.03.02	¶ 1, Line 5,
Section 314.02.03	¶ 1, Line 5

Category 400 Structures

Section 402.03.04	¶ 2, Line 2
Section 410.03.09	¶ 1, Line 4
Section 411.03	¶ 2, Line 1,6
Section 430.03.14	¶ 1, Line 5

Category 500 Paving

Section 522.03	¶ 1, Line 1

Category 600 Shoulders

Section 606.03.01	¶ 5, Line 3
Section 607.03.01	¶ 3, Line 2

Category 800 – Traffic

Section 804.03.03	¶ 1, Line 6
Section 804.03.03	¶ 2, Line 2

Section 810.03.04	¶ 1, Line 3

Category 900 – Materials

Section 910.02.03	¶ 1, Line 3
Section 915.01.06	¶ 1, Line 4, 7
Section 921.10	¶ 1, Line 3

PROJECT DESCRIPTION

Refer to TC Section 2.07.02, Project Overview.

SPECIFICATIONS

All work on this project shall conform to the Maryland Department of Transportation, State Highway Administration's Specifications entitled, "Standard Specifications for Construction and Materials" dated July 2008 revisions thereof, or additions thereto, and the Special Provisions included in this Request for Proposals.

EMPLOYMENT AGENCY

The Maryland Department of Human Resources is located at:

HOWARD COUNTY

Columbia Workforce Center
7161 Columbia Gateway Drive, Columbia MD 21046
Telephone (410) 290-2600 Fax: (410) 312-0834
A One-Stop Partner
columbia@dllr.state.md.us

NOTICE TO CONTRACTOR
INCENTIVE – DISINCENTIVE

The Administration desires to expedite construction on this Contract to minimize the inconvenience to and improve safety for the traveling public and to reduce the time of construction. In order to achieve this, an Incentive – Disincentive provision is established for the Contract. The total Incentive payment shall not exceed **$549,000**. There shall be no limitation on the Disincentive deduction.

In the event the Design-Builder completes the Contract prior to the expiration of the Total Contract Time established at the time of submittal of the Price Proposal, the Administration will pay the Design-Builder an Incentive payment in the daily value of **$18,300** for each calendar day the actual completion date precedes the Total Contract Time established at the time of submittal of the Price Proposal and subject to the conditions precedent set forth below. For purposes of calculation and the determination of entitlement of the "Incentive payment" stated above, the Total Contract Time established at the time of the submittal of the Price Proposal will not be adjusted for any reason, cause or circumstance whatsoever, regardless of fault, save and except in the instance of a catastrophic event.

The parties anticipate that delays may be caused by or arise from any a number of events during the course of the Contract, including, but not limited to, work performed, work deleted, change orders, supplemental agreements, delays, disruptions, differing site conditions, utility conflicts, design changes or defects, time extensions, extra work, right of way issues, permitting issues, actions of suppliers, subcontractors or other contractors, actions by third parties, approval process delays, expansion of physical limits of project to make it functional, weather, weekends, holidays, suspensions of the Design-Builder's operations, or other such events, forces or factors sometimes experienced in highway construction work. Such delays and events and their potential impact on performance by the Design-Builder are specifically contemplated and acknowledged by the parties entering into this Contract, and shall not extend the Total Contract Time for the purposes of calculation of the "Incentive payment" set forth above. Further, any and all costs or impacts whatsoever incurred by the Design-Builder in accelerating its work to overcome or absorb such delays or events in an effort to complete the work prior to the Total Contract Time, regardless of whether the Design-Builder successfully does so or not, shall be the sole responsibility of the Design-Builder in every instance.

In the event that there is a catastrophic event where there is a declared state of emergency directly and substantially impacting the Design-Builder's operations on the Contract, the Design-Builder and the Administration shall agree as to the number of calendar days to extend the original Total Contract Time so that such extended Total Contract Time will be used in the calculation of the "Incentive payment". In the event the Design-Builder and the Administration are unable to agree to the number of calendar days to extend the Total Contract Time for the purposes of the calculation of the "Incentive payment", the Administration will unilaterally determine the number of calendar days to extend the Total Contract Time reasonable necessary and due solely to such catastrophic event. The Design-Builder shall have no right whatsoever to

contest such determination, save and except the Design-Builder establishes that the number of calendar days determined by the Administration were arbitrary or without any reasonable basis.

However, notwithstanding anything above to the contrary, upon the Design-Builder's written request being made directly to the Director, Office of Construction, with copies provided to both the District Engineer and the Chief, Innovative Contracting Division, the Administration reserves unto the Director, Office of Construction, in his sole and absolute discretion, according to the parameters set forth below, the authority to make a determination to either fully enforce the above provisions with no modification, modify the Total Contract Time by moving it, or both modify the Total Contract Time by moving it and also modify the "Incentive payment" amount by reducing it.

No modification of this "Incentive – Disincentive" provision will be considered by the Director, Office of Construction for any impacts, whatsoever, beyond the reasonable control of the Design-Builder unless the Design-Builder clearly establishes that it has continuously from the beginning of the project aggressively, efficiently, and effectively pursued the achievement of the "Incentive payment," including the utilization of any and all reasonable available means and methods to overcome all impacts and accelerate the work so as to still achieve the "Incentive payment," and that, but for this impact, the Design-Builder would have otherwise earned the "Incentive payment" provided in the original Contract. Also, to the extent the request is not submitted in writing to the Director, Office of Construction within not less than twenty (20) calendar days prior to the original Total Contract Time, the Design-Builder must also continue to aggressively, efficiently, and effectively pursue the completion of the "Incentive – Disincentive" work, including the utilization of any and all reasonably available means and methods to overcome all impacts and accelerate the work, until such a determination is made by the Director, Office of Construction or twenty (20) calendar days has expired since such written request was received by the Director, Office of Construction.

As conditions precedent to the Design-Builder's entitlement to any "Incentive payment," the Design-Builder must:

No later than 60 days after final acceptance by the Administration, either (a) elect to be paid the "Incentive payment" pursuant to the next paragraph or (b) notify the Administration in writing that the Design-Builder is electing to be paid the "Incentive payment" and is reserving one or more outstanding GP-5.14 claims for final determination.

The Design-Builder shall notify the Administration in writing, within 60 days of the final acceptance of the work in the Contract by the Administration, that the Design-Builder elects to be paid the "Incentive payment" which the Design-Builder is eligible to be paid based on the actual acceptance of the work, and such written notice shall constitute a full and complete waiver, release and acknowledgment of satisfaction by the Design-Builder of any and all claims, causes of action, issues, demands, disputes, matters or controversies, of any nature or kind whatsoever, known or unknown, against the Administration, its employees, officers, agents, representatives, consultants, and their respective employees, officers and representatives, the

Design-Builder has or may have as to work performed, work deleted, change orders, supplemental agreements, delays, disruptions, differing site conditions, utility relocations and conflicts, design changes or defects, time extensions, extra work, right of way issues, permitting issues, actions of suppliers or subcontractors or other Contractors, actions by third parties, shop drawing approval process delays, expansion of the physical limits of the project to make it functional, weather, weekends, holidays, suspensions of Design-Builder's operations, extended or unabsorbed home office or job site overhead, lump sum maintenance of traffic adjustments, lost profits, prime mark-up on subcontractor work, acceleration costs, any and all direct and indirect costs, any other adverse impacts, events, conditions, circumstances or potential damages, on or pertaining to, or as to or arising out of the Contract. This waiver, release and acknowledgment of satisfaction shall be all-inclusive and absolute, save and except any routine Administration final estimating quantity adjustments.

Should the Design-Builder fail to achieve the Contract and obtain acceptance from the Administration prior to the expiration of the original Total Contract Time or prior to the adjusted Total Contract Time as allowed in Contract documents, the Administration shall deduct **$18,300** for each calendar day after the Total Contract Time for which the conditions of acceptance have not been achieved, from monies otherwise due to Design-Builder. This deduction shall be the Disincentive for the Design-Builder's failing to timely complete the Contract.

NOTICE TO CONTRACTOR

VETERAN - OWNED SMALL BUSINESS ENTERPRISE (VSBE) REQUIREMENTS. This Solicitation has a VSBE goal of One-Half percent (0.5%). By submitting a Price Proposal, the Proposer agrees that this percentage of the total dollar amount of the contract will be performed by verified VSBEs.

In 2015, Maryland amended COMAR 21.11.13.05 as part of its VSBE program concerning VSBE primes. This amendment, which became effective March 6, 2015, and is applicable to this Request for Proposals ("RFP"), allows an agency to count the distinct, clearly defined portion of work that a certified VSBE performs with its own work force toward meeting up to one-hundred percent (100%) of the VSBE goal established for a procurement. VSBE forms and instructions are contained in the RFP Contract Provisions, Proposal Form Packet – STATE. Failure to complete the information may be grounds for the Price Proposal to be declared non-responsive.

In accordance with COMAR 21.11.13.05(C)(1), proposers are required to:

a) Identify specific work categories within the scope of the procurement appropriate for subcontracting;
b) Solicit VSBEs before bids or proposals are due, describing the identified work categories and providing instructions on how to bid on the subcontracts;
c) Attempt to make personal contact with the VSBEs solicited and to document these attempts;
d) Assist VSBEs to fulfill, or to seek waiver of, bonding requirements; and
e) Attempt to attend prebid or other meetings the procurement agency schedules to publicize contracting opportunities to VSBEs.

Questions or concerns regarding the (VSBE) participation goal of this procurement must be raised before the due date for submission of Price Proposals.

A Contractor that responds to this RFP shall complete, sign, and submit all required VSBE documentation at the time of Price Proposal submission. See Proposal Form Packet VSBE Instructions for requirements and forms.

Upon successful Award and execution of the Contract, and upon issuance of a Notice to Proceed to a contractor, participation reports are required from both the Contractor and any participating VSBE subcontractor. Report instruction and forms are also located in the Proposal Form Packet.

NOTICE TO CONTRACTOR

PROJECT SCHEDULE. Section 109 shall apply.

NOTICE TO PROPOSERS. The Proposal Form Packet in this Request for Proposals requires the following information be submitted for the Proposer and each firm quoting or considered as subcontractors:

(a) Name of firm.

(b) Address of firm.

(c) MBE, Non-MBE, DBE, or Non-DBE.

(d) Age of firm.

(e) Annual gross receipts per last calendar year.

Note that there are provisions for submitting copies for additional subcontractors, and that an "X" is required to indicate whether or not additional copies have been submitted.

AFFIRMATIVE ACTION PLAN (AAP) CONTRACT GOALS. In order to be in compliance with the revised MBE/DBE laws effective September 27, 2011 or later, the proposer is required to complete the AAP information on pages 19, 20, 24–27, and 37-41 of 45 of the Contract Provisions, Proposal Form Packet—Federal, or complete the AAP information on pages 15-25, and 34-38 of 43 of the Contract Provisions, Proposal Form Packet—State, or complete the AAP information on pages 16-26 and 35-39 of 44 of the Contract Provisions, Proposal Form Packet—State Small Business Reserve Procurement. Failure to complete the information may be grounds for the proposer to be declared non-responsible.

BOOK OF STANDARDS. The Book of Standards for Highway and Incidental Structures is only available on the Administration's Internet Site at www.roads.maryland.gov. The Book of Standards can be located by clicking on Business, Business Center, Business Standards and Specifications; and Book of Standards for Highway and Incidental Structures.

2008 STANDARD SPECIFICATION FOR CONSTRUCTION AND MATERIALS BOOK. The 2008 Standard Specifications for Construction and Materials Book is now only available on the Administration's Internet Site at www.roads.maryland.gov. The 2008 Specification Book can be located by clicking on Business, Business Center, Business Standards and Specifications; and 2008 Standard Specification for Construction and Materials which is available for download in .pdf format.

PAYMENT OF STATE OBLIGATIONS. Electronic funds transfer will be used by the State to pay Contractor for this Contract and any other State payments due Contractor unless the State Comptroller's Office grants Contractor an exemption.

By submitting a response to this solicitation, the Bidder/Offeror agrees to accept payments by electronic funds transfer unless the State Comptroller's Office grants an exemption. The selected Bidder/Offeror shall register using the attached form COT/GAD X-10 Vendor Electronic Funds (EFT) Registration Request Form. Any request for exemption must be submitted to the State Comptroller's Office for approval at the address specified on the COT/GAD X-10 form and must

include the business identification information as stated on the form and include the reason for the exemption.

An electronic form and additional information can be found at http://comptroller.marylandtaxes.com/Vendor_Services/Accounting_Information/Electronic_Funds_Transfer/

BRIDGE UNDERCLEARANCE. The minimum underclearances shall be maintained whenever resurfacing a roadway. This may require grinding the existing pavement prior to placing the resurfacing material. Immediately after completing the resurfacing operation and when the lane closures are still in the effect, the Contractor, in the presence of the Engineer, shall measure the minimum vertical underclearance. The Engineer will submit results to the Office of Structures. The cost of these measurements will be incidental to other pertinent items specified in the Contract Documents.

REQUEST FOR INFORMATION.

Refer to TC Section 2.08.02

RIGHT-OF-WAY STATUS.

For right-of-way status information, please refer to TC Section 2.07.02.05.6 Right of Way.

In accordance with the requirements of Title 23, Code of Federal Regulations, Part 635, this is to certify that of the thirteen (13) parcels required for construction on the above-captioned contract, none (0) are in the possession of the State Highway Administration (SHA) at this time.

This is a design-build project and the Administration has identified additional right-of-way needed to design and construct the project. The Administration is developing plats and will acquire the right-of-way. It is anticipated that the total right-of-way clearing will be July 31, 2017.

Once the plats have been issued, appraisals will be completed and approved and first offers will be made. Once first-offers have been made, a new Right of Way Certification will be issued.

The Design-Build Team will be unable to proceed with construction until such time as the SHA issues a Right-of-way Certification that the right-of-way is clear.

There is no relocation assistance service necessary for the above-captioned contract.

Notice is hereby given in the contract proposal, in accordance with Title 23, Code of Federal Regulations, Part 635, which the lack of possession of any of these properties on this project may interfere with construction operation.

The SHA will not honor any claim for inconvenience or delay caused by the lack of clear right-of-way. Notice will be given that an extension of time will be granted, if necessary, for delays caused by the interference beyond the time of notice to proceed.

Shown below is a table of impacted parcels within the project limits:

Number of Properties	Property Name	Item Numbers	Status Update
1	Holweck-Mulreany, Karen & Mulreany, Timothy	108979	Awaiting Appraisal
2	Doetsch, George L. Revocable Trust	109030	Awaiting Appraisal
3	Limsky, Jodie & Michael	109024	Awaiting Appraisal
4	Chacko, Thomas & Abraham, Jessy	109412	Awaiting Appraisal
5	Gramkow, Xavier & Cynthia	109008	Awaiting Appraisal
6	De, Parnab & Rakhi	108987	Awaiting Appraisal
7	Lewis Frederick Trustee, Lewis Thomas S Trustee et al	108995	Awaiting Appraisal
8	Kenyon, David & Melissa.	109023	Awaiting Appraisal
9	Colombel, Nicholas & Erika	108989	Awaiting Appraisal
10	Abrams, Jeffrey & Francoise	109437	Awaiting Appraisal
11	Stevens, Mark & Robin	109002	Awaiting Appraisal
12	Atlantic Seaboard Corp	108996	Awaiting Appraisal
13	Lapinski, Eric and Charles, et al	108981	Awaiting Appraisal

REQUIRED ENVIRONMENTAL PERMITS, APPROVALS AND AUTHORIZATIONS.

For permit information, please refer to TC Section 2.07.02.7 Permits. All permits obtained by SHA will be inserted here upon approval.

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Mark Belton, Secretary
Joanne Throwe, Deputy Secretary

Forest Service
2 South Bond Street, Suite 101
Bel Air, Maryland 21014

REFORESTATION LAW: PROJECT REVIEW

CONTRACT #:	HO141A21	PDMS #:	N/A
COUNTY:	Howard	REVIEWED BY:	T. Ericson

TO:	Joel Bush	DATE:	May 4, 2016
AGENCY:	MD SHA	PROJECT:	Dualization of MD32 from MD108 to north of Linden Church Road.
ADDRESS:	707 N. Calvert St., Mail Stop C-303 Baltimore, MD 21202		

This memorandum is to inform you that the above referenced contract was reviewed by this office on: May 4, 2016

Our review of this project indicated that **33.2** acres of forest land will be cleared. The following conditions are to apply to this project:

XX 1. Reforestation of **19.3** acres must be conducted on site within one year of this project's official construction completion date. Further determination of on-site reforestation will be done at the time this project is completed.

XX 2. Reforestation of **13.9** acres must be conducted off site on public lands within the same county or watershed in which the clearing occurred. This reforestation must be completed within one year of the construction completion of the project.

3. Other conditions: Pay fee-in-lieu of planting of $00.00 into the State Reforestation Fund
0.0 acres at $4,356.00 an acre ($0.10 per square foot) = $00.00

All reforestation that is carried out by you or your agency must have the planting plans approved by the Department of Natural Resources-Forest Service. As stated earlier in the review process, state agencies who are unable to locate public lands for mitigation planting must provide a detailed explanation of why they cannot fulfill the planting obligations before any payment (in lieu of planting) will be accepted into the reforestation fund. This explanation must be submitted prior to construction completion. If the fee-in-lieu is approved, billing will be based on a fee of 10 cents per square foot of forest cleared for construction projects for which bids were let out July 1, 1992 or later.

The review of this project indicated that a total of **33.2** acres of forest land is to be cleared. So the resulting bill, if no reforestation is carried out by you or your agency, would be **$144,619.20**. Please note that this dollar amount is an estimate; final determination is pending final review of the project.

Attached is a copy of our completed review form for your records. A copy of this form has also been placed on file with our Reforestation Law Compliance Section. If you should have any questions, please contact:

Tod Ericson phone #: 410-836-4568

Larry Hogan, *Governor*
Boyd K. Rutherford, *Lt. Governor*

State Highway Administration
Maryland Department of Transportation

Pete K. Rahn, *Secretary*
Gregory C. Johnson, P.E., *Administrator*

June 10, 2016

Ms. Andi Cunabaugh, Chief
Regulatory Services Coordination Office
Water Management Administration, Suite 430
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: MD SHA Project No. HO141A21
MD 32, from MD 108 to Linden Church Road
Interchange – Highway Dualization
Howard County - **Joint Permit Application**

Dear Ms. Cunabaugh:

The Maryland State Highway Administration (SHA) respectfully submits a Joint Federal/State Permit Application (JPA) for the alteration of any Floodplain, Waterway, Tidal, or Nontidal Wetland in Maryland for the above referenced project. The project is for the dualization of MD 32 into a 4-lane divided highway for approximately 2.3 miles from MD 108 to north of the Linden Church Road Interchange in Clarksville, Howard County.

This work was previously authorized as part of the MD 32 corridor under permit number 06-NT-3218, tracking number 200664602. The MD 32 corridor dualization work was authorized on February 23, 2007. On February 16, 2012 the authorization period was extended until February 23, 2017. Unfortunately SHA will not be able to complete the work within that time frame. Since 10 years have passed, SHA is re-applying to perform work as proposed in the enclosed JPA. This JPA also serves to request a permit modification and permit authorization period extension for US Army Corp of Engineers Permit number CENAB-OP-RMN-95-01083-12.

Proposed work will include: the dualization of MD 32 for 2.3 miles into a 4-lane divided highway from MD 108 to north of the Linden Church Road interchange, roadway reconstruction and resurfacing, drainage and stormwater management improvements, pipe structure replacements, signing and pavement marking, landscaping, traffic barrier installation, and utility relocations.

As a result of the proposed work 64,250 SF of wetland, 162,500 SF of 25' regulated nontidal wetland buffer, and 2,122 LF of Waters of the U. S. are proposed to be permanently impacted. Additionally, 12.86 acres of ground disturbance will occur in the FEMA 100-year floodplain.

My telephone number/toll-free number is 1-800-446-5962
Maryland Relay Service for Impaired Hearing or Speech 1.800.735.2258 Statewide Toll Free
Street Address: 707 North Calvert Street • Baltimore, Maryland 21202 • Phone 410.545.0300 • www.roads.maryland.gov

Attached are one original and six (6) copies of the JPA requesting authorization to perform this work. This submittal also includes:

A. Location Map, Certification of Notification & Public Notice Billing Approval Form
B. FEMA FIRMette & Wetland Delineation Report
C. Roadway Plans, Impact plates & FEIS vs. Current Design Impacts Tables
D. Environmental Documentation
E. Purpose & Need, Alternate and Avoidance & Minimization Analyses

If you have any questions or need any additional information please contact Reggie Graves at (410) 545-8012, or at rgraves@sha.state.md.us .

Sincerely,

Todd Nichols, Chief
Environmental Programs Division
Office of Environmental Design

TN/RG
Enclosures:

cc: Mr. Daniel Sharar-Salgado, SHA-OHD-HHD w/attachments
Ms. Allison Grooms, SHA-OPPE-EPLD " "
Ms. Yuqiong Bai, SHA-OHD-HDD " "
Ms. Serese Aranha-Scott, Jacobs " "
Ms. Kristen Goddard, AD Marble " "

JOINT FEDERAL/STATE APPLICATION FOR THE ALTERATION OF ANY FLOODPLAIN, WATERWAY, TIDAL OR NONTIDAL WETLAND IN MARYLAND

FOR AGENCY USE ONLY

Application Number	______	**Date Determined Complete**	______
Date Received by State	______	**Date(s) Returned**	______
Date Received by Corps	______		______
Type of State permit needed	______	**Date of Field Review**	______
Type of Corps permit needed	______	**Agency Performed Field Review**	______

++

- Please submit 1 original and 6 copies of this form, required maps and plans to the Wetlands and Waterways Program as noted on the last page of this form.
- Any application which is not completed in full or is accompanied by poor quality drawings may be considered incomplete and result in a time delay to the applicant.

Please check one of the following:

RESUBMITTAL: _____ **APPLICATION AMENDMENT:** _____ **MODIFICATION TO AN EXISTING PERMIT:** X
JURISDICTIONAL DETERMINATION ONLY _____ **APPLYING FOR AUTHORIZATION** X
PREVIOUSLY ASSIGNED NUMBER (RESUBMITTALS AND AMENDMENTS) CENAB-OP-RMN-95-01083-12 06-NT-3218/200664602

DATE July 8, 2016
APPLICATION DESCRIPTION: MD SHA Contract No. HO1415170/FMIS No. HO141A21/ MD 32 from MD 108 to Linden Church Road/Highway Dualization

1. APPLICANT INFORMATION:
APPLICANT NAME:

A. Name: Mr. Todd Nichols
B. Daytime Telephone: (410) 545-8628
C. Company: MD State Highway Administration – EPD
D. Email Address: tnichols@sha.state.md.us
E. Address: 707 North Calvert Street Mailstop – C-303
F. City: Baltimore State: Maryland Zip 21202

AGENT/ENGINEER INFORMATION:

A. Name: Ms. Serese Aranha-Scott
B. Daytime Telephone: (410) 837-5840
C. Company: Jacobs Engineering
D. Email Address: Serese.Aranha-Scott@jacobs.com
E. Address: 100 S. Charles Street, Tower 2, Suite 1000
F. City: Baltimore State: Maryland Zip: 21201

ENVIRONMENTAL CONSULTANT:

A. Name: Ms. Kristen Goddard
B. Daytime Telephone: (410) 902-1421
C. Company: A.D. Marble
D. Email Address: kgoddard@admarble.com
E. Address: 10451 Mill Run Circle, Suite 400
F. City: Owings Mills State: Maryland Zip: 21117

MDE CONSULTANT REVIEWER:
Mr. Jack Dinne – Corps Reviewer
A. Name: Ms. Debra Correia & Ms. Paula Stonesifer
B. Daytime Telephone: (410) 537-3000
C. Company: MDE – Wetlands & Waterways - NTW
D. Email Address: Debra.correia@maryland.gov Paula.stonesifer@maryland.gov
E. Address: 1800 Washington Boulevard, Suite 430
F. City: Baltimore State: Maryland Zip: 21202

PRINCIPAL CONTACT:

A. Name: Mr. Reginald Graves
B. Daytime Telephone: (410) 545-8012
C. Company: MD State Highway Administration – HDD
D. Email Address: RGraves@sha.state.md.us
E. Address: 707 North Calvert Street Mailstop – C-303
F. City: Baltimore State: Maryland Zip: 21202

2. PROJECT DESCRIPTION

a. GIVE WRITTEN DESCRIPTION OF PROJECT:

The proposed project includes the dualization of of MD 32 from MD 108 to I-70. Work will include construction of southbound MD 32 and associated turn arounds and ramp reconstruction, grinding/resurfacing of existing northbound MD 32, traffic barrier and pavement marking installation, and drainage facilities installation. The project will be completed in two Phases; Phase I from MD 108 to Linden Church Road, and Phase II from Linden Church Road to I-70.

Has any portion of the project been completed? _____Yes _____No If yes, explain _____
Is this a residential subdivision or commercial development? _____Yes X No
If yes, total number of acres on property _____acres

b. ACTIVITY: Check all activities that are proposed in the wetland, waterway, floodplain, and nontidal wetland buffer as appropriate.

A. X filling
B. dredging
C. X excavating
D. flooding or impounding water
E. draining
F. X grading
G. X removing or destroying vegetation
H. building structures

Area for items(s) checked: **Wetlands**

Nontidal Wetland - *Permanent*	158,084	sq. ft.
Nontidal Wetland - *Temporary*	23,945	sq. ft.
Tidal Wetland - *Permanent*	0	sq. ft.
Tidal Wetlands - *Temporary*	0	sq. ft.

Wetland Buffers

Buffer - *Permanent* (Nontidal Wetlands Only)	362,962	sq. ft.
Buffer - *Temporary* (Nontidal Wetlands Only)	34,303	sq. ft.
Expanded Buffer (Nontidal Wetland Only)	0	sq. ft.

Stream /Waters

Stream affected - *Permanent*	69,033	sq. ft.	13,783	LF
Stream affected - *Temporary*	26,686	sq. ft.	2,125	LF
Tidal Waters - *Permanent*	0	sq. ft.		
Tidal Waters - *Temporary*	0	sq. ft.		

100-year Floodplain

Disturbance in Floodplain	602,173 SF (Perm) 233,772 SF(Temp)
Net Volume of Material in Floodplain	0 +/- CY

For each activity, give overall length and width (in feet), in columns 1 and 2. For multiple activities, give total area of disturbance in square feet in column 3. For activities in tidal waters, give maximum distance channelward (in feet) in column 4. For dam or small ponds, give average depth (in feet) for the completed project in column 5. Give the volume of fill or dredged material in column 6.

		Length (Ft.) 1	Width (Ft.) 2	Area Sq. Ft. 3	Maximum/Average Channelward Encroachment 4		Pond Depth	Volume of fill/dredge material (cubic yards) below MHW or OHW 6
A.	Bulkhead							
B.	Revetment							
C.	Vegetative Stabilization							
D.	Gabions							
E.	Groins							
F.	Jetties							
G.	Boat Ramp							
H.	Pier							
I.	Breakwater							
J.	Repair & Maintenance							
K.	X Road Crossing	Varies	Varies					
L.	Utility Line							
M.	Outfall Construction							
N.	Small Pond							
O.	Dam							
P.	Lot Fill							
Q.	Building Structures							
R.	X Culvert	Varies	Varies					
S.	Bridge							
T.	Stream Channelization							
U.	Parking Area							
V.	Dredging							

1. _____New 2._____Maintenance 3._____Hydraulic 4._____Mechanical

W. X Other (explain) See impact plates.

d. PROJECT PURPOSE: Give brief written description of the project purpose:
The purpose of this project is to improve traffic operations and safety conditions throughout the corridor while minimizing impacts to local residents, businesses, and the environment, as well as to provide continuity with the remaining portion of the system.

3. PROJECT LOCATION:
a. LOCATION INFORMATION:

A. County: Howard B. City: Clarksville C. Name of waterway or closest waterway UNTs to Middle Patuxent River
D. State stream use class designation: Use IV-P
E. Site Address or Location: MD 32, Clarksville, Maryland
F. Directions from nearest intersection of two state roads: From the intersection of MD 32 and MD 108, go north on MD 32 to 0.80 mile north of Linden Church Road
G. Is your project located in the Chesapeake Bay Critical Area (generally within 1,000 feet of tidal waters or tidal wetlands)?:
___ Yes _X_ No
H. County Book Map Coordinates (Alexandria Drafting Co.); Excluding Garrett and Somerset Counties:
Map: 13 & 14 Letter: 13: K, 14:A-E Number: 13: 3&4, 14:4-7 (to the nearest tenth)
I. FEMA Floodplain Map Panel Number (if known): 24027C0130D
J. 1. 39.222832 latitude 2. -76.965222 longitude

b. ACTIVITY LOCATION: Check one or more of the following as appropriate for the type of wetland/waterway where you are proposing an activity:

A. ___ Tidal Waters
B. ___ Tidal Wetlands
C. ___ Special Aquatic Site (e.g., mudflat, vegetated shallows)
D. ___ Nontidal Wetland
E. X 25-foot buffer (nontidal wetlands only)
F. ___ 100-foot buffer (nontidal wetland of special State concern)
G. X In stream channel
1. ___ Tidal 2. X Nontidal
H. X 100-year floodplain (outside stream channel)
I. ___ River, lake, pond
J. ___ Other (Explain)

c. LAND USE:

A. Current Use of Parcel Is: 1. ___ Agriculture: Has SCS designated project site as a prior converted cropland?
___ Yes ___ No 2. X Wooded 3. ___ Marsh/Swamp 4. X Developed
5. X Other SHA ROW

B. Present Zoning Is: 1. X Residential 2. ___ Commercial/Industrial 3. ___ Agriculture 4. ___ Marina 5. X Other SHA ROW
C. Project complies with current zoning X Yes ___ No

THE FOLLOWING INFORMATION IS REQUIRED BY THE STATE (blocks 4-7):

4. REDUCTION OF IMPACTS: Explain measures taken or considered to avoid or minimize wetland losses in F. Also check Items A-E if any of these apply to your project.

A. X Reduced the area of disturbance
B. ___ Reduced size/scope of project
C. X Relocated structures
D. ___ Redesigned project

E. X Other The advertised request for proposals includes incentives for the selected design-build team to further avoid and minimize impacts in the final design plans.

F. Explanation The proposed stormwater management basins were relocated to areas that would have the least impact on wetlands, streams, and floodplain areas. Conceptual plans propose to construct 2:1 slopes to minimize impacts to adjacent resources. An in-stream (ephemeral) dry pond for stormwater management could not be eliminated due to constraints, see Attachment E.

Describe reasons why impacts were not avoided or reduced in Q. Also check Items G-P that apply to your project.

G. ____ Cost
H. X Extensive wetlands on site
I. X Engineering/design constraints
J. ____ Other natural features
K. ____ Parcel size
L. ____ Other regulatory requirement
M. X Failure to accomplish project purpose
N. X Safety/public welfare issue
O. ____ Inadequate zoning
P. ____ Other ____

Q. Description: Due to the extensive acreage of wetlands on-site, project impacts could not be avoided and still meet the project needs.

5. LETTER OF EXEMPTION: If you are applying for a letter of exemption for activities in nontidal wetlands and/or their buffers, explain why the project qualifies:

A. ____ No significant plant or wildlife value and wetland impact
1. ____ Less than 5,000 square feet
2. ____ In an isolated nontidal wetland less than 1 acre in size
B. ____ Repair existing structure/fill
C. ____ Mitigation Project
D. ____ Utility Line
1. ____ Overhead
2. ____ Underground
E. Other (explain) ____

F. X Check here if you are **not** applying for a letter of exemption.

IF YOU ARE APPLYING FOR A LETTER OF EXEMPTION, PROCEED TO BLOCK 11

6. ALTERNATIVE SITE ANALYSIS: Explain why other sites that were considered for this project were rejected in M. Also check any items in D-L if they apply to your project. **(If you are applying for a letter of exemption, do not complete this block):**

A. X 1 site
B. ____ 2 - 4 sites
C. ____ 5 or more sites

Alternative sites were rejected/not considered for the following reason(s):
D. ____ Cost
E. ____ Lack of availability
F. X Failure to meet project purpose
G. ____ Located outside general/market area
H. ____ Greater wetlands impact
I. ____ Water dependency
J. ____ Inadequate zoning
K. ____ Engineering/design constraints
L. X Other Impacts to forest and private property

M. Explanation: A selected alternative was chosen through the NEPA process. See attachment E.

7. PUBLIC NEED: Describe the public need or benefits that the project will provide in F. Also check Items in A-E that apply to your project. **(If you are applying for a letter of exemption, do not complete this block):**

A. ____ Economic
B. X Safety
C. ____ Health/welfare
D. ____ Does not provide public benefits
E. ____ Other ____

F. Description: Expanding the roadway will provide better connectivity of the existing roadway network and will improve safety of the MD 32 corridor. See attachment E.

8. OTHER APPROVALS NEEDED/GRANTED:

A. Agency	B. Date Sought	C. Decision		D. Decision Date	E. Other Status
		1. Granted	2. Denied		
SHA-PRD ESC/SWM	5/2/16				
USFWS		X		3/9/16	
DNR-PRD		X		2/11/16	
DNR-WHS		X		3/17/16	
MHT		X		3/28/16	

9. MITIGATION PLAN: Please provide the following information:

a. Description of a monetary compensation proposal, if applicable (for **state requirements** only). Attach another sheet if necessary.
Mitigation for the proposed permanent wetland impacts resulting from the MD 32 dualization project will debit from the existing Nixon Farm wetland mitigation site.

b. Give a brief description of the proposed mitigation project.
N/A

c. Describe why you selected your proposed mitigation site, including what other areas were considered and why they were rejected.
N/A

d. Describe how the mitigation site will be protected in the future.
Site protection measures established during the initial planning and design of the Nixon Farm wetland mitigation site will continue as previously set forth.

10. HAVE ADJACENT PROPERTY OWNERS BEEN NOTIFIED?: A. X Yes B. _____ No
Provide names and mailing addresses below (Use separate sheet, if necessary):

a. Please see attached.	b.	c.

11. HISTORIC PROPERTIES: Is your project located in the vicinity of historic properties? (For example: structures over 50 years old, archeological sites, shell mounds, Indian or Colonial artifacts). Provide any supplemental information in Section 13.

A. _____ Yes B. X No C. _____ Unknown

12. ADDITIONAL INFORMATION: Use this space for detailed responses to any of the previous items. Attach another sheet if necessary:
See Attachment D.

Check box if data is enclosed for any one or more of the following (see checklist for required information):

A.	____ Soil borings	D.	X Field surveys	G.	____ Site plan
B.	____ Wetland data sheets	E.	X Alternate site analysis	H.	X Avoidance and minimization analysis
C.	____ Photographs	F.	____ Market analysis		

I. X Other (explain) A. Location Map, Certification of Notification & Public Notice Billing Approval Form; B. FEMA FIRMette & Wetland Delineation report; C. Roadway Plans, Impact plates & FEIS vs. Current Impact Tables; D. Environmental Documentation; and E. Purpose and Need, Alternate and Avoidance & Minimization Analysis

CERTIFICATION:

I hereby designate and authorize the agent named above to act on my behalf in the processing of this application and to furnish any information that is requested. I certify that the information on this form and on the attached plans and specifications is true and accurate to the best of my knowledge and belief. I understand that any of the agencies involved in authorizing the proposed works may request information in addition to that set forth herein as may be deemed appropriate in considering this proposal. I certify that all Waters of the United States have been identified and delineated on site, and that all jurisdictional wetlands have been delineated in accordance with the Corps of Engineers Wetlands Delineation Manual (Wetlands Research Program Technical Report Y-87-1). I grant permission to the agencies responsible for authorization of this work, or their duly authorized representative, to enter the project site for inspection purposes during working hours. I will abide by the conditions of the permit or license if issued and will not begin work without the appropriate authorization. I also certify that the proposed works are consistent with Maryland's Coastal Zone Management Plan. I understand that none of the information contained in the application form is confidential and that I may request that additional required information be considered confidential under applicable laws. I further understand that failure of the landowner to sign the application will result in the application being deemed incomplete.

LANDOWNER MUST SIGN: _____ DATE: _____

Mr. Todd Nichols, Chief
Environmental Programs Division
Office of Environmental Design

WHERE TO MAIL APPLICATION

Maryland Department of the Environment
Water Management Administration
Regulatory Services Coordination Office
1800 Washington Boulevard, Suite 430
Baltimore, Maryland 21230
Telephone: (410) 537-3762
1-800-876-0200

BEFORE YOU MAIL… DON'T FORGET…

- **SIGN AND DATE THE APPLICATION. THE LANDOWNER MUST SIGN.**
- **SEVEN (7) COPIES OF ALL DOCUMENTS (APPLICATION, PLANS, MAPS, REPORTS, ETC.) MUST BE RECEIVED TO BEGIN OUR REVIEW. The VICINITY MAP (LOCATION MAP) SHALL HAVE THE PROJECT SITE PINPOINTED.**

Revised 7/10

SUPPLEMENTARY INFORMATION TO BE INCLUDED ON PLANS, DRAWINGS, OR VICINITY MAPS

In addition to the information indicated on the previous pages, you should include the following on the 8 1/2 x 11 site plans and any blueprints you have submitted:

1. Delineation of any wetland buffers or expanded buffers, clearly marked and differentiated.

2. Location of mitigation area, if proposed on the same site as the project.

Note: If you are proposing a complex project you may wish to submit engineering blueprints of your project with the application form to expedite review.

Mitigation Location Map: If you are proposing that nontidal wetland mitigation be done at a different location than the proposed project, you should submit a map showing the location of the mitigation site in relation to the proposed nontidal wetland losses.

WETLAND DELINEATION

Wetlands should be identified according to methods described in the publication Corps of Engineers Wetlands Delineation Manual (Wetlands Research Program Technical Report Y-87-1). Copies of the manual may be obtained by calling the U. S. Government Printing Office at 202-783-3238 and requesting document #024-010-00-683-8 at a cost of $7.50. Wetlands must be shown on all plans submitted with the application. All wetlands on site must be delineated and shown on the overall site plan. 8½ x 11 inch plans with topography showing relation of the wetlands and project impacts must be submitted. Copies of the wetland reports and data sheets used in making the determination be included with your application submittal.

Regulatory Agencies

Federal Permits

U.S. Army Corps of Engineers
Baltimore District
Attention: CENAB-OP-R
P. O. Box 1715
Baltimore, MD 21203-1715
Telephone: (410) 962-3670

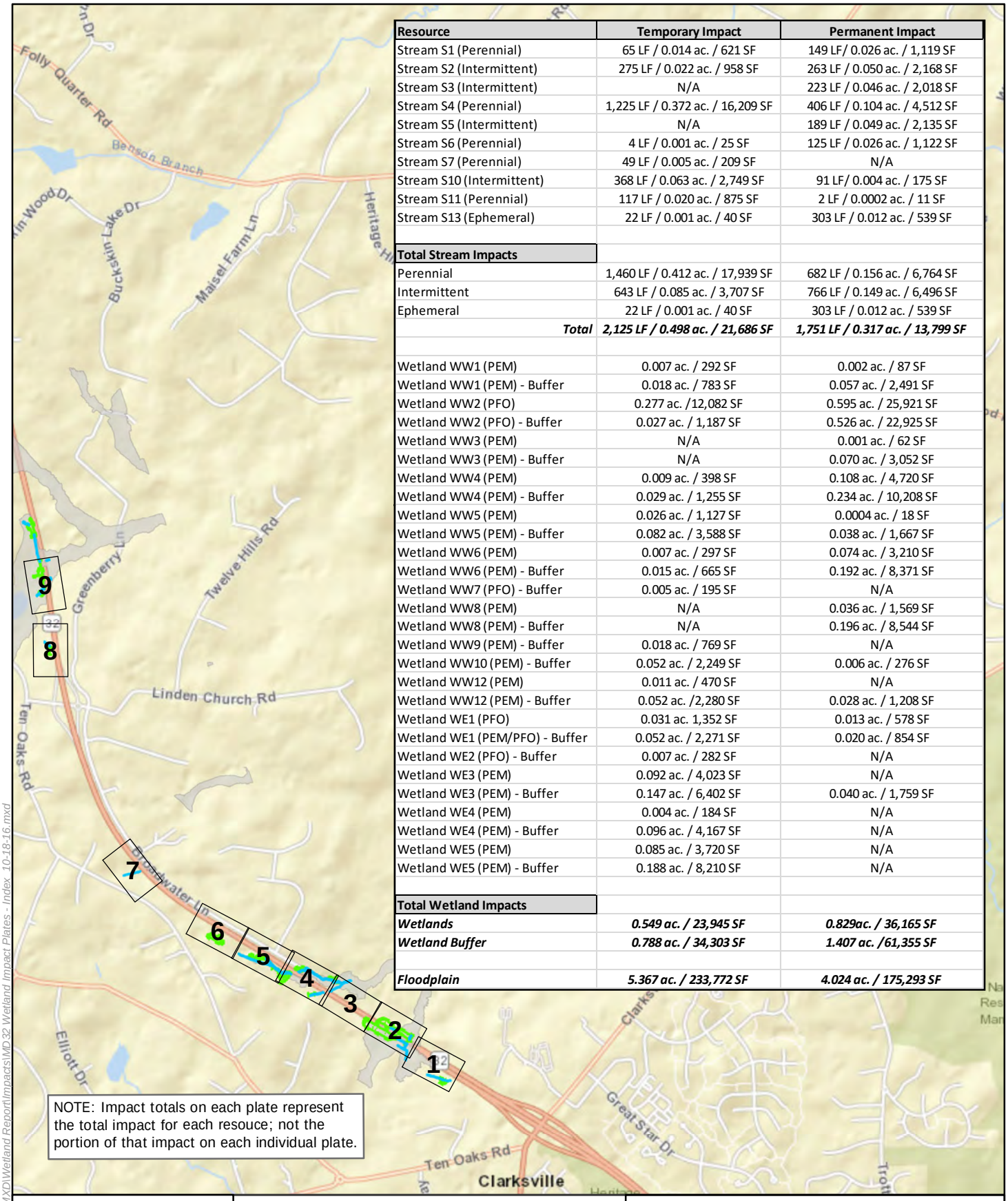
State Authorizations

MD Dept. of the Environment
Water Management Administration
Tidal Wetlands Division
1800 Washington Blvd, Ste 430
Baltimore, MD 21230
Telephone: (410) 537-3837

Coastal Zone Consistency Statement

MD Dept. of the Environment
Water Management Administration
Wetlands and Waterways Program
1800 Washington Blvd, Ste 430
Baltimore, MD 21230
Telephone: (410) 537-3745

MD Dept. of the Environment
Water Management Administration
Nontidal Wetlands and Waterways Division
1800 Washington Blvd, Ste 430
Baltimore, MD 21230
Telephone: (410) 537-3768



Resource	Temporary Impact	Permanent Impact
Stream S1 (Perennial)	65 LF / 0.014 ac. / 621 SF	149 LF/ 0.026 ac. / 1,119 SF
Stream S2 (Intermittent)	275 LF / 0.022 ac. / 958 SF	263 LF / 0.050 ac. / 2,168 SF
Stream S3 (Intermittent)	N/A	223 LF / 0.046 ac. / 2,018 SF
Stream S4 (Perennial)	1,225 LF / 0.372 ac. / 16,209 SF	406 LF / 0.104 ac. / 4,512 SF
Stream S5 (Intermittent)	N/A	189 LF / 0.049 ac. / 2,135 SF
Stream S6 (Perennial)	4 LF / 0.001 ac. / 25 SF	125 LF / 0.026 ac. / 1,122 SF
Stream S7 (Perennial)	49 LF / 0.005 ac. / 209 SF	N/A
Stream S10 (Intermittent)	368 LF / 0.063 ac. / 2,749 SF	91 LF/ 0.004 ac. / 175 SF
Stream S11 (Perennial)	117 LF / 0.020 ac. / 875 SF	2 LF / 0.0002 ac. / 11 SF
Stream S13 (Ephemeral)	22 LF / 0.001 ac. / 40 SF	303 LF / 0.012 ac. / 539 SF
Total Stream Impacts		
Perennial	1,460 LF / 0.412 ac. / 17,939 SF	682 LF / 0.156 ac. / 6,764 SF
Intermittent	643 LF / 0.085 ac. / 3,707 SF	766 LF / 0.149 ac. / 6,496 SF
Ephemeral	22 LF / 0.001 ac. / 40 SF	303 LF / 0.012 ac. / 539 SF
Total	***2,125 LF / 0.498 ac. / 21,686 SF***	***1,751 LF / 0.317 ac. / 13,799 SF***
Wetland WW1 (PEM)	0.007 ac. / 292 SF	0.002 ac. / 87 SF
Wetland WW1 (PEM) - Buffer	0.018 ac. / 783 SF	0.057 ac. / 2,491 SF
Wetland WW2 (PFO)	0.277 ac. /12,082 SF	0.595 ac. / 25,921 SF
Wetland WW2 (PFO) - Buffer	0.027 ac. / 1,187 SF	0.526 ac. / 22,925 SF
Wetland WW3 (PEM)	N/A	0.001 ac. / 62 SF
Wetland WW3 (PEM) - Buffer	N/A	0.070 ac. / 3,052 SF
Wetland WW4 (PEM)	0.009 ac. / 398 SF	0.108 ac. / 4,720 SF
Wetland WW4 (PEM) - Buffer	0.029 ac. / 1,255 SF	0.234 ac. / 10,208 SF
Wetland WW5 (PEM)	0.026 ac. / 1,127 SF	0.0004 ac. / 18 SF
Wetland WW5 (PEM) - Buffer	0.082 ac. / 3,588 SF	0.038 ac. / 1,667 SF
Wetland WW6 (PEM)	0.007 ac. / 297 SF	0.074 ac. / 3,210 SF
Wetland WW6 (PEM) - Buffer	0.015 ac. / 665 SF	0.192 ac. / 8,371 SF
Wetland WW7 (PFO) - Buffer	0.005 ac. / 195 SF	N/A
Wetland WW8 (PEM)	N/A	0.036 ac. / 1,569 SF
Wetland WW8 (PEM) - Buffer	N/A	0.196 ac. / 8,544 SF
Wetland WW9 (PEM) - Buffer	0.018 ac. / 769 SF	N/A
Wetland WW10 (PEM) - Buffer	0.052 ac. / 2,249 SF	0.006 ac. / 276 SF
Wetland WW12 (PEM)	0.011 ac. / 470 SF	N/A
Wetland WW12 (PEM) - Buffer	0.052 ac. /2,280 SF	0.028 ac. / 1,208 SF
Wetland WE1 (PFO)	0.031 ac. 1,352 SF	0.013 ac. / 578 SF
Wetland WE1 (PEM/PFO) - Buffer	0.052 ac. / 2,271 SF	0.020 ac. / 854 SF
Wetland WE2 (PFO) - Buffer	0.007 ac. / 282 SF	N/A
Wetland WE3 (PEM)	0.092 ac. / 4,023 SF	N/A
Wetland WE3 (PEM) - Buffer	0.147 ac. / 6,402 SF	0.040 ac. / 1,759 SF
Wetland WE4 (PEM)	0.004 ac. / 184 SF	N/A
Wetland WE4 (PEM) - Buffer	0.096 ac. / 4,167 SF	N/A
Wetland WE5 (PEM)	0.085 ac. / 3,720 SF	N/A
Wetland WE5 (PEM) - Buffer	0.188 ac. / 8,210 SF	N/A
Total Wetland Impacts		
Wetlands	***0.549 ac. / 23,945 SF***	***0.829ac. / 36,165 SF***
Wetland Buffer	***0.788 ac. / 34,303 SF***	***1.407 ac. /61,355 SF***
Floodplain	***5.367 ac. / 233,772 SF***	***4.024 ac. / 175,293 SF***

A.D. MARBLE
environmental·cultural·engineering
10451 Mill Run Circle, Suite 400
Owings Mills, MD 21117

0 1,500 3,000 Feet

Aquatic Resources Impact Plates

MD 32 Roadway Improvements Project
MD 108 to Linden Church Road
Howard County, Maryland

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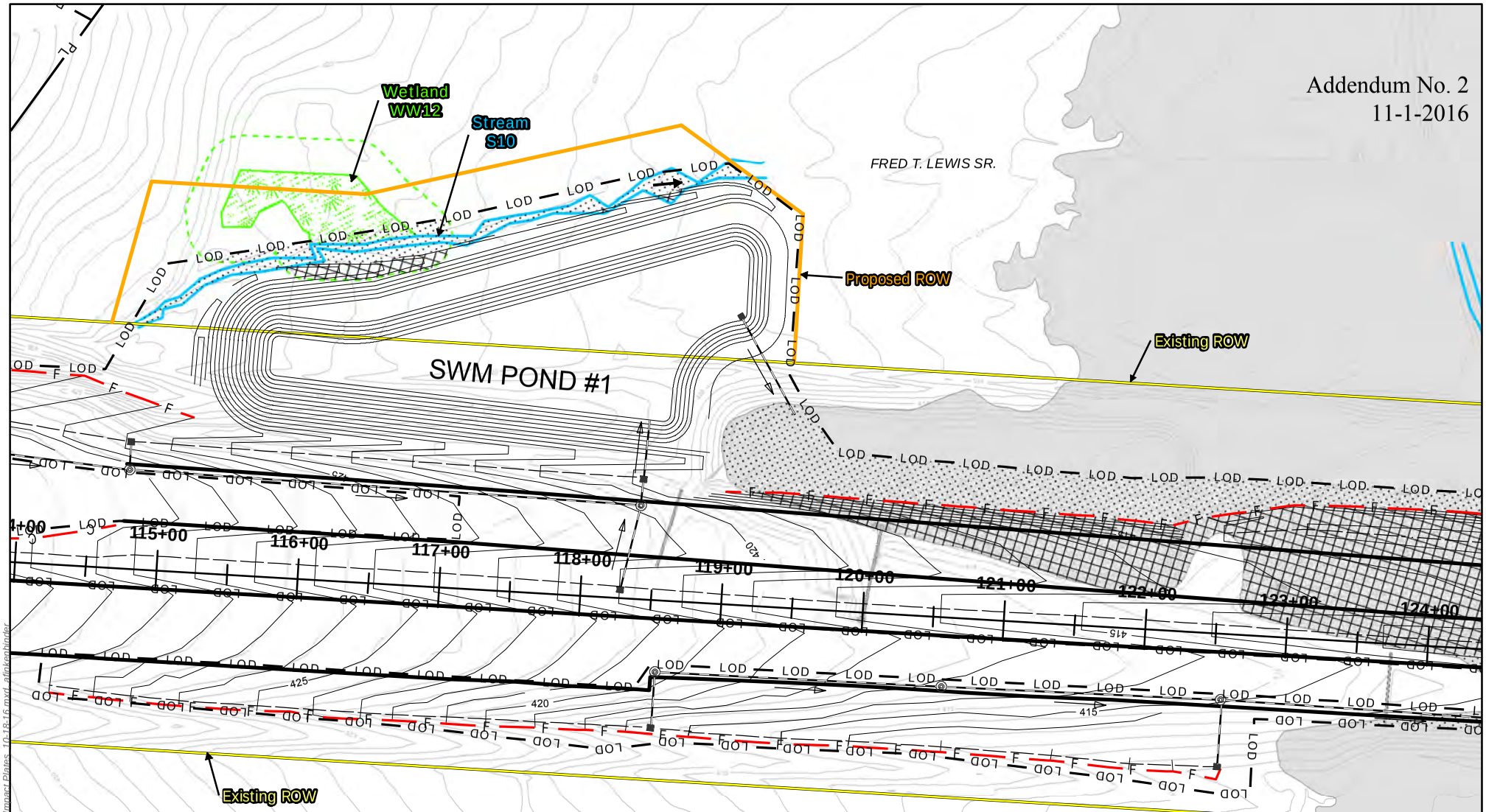
Prepared by: A.D. Marble - October 2016



Resource	Temporary Impact	Permanent Impact
Stream S10 (Intermittent)	368 LF / 0.063 ac. / 2,749 SF	91 LF/ 0.004 ac. / 175 SF
Wetland WW12 (PEM)	0.011 ac. / 470 SF	N/A
Wetland WW12 (PEM) - Buffer	0.052 ac. /2,280 SF	0.028 ac. / 1,208 SF

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DELINEATED STREAM
DELINEATED WETLAND
WETLAND BUFFER
100-YEAR FLOODPLAIN
LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
PROPOSED CONDITIONS
EXISTING CONDITIONS
EXISTING DRAINAGE
C CUT LINE
F FILL LINE
PROPOSED RIGHT-OF-WAY
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Aquatic Resources Impact Plates

MD 32 Roadway Improvements Project
MD 108 to Linden Church Road
Howard County, Maryland

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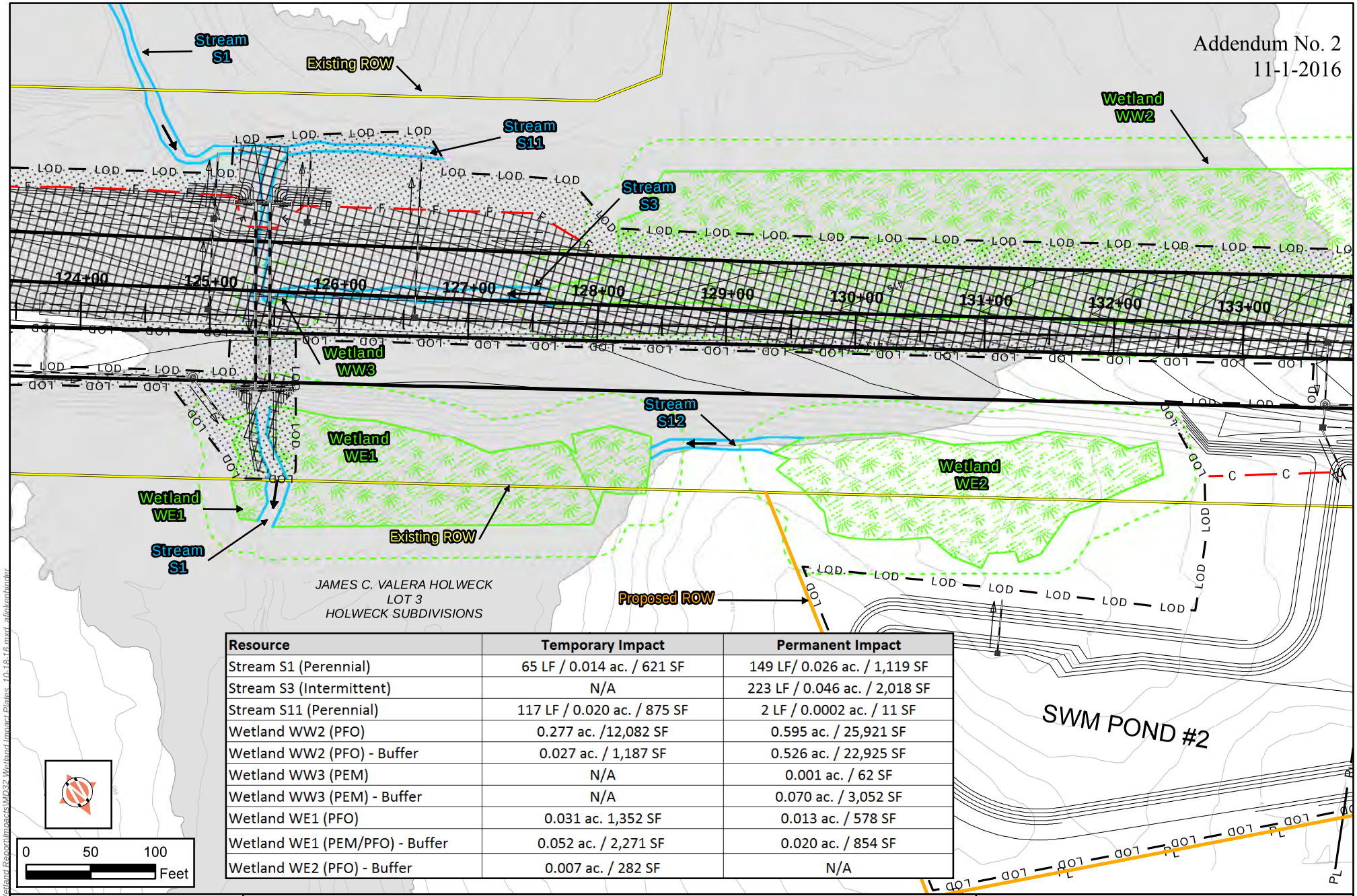

Resource	Temporary Impact	Permanent Impact
Stream S1 (Perennial)	65 LF / 0.014 ac. / 621 SF	149 LF/ 0.026 ac. / 1,119 SF
Stream S3 (Intermittent)	N/A	223 LF / 0.046 ac. / 2,018 SF
Stream S11 (Perennial)	117 LF / 0.020 ac. / 875 SF	2 LF / 0.0002 ac. / 11 SF
Wetland WW2 (PFO)	0.277 ac. /12,082 SF	0.595 ac. / 25,921 SF
Wetland WW2 (PFO) - Buffer	0.027 ac. / 1,187 SF	0.526 ac. / 22,925 SF
Wetland WW3 (PEM)	N/A	0.001 ac. / 62 SF
Wetland WW3 (PEM) - Buffer	N/A	0.070 ac. / 3,052 SF
Wetland WE1 (PFO)	0.031 ac. 1,352 SF	0.013 ac. / 578 SF
Wetland WE1 (PEM/PFO) - Buffer	0.052 ac. / 2,271 SF	0.020 ac. / 854 SF
Wetland WE2 (PFO) - Buffer	0.007 ac. / 282 SF	N/A

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WETLAND BUFFER
100-YEAR FLOODPLAIN
LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
PROPOSED CONDITIONS
EXISTING CONDITIONS
EXISTING DRAINAGE
C CUT LINE
F FILL LINE
PROPOSED RIGHT-OF-WAY
EXISTING RIGHT-OF-WAY
PL PROPERTY LINES

Aquatic Resources Impact Plates

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MD 108 to Linden Church Road
Howard County, Maryland

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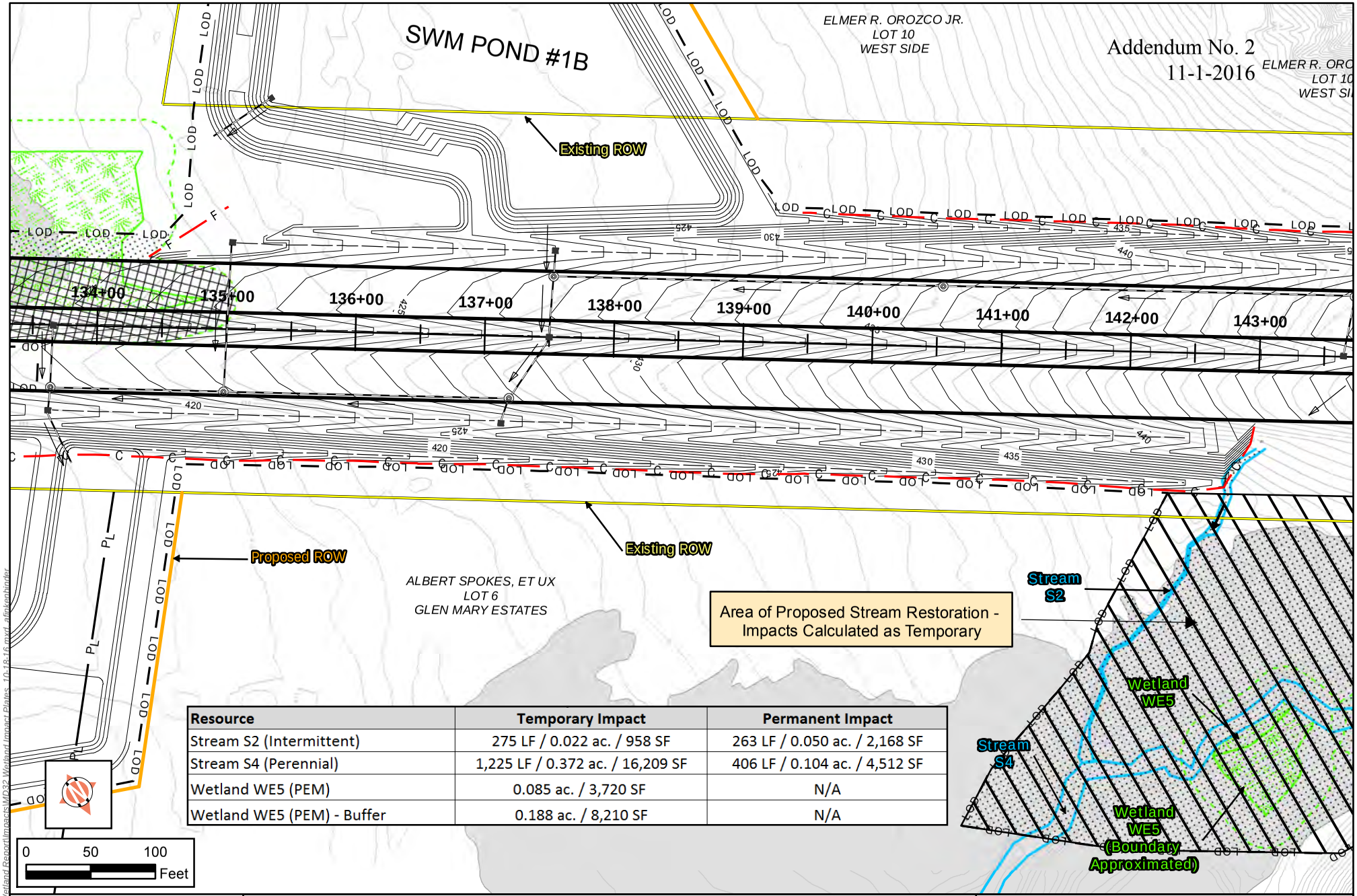

Resource	Temporary Impact	Permanent Impact
Stream S2 (Intermittent)	275 LF / 0.022 ac. / 958 SF	263 LF / 0.050 ac. / 2,168 SF
Stream S4 (Perennial)	1,225 LF / 0.372 ac. / 16,209 SF	406 LF / 0.104 ac. / 4,512 SF
Wetland WE5 (PEM)	0.085 ac. / 3,720 SF	N/A
Wetland WE5 (PEM) - Buffer	0.188 ac. / 8,210 SF	N/A

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DELINEATED WETLAND
WETLAND BUFFER
100-YEAR FLOODPLAIN
LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
PROPOSED CONDITIONS
EXISTING CONDITIONS
EXISTING DRAINAGE
C CUT LINE
F FILL LINE
PROPOSED RIGHT-OF-WAY
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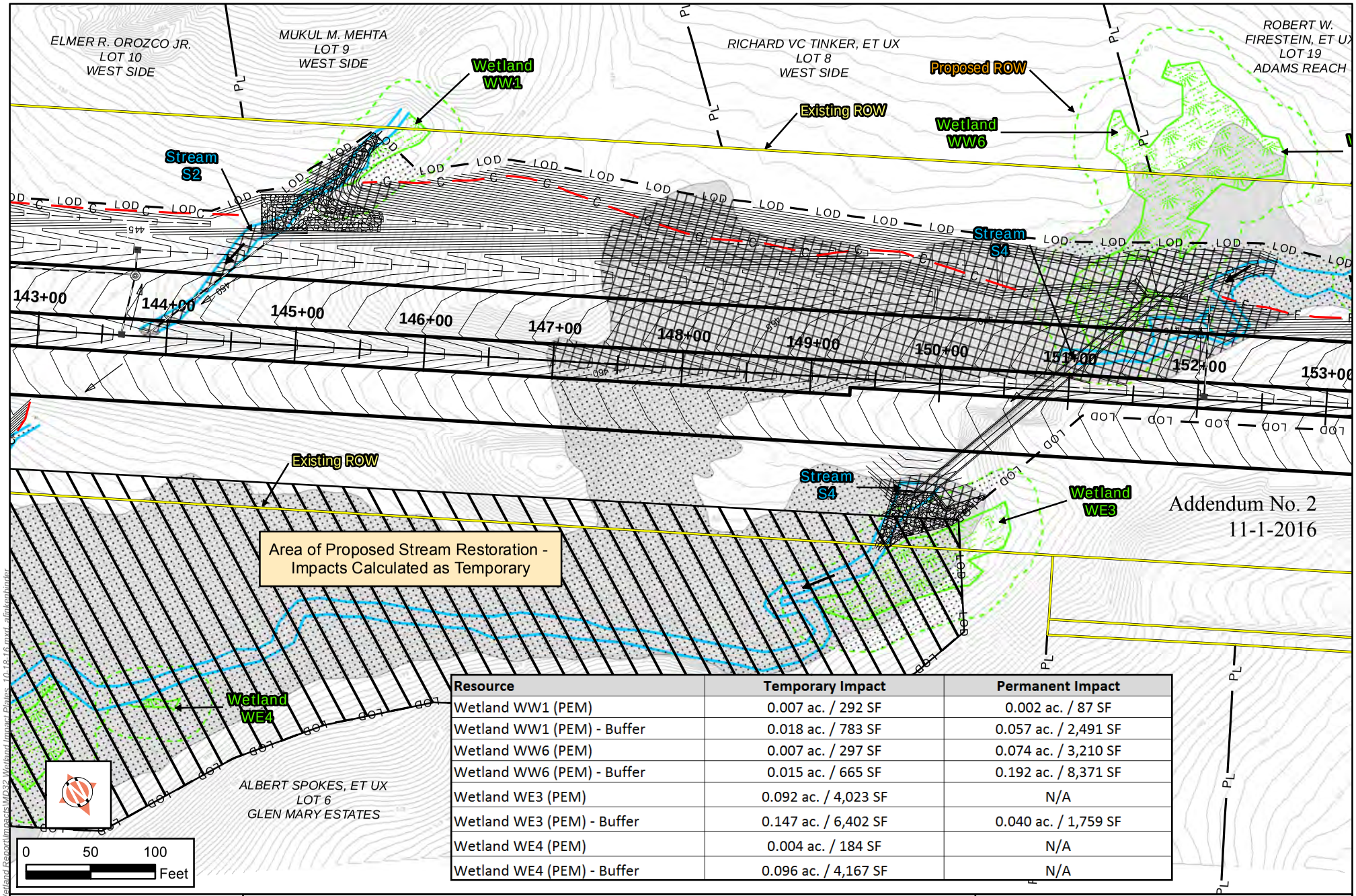

Resource	Temporary Impact	Permanent Impact
Wetland WW1 (PEM)	0.007 ac. / 292 SF	0.002 ac. / 87 SF
Wetland WW1 (PEM) - Buffer	0.018 ac. / 783 SF	0.057 ac. / 2,491 SF
Wetland WW6 (PEM)	0.007 ac. / 297 SF	0.074 ac. / 3,210 SF
Wetland WW6 (PEM) - Buffer	0.015 ac. / 665 SF	0.192 ac. / 8,371 SF
Wetland WE3 (PEM)	0.092 ac. / 4,023 SF	N/A
Wetland WE3 (PEM) - Buffer	0.147 ac. / 6,402 SF	0.040 ac. / 1,759 SF
Wetland WE4 (PEM)	0.004 ac. / 184 SF	N/A
Wetland WE4 (PEM) - Buffer	0.096 ac. / 4,167 SF	N/A

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LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
PROPOSED CONDITIONS
EXISTING CONDITIONS
EXISTING DRAINAGE
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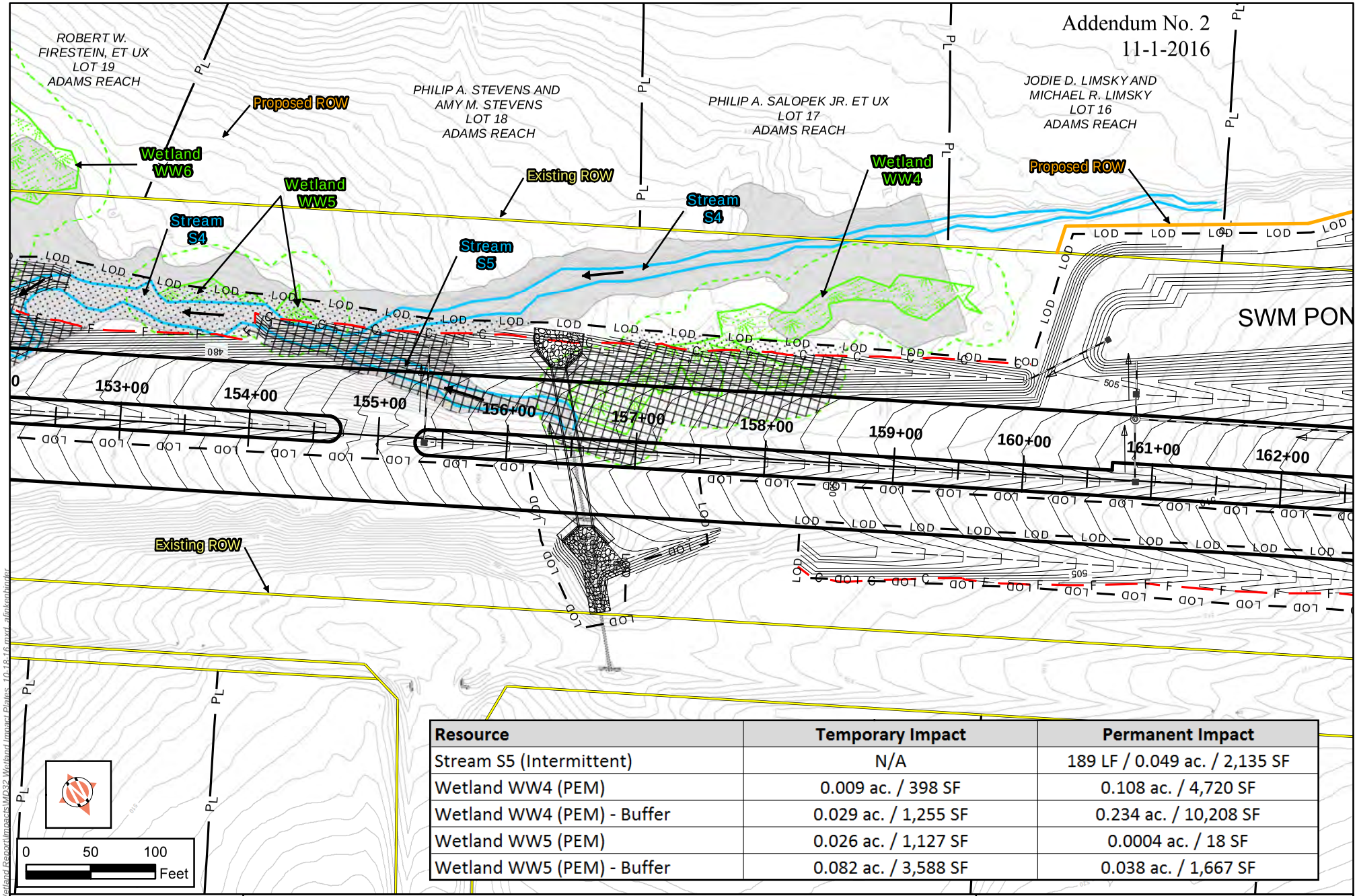

Resource	Temporary Impact	Permanent Impact
Stream S5 (Intermittent)	N/A	189 LF / 0.049 ac. / 2,135 SF
Wetland WW4 (PEM)	0.009 ac. / 398 SF	0.108 ac. / 4,720 SF
Wetland WW4 (PEM) - Buffer	0.029 ac. / 1,255 SF	0.234 ac. / 10,208 SF
Wetland WW5 (PEM)	0.026 ac. / 1,127 SF	0.0004 ac. / 18 SF
Wetland WW5 (PEM) - Buffer	0.082 ac. / 3,588 SF	0.038 ac. / 1,667 SF

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LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
PROPOSED CONDITIONS
EXISTING CONDITIONS
EXISTING DRAINAGE
C CUT LINE
F FILL LINE
PROPOSED RIGHT-OF-WAY
EXISTING RIGHT-OF-WAY
PL PROPERTY LINES

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Howard County, Maryland

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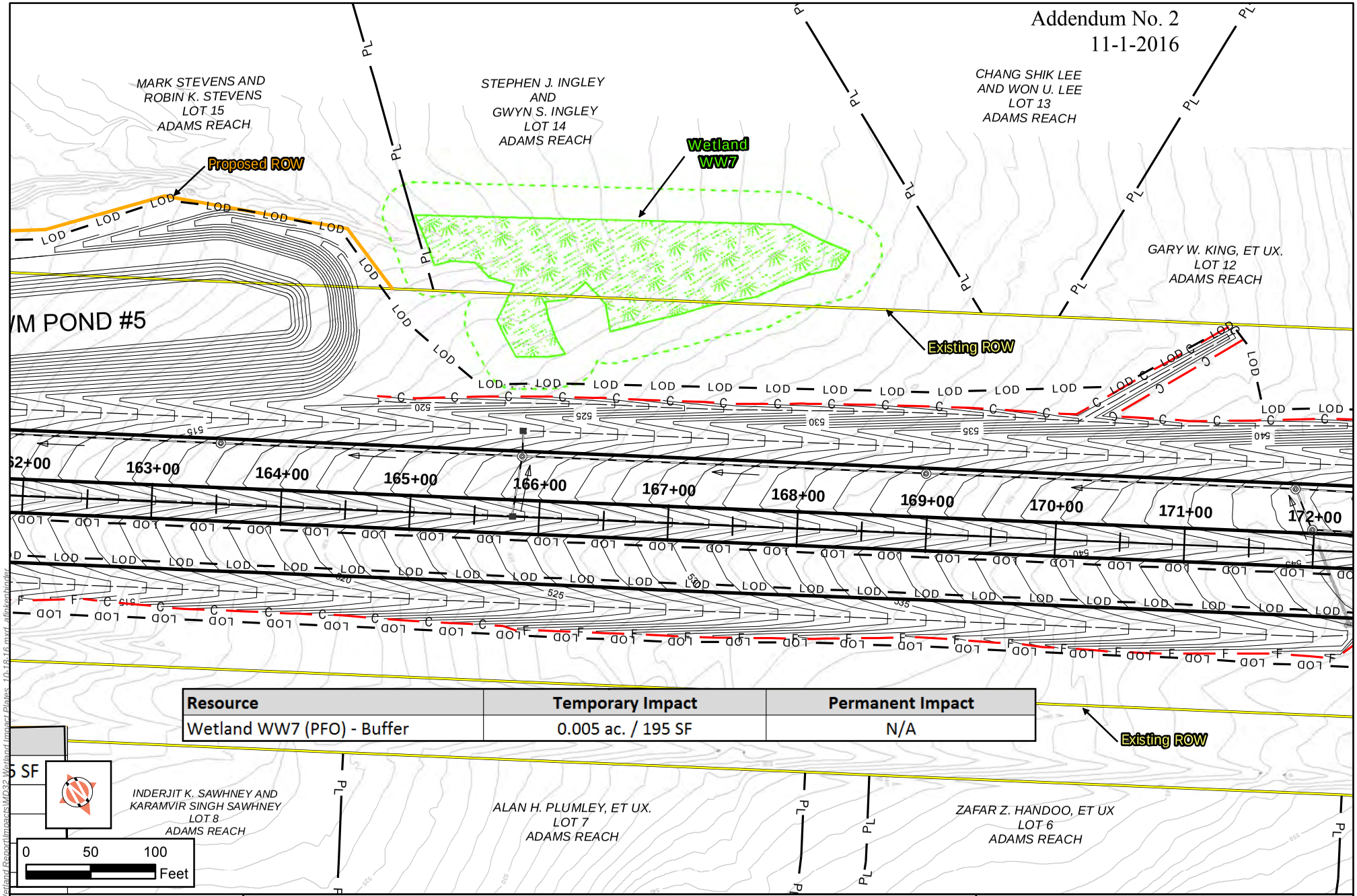
Addendum No. 2
11-1-2016



Resource	Temporary Impact	Permanent Impact
Wetland WW7 (PFO) - Buffer	0.005 ac. / 195 SF	N/A

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100-YEAR FLOODPLAIN
LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
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PROPOSED RIGHT-OF-WAY
EXISTING RIGHT-OF-WAY
PL PROPERTY LINES

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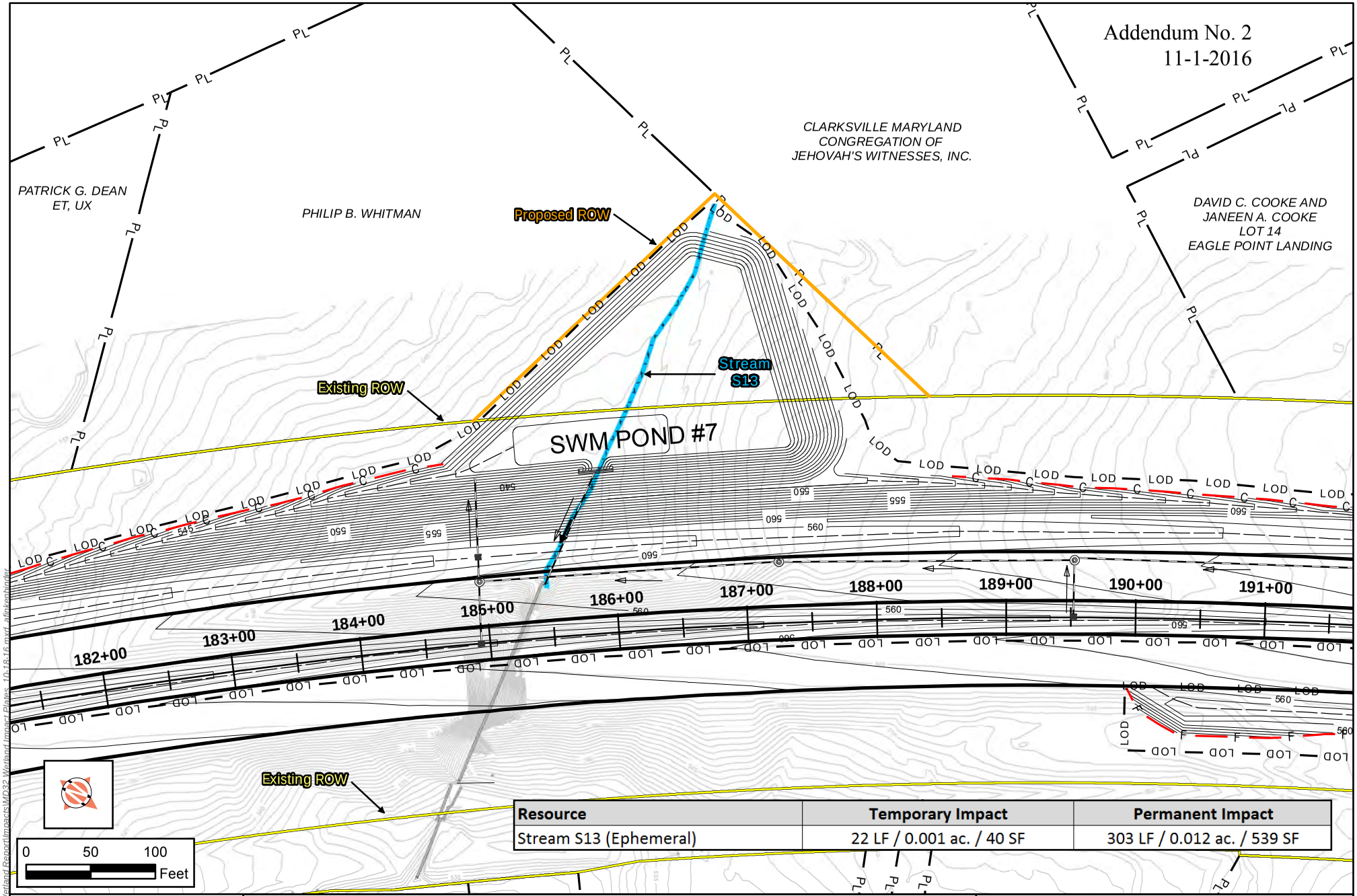

Resource	Temporary Impact	Permanent Impact
Stream S13 (Ephemeral)	22 LF / 0.001 ac. / 40 SF	303 LF / 0.012 ac. / 539 SF

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100-YEAR FLOODPLAIN
LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
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C CUT LINE
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EXISTING RIGHT-OF-WAY
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MD 108 to Linden Church Road
Howard County, Maryland

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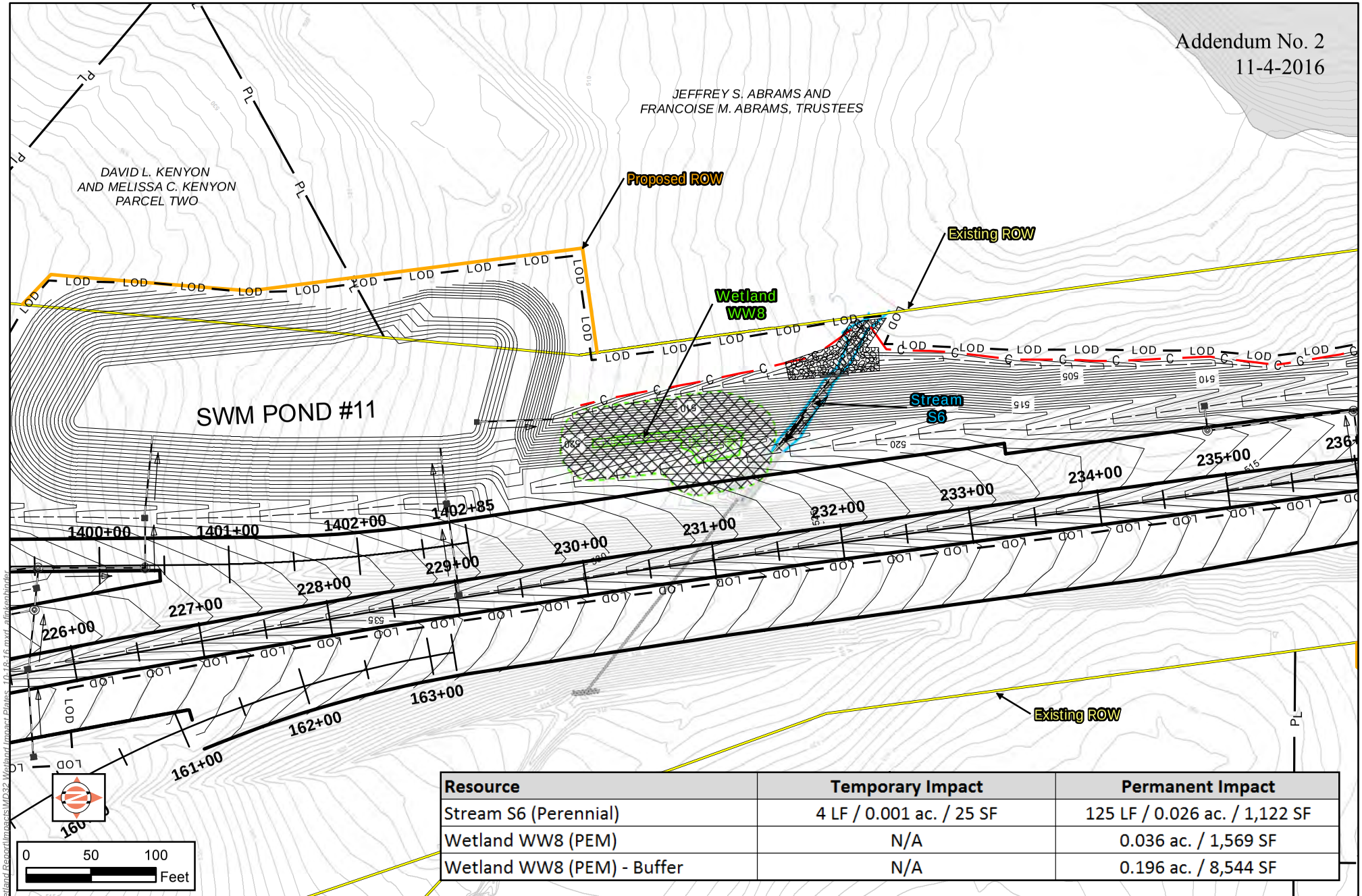
Addendum No. 2
11-4-2016



Resource	Temporary Impact	Permanent Impact
Stream S6 (Perennial)	4 LF / 0.001 ac. / 25 SF	125 LF / 0.026 ac. / 1,122 SF
Wetland WW8 (PEM)	N/A	0.036 ac. / 1,569 SF
Wetland WW8 (PEM) - Buffer	N/A	0.196 ac. / 8,544 SF

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DELINEATED WETLAND
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100-YEAR FLOODPLAIN
LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
PROPOSED CONDITIONS
EXISTING CONDITIONS
EXISTING DRAINAGE
C CUT LINE
F FILL LINE
PROPOSED RIGHT-OF-WAY
EXISTING RIGHT-OF-WAY
PL PROPERTY LINES

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MD 108 to Linden Church Road
Howard County, Maryland

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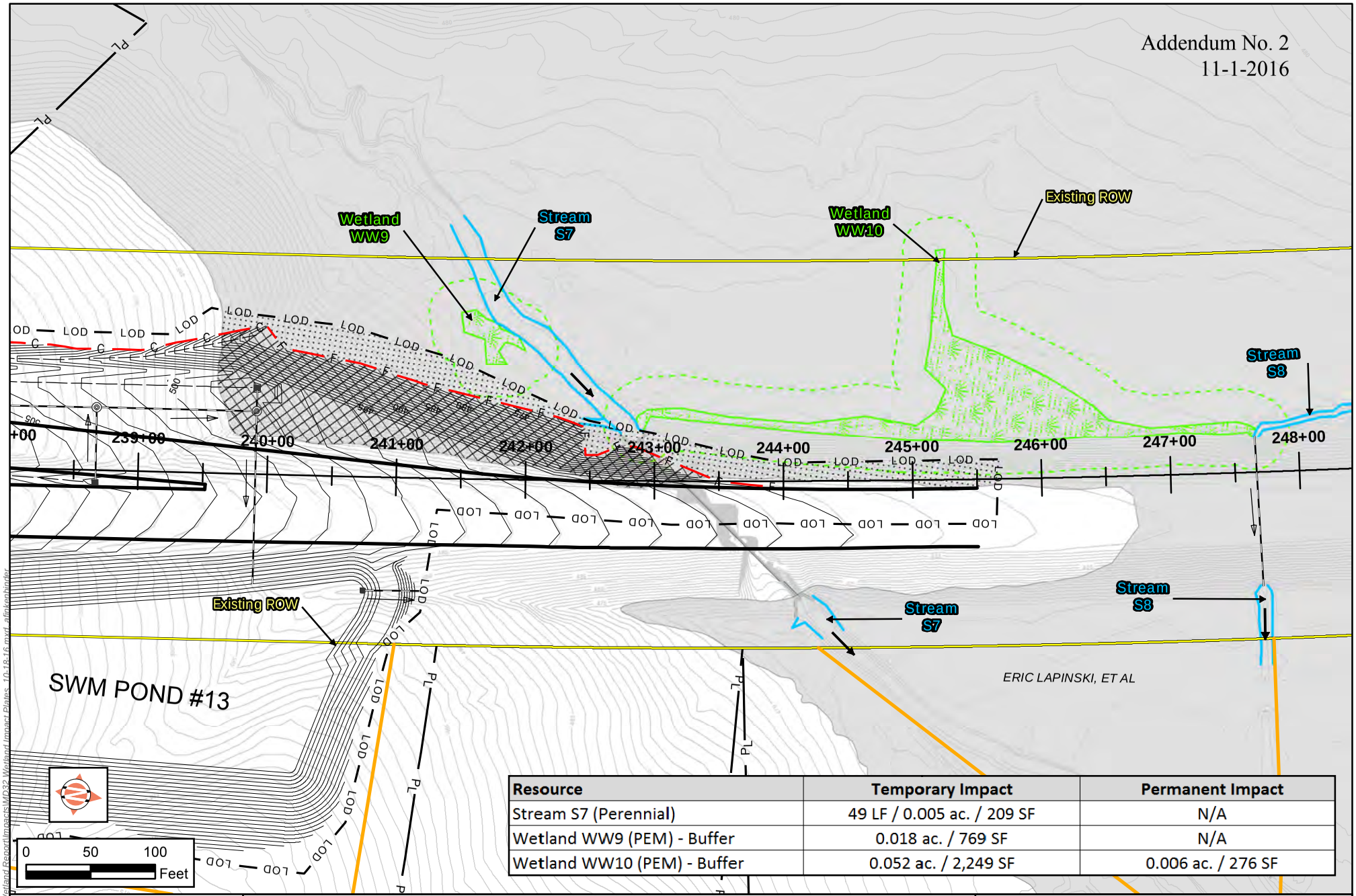

Resource	Temporary Impact	Permanent Impact
Stream S7 (Perennial)	49 LF / 0.005 ac. / 209 SF	N/A
Wetland WW9 (PEM) - Buffer	0.018 ac. / 769 SF	N/A
Wetland WW10 (PEM) - Buffer	0.052 ac. / 2,249 SF	0.006 ac. / 276 SF

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DELINEATED WETLAND
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100-YEAR FLOODPLAIN
LOD --- LIMIT OF DISTURBANCE
PERMANENT IMPACTS
TEMPORARY IMPACTS
PROPOSED CONDITIONS
EXISTING CONDITIONS
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MD 108 to Linden Church Road
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P:\GIS\Projects\P1472B\MXD\Wetland Report\Impacts\MD32 Wetland Impact Plates_10-18-16.mxd_afinkenbinder

Prepared by: A.D. Marble, October 2016

MD 32 from MD 108 to Linden Church Road Interchange Currently Proposed Impacts Compared with MD 32 Planning Study FEIS Impacts to Wetlands and Waters of the U. S.

June 10, 2016

Permanent Wetlands (PEM) Impact Summary and FEIS Comparison

WETLAND ID	CURRENT IMPACT (AC/SF)	FEIS IMPACT (AC/SF)	COMPARISON	
			INCREASE (AC/SF)	DECREASE (AC/SF)
WW1	0.00195/85	0	0.00195/85	0
WW3	0.00142/62	0	0.00142/62	0
†WW4	0.07018/3057	0.02867/1249	0.04151/1808	0
‡WW6	0.08000/3485	0.03469/1511	0.04532/1974	0
*WW8	0.03602/1569	N/A	0.03602/1569	0
*WW9	0.00657/286	N/A	0.00657/286	0
WW10	0.23/10038	0.02094/912	0.21/9126	0
TOTAL	0.43 AC/18,582 SF	0.08 AC/2572 SF		
		NET	****0.34 AC/14,910 SF**	

†WW4 was delineated as Palustrine Scrub Shrub (PSS) in SHA MD 32 planning study.
‡WW6 was delineated as Palustrine Forested (PFO) in SHA MD 32 planning study.
*WW8 and WW9 were not delineated in the original MD 32 planning study.
** The net increase of 0.34 AC of impact when compared to the approved 2005 FEIS impacts stem primarily from wetland type conversions and an expansion of resources as identified in the updated wetland delineation completed in January – March of 2016), and an LOD expansion triggered by the MD Stormwater Management Act of 2007 which requires that ESD be implemented to the maximum extent practicable.

Permanent Wetlands (PFO/PEM) Impact Summary and FEIS Comparison

WETLAND ID	CURRENT IMPACT (AC/SF)	FEIS IMPACT (AC/SF)	COMPARISON	
			INCREASE (AC/SF)	DECREASE (AC/SF)
†WW11	0.30/13,149	0.86/3759	0.22/9390	0
		NET	****0.22AC/9390 SF**	

†WW11 was delineated as perennial/intermittent Waters of the U. S. in SHA MD 32 planning study.
**The net increase of 0.22 AC of impact when compared to the approved 2005 FEIS impacts stem primarily from wetland type conversion and an expansion of resources as identified in the updated wetland delineation completed in January – March of 2016; and an LOD expansion triggered by the MD Stormwater Management Act of 2007 which requires that ESD be implemented to the maximum extent practicable.

Permanent Wetlands (PFO) Impact Summary and FEIS Comparison

WETLAND ID	CURRENT IMPACT (AC/SF)	FEIS IMPACT (AC/SF)	COMPARISON	
			INCREASE (AC/SF)	DECREASE (AC/SF)
†WW2 *	0.75/32,519	0.93/40,389	0	0.18/7870
		NET	**‡ -0.18 AC/7870 SF**	

‡SHA commitment to reduce FEIS impacts by ¼ acre will require an additional 3,020 SF reduction in impacts.

* Current design plans (as shown) permanently impact 32,519 SF of Wetland WW2. The amount of permanent impact to this wetland must be reduced to 29,499 SF during the Design-Build phase.

Permanent Waters of the U. S. (Perennial/Intermittent) Impact Summary and FEIS Comparison

WATERS OF THE U. S. ID	CURRENT IMPACT (LF)	CONSTRUCTED IMPACTS (LF)	FEIS IMPACT (LF)	COMPARISON	
				INCREASE (LF)	DECREASE (LF)
S1	105	0	82	23	0
S2	266	0	109	157	0
†S3	223	0	N/A	223	0
S4	280	0	111	169	0
S5	189	0	570	0	381
*S6	88	126	115	99	0
S7	121	0	115	6	0
S8	537	0	1074	0	537
†S10	56	0	N/A	56	0
TOTAL	1865 LF	126 LF	2176 LF		
			NET	**-185 LF**	

†S3 and S10 were not identified in SHA MD 32 planning study.
*S6 was previously impacted by construction of the Linden Church Road Interchange.

Permanent Waters of the U. S. (Ephemeral) Impact Summary and FEIS Comparison

Waters of the U. S. ID	CURRENT IMPACT (LF)	FEIS IMPACT (LF)	INCREASE (LF)	DECREASE (LF)
†S13	257	117	140	0
		NET	****140**	

†S13 was identified as perennial/intermittent Waters of the U. S. in SHA MD 32 planning study.
**The net increase of 140 LF to S13 when compared to the approved 2005 FEIS stems from an LOD expansion triggered by the MD Stormwater Management Act of 2007 which requires that ESD be implemented to the maximum extent practicable. See "Justification of SWM impacts in Ephemeral Waters" statement in Attachment E.

NOTICE TO CONTRACTOR

EARLY SUBMISSIONS. The last sentence of the first paragraph of TC-5.02, "No work shall be started before receipt of the Notice to Proceed" shall not apply to the following:

After notification to the Contractor from the Administration that the Contractor is the apparent low bidder, the Contractor will be permitted to provide a written request to the Engineer to submit documentation for materials sources and working drawings for any items of work that have a long lead time and could jeopardize the project schedule. Upon written approval from the Engineer the Contractor may submit the applicable documentation to the Engineer.

Should the Contract not be awarded to the apparent low bidder who meets the requirements of the Contract, GP-8.10 will apply for all costs accrued for the preparation and approval of the working drawings and any resultant material purchase approved by the District Engineer and steel fabricated in conformance with the approved working drawings between the date the Contractor received notice of apparent low bidder and the date of notice that the apparent low bidder will not be awarded this Contract.

Should this Contract not be awarded to the apparent low bidder due to failure of the Contractor to comply with all award and execution requirements, all costs accrued for the preparation of the specific items and any resultant material purchased and steel fabrication shall be borne by the Contractor.

Failure of the Contractor to submit the early submissions will not be basis for delaying issuance of the Notice to Proceed or be considered a reason for a time extension.

GENERAL PROVISIONS

GP SECTION 2
BIDDING REQUIREMENTS AND CONDITIONS FOR DESIGN-BUILD – COMPETETIVE SEALED PROPOSALS

16 **DELETE: GP-2.19 (a) General.** in its entirety.

INSERT: The following:

GP-2.19 (a) General. The Contract is to be awarded as outlined in TC 2 of the Request for Proposals.

DELETE: GP-2.19 (b) Determination of Lowest Bidder.

INSERT: The following:

GP-2.19 (b) Determination of Successful Proposer.

DELETE: The first sentence in GP-2.19 (b) "Bids shall be…Invitation for Bids."

INSERT: The following:

Proposals shall be evaluated as outlined in TC 2 of the Request for Proposals

17 **DELETE: GP-2.19 (c) Award.** in its entirety.

INSERT: The following:

GP-2.19 (c) Award. Award of the Contract will be based on the criteria as outlined in TC 2 of the Request for Proposals.

TERMS AND CONDITIONS

TC SECTION 2
BIDDING REQUIREMENTS AND CONDITIONS FOR COMPETITIVE SEALED PROPOSALS (DESIGN-BUILD)

TC-2.03 VALUE ENGINEERING CHANGE PROPOSALS

DELETE: This entire section.

INSERT: The following:

Value Engineering proposals will not be entertained on this project.

TC-2.06 PARTNERING

DELETE: This entire section.

INSERT: The following:

Partnering on this project will be mandatory. The partnership will be structured to draw on the strengths of each organization through open communication, teamwork and cooperative action to identify and achieve mutual goals. The objective is to create an atmosphere of trust and honest dialogue among all stakeholders. This partnership will not change the legal relationship of the parties to the Contract nor relieve any party from any of the terms of the Contract.

The Administration's Assistant District Engineer of Construction, the Project Design Engineer and the Design-Builder's management representative will organize a partnering project team. Persons recommended being on the team and guidelines for partnering are included in the Partnering Field Guide at www.mdqi.org.

The kick-off workshop meeting will be held soon after execution of the Contract. All stakeholders will attend the kick-off workshop to develop and commit to the Partnering Charter and Issue Resolution process. Follow-up meetings will be held monthly by the Design-Builder and the Administration, with other stakeholders attending as needed.

Measuring the partnering on the project is a key element to its success. All stakeholders will participate in the process. The Partnering Project Rating form will be completed monthly and then entered into the Administration's Partnering Data Base. Summaries of the ratings will then be shared with the team. The Administration's and Design-Builder's management team will review the partnering ratings and intervene if necessary on a monthly basis.

All cost of partnering meetings shall be shared equally between the Design-Builder and the Administration.

TC 2.07 REQUEST FOR PROPOSALS (RFP)

2.07.01 Design-Build Concept

The Administration is soliciting Price Proposals for the design and construction of improvements to MD 32 from MD 108 to north of Linden Church Road. This project is located in Howard County, Maryland. The basis of payment for this work will be "lump sum" which price shall include all costs associated with design and construction of the project in accordance with the requirements of this RFP.

The use of the term "Contractor" or "Design-Builder" within the Contract Documents furnished by the Administration shall be taken to mean Design-Build (D-B) Contractor. These terms are interchangeable.

The use of the term "Designer" or "Design-Build Engineer," within the Contract Documents furnished by the Administration, shall be taken to mean the Engineer working for the Design-Build Contractor. The use of the term "Engineer," within the Contract Documents furnished by the Administration, shall be as defined in Section GP-1.03 of the General Provisions for Construction Contracts.

2.07.01.1 Restrictions on Participation in Design-Build Contracts:

An individual or entity that has received monetary compensation as the lead or prime design consultant under a contract with the Administration to develop the concept plan and/or have been retained to perform construction phase services on behalf of the state, or a person or entity that employs such an individual or entity, or regardless of design phase responsibilities has received in excess of $500,000.00 for services performed, may not submit a Technical Proposal or a Price Proposal for this procurement and is not a responsible proposer under COMAR 21.06.01.01. The Technical Proposal or Price Proposal from such an individual or entity will be rejected pursuant to COMAR 21.06.01.01 and COMAR 21.06.02.03.

The following is a list of consultants and/or subconsultants that have received monetary compensation under a contract with the Administration as the prime consultant to develop the concept plan, have been retained by the Administration to perform construction phase services on the behalf of the state for this procurement, or have received payment in excess of $500,000.00. SHA makes no representations regarding the completeness of the list:

- Jacobs Engineering
- AD Marble
- AB Consultants
- Sabra Wang & Associates
- Brudis & Associates

- AECOM

§ 13-212.1 of the State Finance & Procurement Article contains various restrictions on participating in State procurements. Any questions regarding eligibility must be appealed to the Maryland State Board of Contract Appeals.

No official or employee of the State of Maryland, as defined under General Provisions Article of the Annotated Code of Maryland, whose duties as such official or employee include matters relating to or affecting the subject matter of this contract, shall during the pendency and term of this contract and while serving as an official or employee of the State become or be an employee of the Design-Build Team or an entity that is a subcontractor on this contract.

No Design-Build Team may use any persons meeting the above restrictions in any capacity, key staff or otherwise, on this Design-Build Contract. It is the responsibility of the Design-Build Team to identify any potential ethics issues concerning its former MDOT employees and seek an opinion from the State Ethics Commission regarding any potential conflicts of interest. The Design-Build Team shall provide certification in its cover letter that it is in compliance with State Ethics Laws prohibiting work on a matter in which a former MDOT employee participated significantly as a State Employee for the duration of this contract.

2.07.02 Project Overview

2.07.02.01 Description of Work

The contract generally consists of the design and construction of MD 32 to a four lane divided highway from MD 108 to north of Linden Church Road. The site is located in Howard County. The length of the work is approximately 3.0 miles.

The scope of improvements is anticipated to include, but not limited to, earthwork, new pavement construction, existing pavement rehabilitation, drainage, stormwater management, erosion & sediment control, reforestation, landscaping, signing and marking, intersection/interchange lighting, construction of small structures such as culverts, utility coordination, and environmental permit acquisition.

The proposed roadway will generally be a 4 lane divided highway with 12 foot lanes, 4 foot paved inside shoulders, and 10 foot paved outside shoulders. It includes a 34 foot median with traffic barrier protection. The MD 32 southbound on-ramp and off-ramp at Linden Church Interchange will be reconstructed with full acceleration and deceleration lanes. The pavement for the new roadway may be asphalt or concrete and the existing roadway will be rehabilitated. The design for this project shall accommodate the future widening of MD 32 at the northern limit. The future MD 32 Phase 2 project will continue to improve MD 32 from a two lane highway to a 4 lane divided highway from north of Linden Church Road to I-70.

2.07.02.02 Project History

The need for improvements to MD 32 corridor has been identified since 1989 by the State and Howard County. Project planning activities began in the 1990's and a Final Environmental Impact Statement (FEIS) was approved by FHWA in 2005. The purpose from the MD 32 planning study is to improve safety and capacity throughout the corridor while attempting to minimize right-of-way impacts and environmental impacts. Project development activities have been phased as cited below due to funding constraints. The phases were prioritized based on crash experience, capacity, and operational issues.

- Burntwoods Road Interchange – construction was completed in 2008.
- Linden Church Road Interchange – construction was completed in 2013.
- Nixon Farm Mitigation Site – construction was completed in 2010.
- Wellworth Way Service Road – currently under construction.
- Phase 1 widening from MD 108 to north of Linden Church Road – An environmental reevaluation of the FEIS for this contract is currently ongoing and is expected to be complete by August 2016.
- Phase 2 widening and safety improvements from Linden Church Road to I-70 – currently in the design phase with a Design-Build contract planned for early-2018. Construction is anticipated to begin by Spring 2019.

2.07.02.03 Project Goals

1. Schedule – Fully open four lanes to traffic and substantially complete construction as soon as possible.
2. Mobility - Minimize delay during construction, specifically any detours
3. Environmental Resources – Minimize impacts to environmental resources.
4. Design Excellence – Provide a project that reflects the practice of good judgment through execution, as well as sound decision making within the project constraints.

2.07.02.04 Project Key Issues

1. Schedule
   - The Administration desires to provide a usable facility to the public as soon as possible.
   - The Design-Builder will set its completion date. Its Price Proposal will be adjusted by $18,300/calendar day of construction time as part of the selection determination.

- The schedule needs to be coordinated with Right-of-Way acquisition phasing and utility relocations.
- An incentive of $18,300/calendar day for up to 30 days will be provided for early completion. An equal disincentive will be assessed if the Design-Builder fails to obtain acceptance before expiration of the Contract Time. Refer to Notice to Contractor Incentive – Disincentive for additional information.

2. Mobility
   - A detour is anticipated for the work to tie the ramp from Linden Church Road to MD 32 southbound. The Administration desires to minimize or eliminate the need for this detour.
   - The Design-Builder will set any ramp detour duration for the ramp from Linden Church Road to MD 32 southbound. Its Price Proposal will be adjusted by $5,100/calendar day for the detour duration as part of the selection determination.

3. Environmental Resources
   - Environmental resources are present within project limits and impacts are anticipated. The Design-Builder shall continue to evaluate avoidance and minimization efforts to these resources.
   - Incentives will be provided for reduction of impacts to environmental resources.

4. Design Excellence
   - A professional, collaborative, and integrated team that is well trained in Design-Build is needed for successful delivery of this project.
   - The Design-Build Team is solely responsible to provide the design and construction of this project in conformance with the Contract Requirements. Providing a project with quality design through integrated and well-documented quality management is needed. This will include the Design-Builder providing a separate Lead Design Firm and Independent Design Quality Management Firm for independent verification that design complies with the Contract Requirements.
   - Consideration must be given in the design and construction for how the improvements will be implemented for this project and be compatible with the future construction of the Phase 2 widening.
   - The Design-Builder must exhibit good judgment and sound decision making in design and construction to ensure the Project Goals are achieved.

2.07.02.05 Project Status

The current status of aspects of the project is as outlined hereafter.

09-15-2016

2.07.02.05.1 Survey

Aerial photogrammetry at 1" = 50' was prepared from photographs. A contour surface model and topographic base map were prepared on the basis of this photogrammetry. Supplemental data collected surveys were performed along portions of the roadways to refine pavement elevations, ditch inverts, service access roads, potential SWM facilities, and pipe culverts. The data from these supplemental surveys was incorporated into the plan and the surface. This information is available in electronic format on ProjectWise. All surveys were performed in the Maryland State Plane Grid, NAD 83/91 and NAVD 88.

The Design-Builder must obtain all additional survey data necessary for their design, construction, and verification of surface model for all design activities.

2.07.02.05.2 Plans

A set of conceptual plans showing the horizontal and vertical geometry for the highway construction has been prepared in Microstation V8i. Files are available in electronic format on ProjectWise.

2.07.02.05.3 Cross-Sections

Field-surveyed cross-sections were not taken. Conceptual cross sections were prepared for the mainline and intersecting streets on the basis of the terrain model surface for the baseline, typical section and profile shown on the plans. These cross sections are being provided in electronic format on ProjectWise for informational purpose only. The Design-Builder must perform field-run cross-sections to complete design and construction activities to address design and/or construction issues and provide clarification where necessary. Cross-sections showing existing and proposed ground must be prepared by the Design-Builder using the appropriate computer software.

2.07.02.05.4 Geotechnical

The Administration has obtained soils borings and infiltration tests at selected locations along the project corridor and performed laboratory testing of the samples. The boring logs and laboratory test data are included on ProjectWise.

These studies were performed with reasonable care and recorded in good faith. The Administration considers the information Engineering Data and will stand behind its accuracy at the location it was taken. The Administration assumes no responsibility in respect to the sufficiency of the studies for design. The Design-Build Team will need to perform additional geotechnical testing and analysis to complete the project. The Design-Build Team is

responsible for performing a complete geotechnical program including additional borings, sampling, in-situ and laboratory testing, analysis, and design, as necessary to complete design and construction.

2.07.02.05.5 Utilities

All utility data of which the Administration is aware is reflected on the survey information. The Administration has had a utility designating service locate underground utilities which identified the existence of the utility at its horizontal location. Inaccuracies in information regarding the locations of an underground utility based on utility designation information shall be considered material only if the utility's actual centerline location is more than three (3) feet distant from the horizontal centerline location shown in that information, without regard to vertical location. Additional utilities may be present in the area.

Utility test hole data will be field collected by the Administration at single point locations. Once uncovered, the utility's horizontal and vertical location will be verified using accurate survey techniques. The Administration considers this information Engineering Data and will stand behind its accuracy at the locations that it is taken. The test hole data is scheduled to be available on ProjectWise in September 2016.

The Design-Builder is responsible for obtaining all information that will be required to complete the roadway design and construction. The Administration has conferred with the utility companies with facilities in this area concerning the potential impact of this roadway construction. The Design-Builder must coordinate and cooperate with other contractors that are expected to be relocating utilities during the construction of this Project. The Design-Builder is responsible for determining the status of all designs and relocations and for identifying all additional required relocations and for coordinating the design and construction of the utilities with the design and construction of the roadway improvements of this Project.

The Design-Builder will be responsible to obtain any additional utility data it determines necessary for design and construction of the project.

2.07.02.05.6 Right of Way

Approximately 300 feet right of way was previously acquired along MD 32 from MD 108 to north of Linden Church Road. The Administration has identified additional right-of-way needed to design and construct the project. The Administration is developing plats and will acquire the right-of-way. It is anticipated that the total right-of-way clearing will be July 31, 2017.

The Design-Builder may prepare design plans, permit applications, and any

other engineering documentation related to the project in advance of the right-of-way clear date. The Design-Builder may begin construction activity only on plans where the disturbance is entirely contained within right-of-way certified by the Administration to be in SHA's possession. The Design-Builder may not proceed with construction on any properties not within SHA possession until such time as the Administration issues a Right-of-Way Certification stating that right-of-way is clear for the construction package. The Administration may issue multiple Right-of-Way Certifications throughout the acquisition process. The Right-of-Way Certification(s) will only list those properties which have been cleared at the time of issuance.

The Design-Builder may revise the roadway alignment and other details of the project to alter the limits of construction or disturbance, subject to environmental constraints, but all construction must be contained within the Right of Way. The Design-Builder will be responsible for acquiring, at its expense, all other rights in land needed for construction staging, yarding, construction, or otherwise.

2.07.02.05.7 Permits

The following permits and/or approvals are anticipated to be required for this project:

- Stormwater Management Permit and Erosion and Sediment Control Approval (from SHA-Plan Review Division)
- National Pollutant Discharge Elimination System (NPDES) Permit (from MDE)
- Section 404 Individual Permit, Water Quality Certification and Nontidal Wetlands & Waterways Permit and (from USACE and MDE)
- Reforestation Law Approval (from DNR)
- Letter of Map Revision (LOMR) (from FEMA)

Status of Stormwater Management and Erosion and Sediment Control Review:

A Stormwater Management (SWM) concept design was developed by the Administration to establish Right of Way needs. The design is currently under review by SHA-PRD. The Design-Build team is responsible to finalize the SWM concept and design and obtain the concept, site development and final approvals in compliance with the "Sediment and Stormwater Guidelines and Procedures for SHA Projects".

No erosion and sediment control design has been developed by the Administration. The Design-Build Team is responsible for the preparation of final Erosion and Sediment Control Plans and obtaining final approvals.

Status of National Pollutant Discharge Elimination System Permit:

The Administration anticipates submitting a Notice of Intent (NOI) form to MDE to complete the public notice period. The ultimate responsibility of submitting any amendments thereto shall be on the Design-Builder. Any delays resultant of obtaining NOI amendments will be the sole responsibility of the Design-Builder.

Status of Nontidal Wetlands & Waterways Permit and Section 404 Individual Permit:

A Nontidal Wetlands and Waterways Permit and Section 404 Individual Permit were approved for the MD 32 corridor planning study. The Administration has applied for a new Permit based on the impacts depicted in the Conceptual Plans. SHA anticipates approval from MDE and the ACOE prior to the submittal of Price Proposals for this project. Any impacts that are outside the current LOD or are in excess of the current assessment will have to be permitted by the Design-Builder. In such cases, the Design-Build Team is responsible for the complete process of preparing the documentation for these approvals and submitting this information to SHA-Environmental Programs Division, who will then submit the modification request to the appropriate agency for approval.

Any resultant delays or changes to schedules or costs, whether direct, indirect or consequential, arising out of changes to the approved permit will be the responsibility of the Design-Builder.

Wetlands and waterways were identified and delineated within the project area. A copy of the delineation report is posted on Projectwise. Surveyed boundaries of waterways, wetlands, and 25-foot wetland buffers are depicted on the Conceptual Plans, and will be provided to the Design-Build Team in electronic format as part of the Project Files. Prior to performing any work on the project, the Design-Build Team shall be responsible for installing temporary orange construction fence and prohibitive signage around the wetland and waterways areas within the immediate work area, as described in the Special Provisions.

Status of Reforestation Law Approval:

The Administration has received the Reforestation Law Approval from DNR for the impacts for this project based upon the proposed activities in the conceptual plans. Any impacts that are outside the current LOD or are in excess of the current assessment will have to be permitted by the Design-Builder. In such cases, the Design-Build Team is responsible for the complete process of preparing the documentation for these approvals and submitting this information to SHA - Landscape Operations Division, who will then

submit the modification request to DNR for approval.

Any resultant delays or changes to schedules or costs, whether direct, indirect or consequential, arising out of changes to the approved permit will be the responsibility of the Design-Builder.

Status of FEMA Letter of Map Revision

The Administration has applied for the FEMA Conditional Letter of Map Revision (CLOMR) based on the current LOD impacts. SHA anticipates having an approved CLOMR for the impacts prior to the submittal of Price Proposals for this project based upon the proposed activities in the conceptual plans. The Design-Build team is responsible to obtain the FEMA Letter of Map Revision (LOMR).

2.07.03 RFP Package

The following materials are being provided to all prospective proposers:

A. Request for Proposals.

- Questions and Responses

The following materials are being provided in electronic format on ProjectWise. This material is considered Engineering Data and the Administration will stand behind its accuracy unless otherwise specified in the contract documents.

B. Survey/Topographic Files

- Topographic files (including stream cross sections)
- Text files
- Existing Contour files
- Triangle files
- Environmental Features file
- Existing Surface files

C. Utility Files

- Existing Utility designation files
- Test Hole Information

D. Right-of-Way

- Existing Right-of-way files

- Proposed Right-of-way file
- Proposed Right-of-way Plats

E. Reforestation Impact Plans & Wetland Plates

- Forest Impact Plans
- Forest Impact Design Files
- Wetland Impact Plates
- Wetland Impact Plates Design files
- Wetland Delineation Memorandum
- Original ACOE Permit

F. Appendices

- Pavement and Geotechnical Data
- Existing and Proposed Traffic Data
- Traffic Control Device Design Request
- ITS Details
- POP Sign Details
- Existing Structure Inspection Report
- Structure Checklist
- Pavement and Geotechnical Design Guide Information

The following materials are being provided in electronic format on ProjectWise. This material is considered Conceptual and the Administration makes no representation regarding its accuracy.

G. Conceptual Plan Sheets

- Title Sheet
- Typical Section Sheets
- Geometry Sheets
- Conceptual Roadway Plans
- Roadway Profile Sheets
- Structural TS&L Plans

- Cross Sections
- Conceptual Utility Scroll Plans
- Landscape Planting Zone Concept Plans

H. Conceptual Plan Design Files

- Roadway Design Files
- Horizontal Baseline
- Vertical Alignment file
- Shading file
- Border files
- Conceptual Potential SWM Area files
- Conceptual Cross Section files
- Inroads files
- Conceptual Drainage files
- Utility Impact Matrix

I. Conceptual Stormwater Management and Drainage Information

- Conceptual Stormwater Management Report

J. As-Built Plans

The following materials are being provided in electronic format on ProjectWise. This material is considered necessary for the Design-Build Team to prepare a Price Proposal and/or finalize their designs.

K. Environmental Documents

- Original FEIS
- NEPA Reevaluation
- Noise Study

L. Stormwater Management and Surface Drainage Information

- NOI Form
- Drainage Design Guideline
- BMP Checklists and As-Built Certification Formats

- SWM Report Format Guidelines
- SHA BMP Identification Form
- Water Quality Summary Sheet Format and Definitions
- Geotextile Guidelines
- Maryland State Highway Administration Stormwater Management Site Development Criteria, prepared by Highway Hydraulics Division, Revised June 2011.
- SHA Standard SWM Details

M. Office of Structures, Draft Policy and Procedures Manual

- DESIGN PPMS
- PLAN PPMS

N. Utility Owner Requirement

In general, the Microstation files included on the ProjectWise are in conformance with the MDSHA Microstation V8 CAD Standards Manual.

It is likely that most Proposers will use plot drivers that differ from the drivers used to produce the provided plans. Some of the drawings screen existing features through level symbology color 250. The manipulation of the drawing files to produce any requirements (as found elsewhere in the RFP) for as-built plans will be the responsibility of the selected Design-Builder.

Proposers are also provided with a file index provided on Projectwise. The file is a Word Document describing all the files and files names as outlined above.

2.07.04 Description of Work

2.07.04.1 Engineering/Construction Services

The required engineering and construction services to be provided by the Design-Builder will include, but not be limited to:

- Roadway Design and Construction.
- Structural Design and Construction for All Culverts, Walls, and any and all other incidental structures specifically required for this project.
- Hydraulic Analysis, Design, Construction and Agency Approval for structures specifically required for this project.

- Temporary and Permanent Signing, Lighting, Signalization, Pavement Marking, and ITS Design and Construction.
- Roadside Landscape Planting, Stormwater Management Landscape Planting, Reforestation Design and Construction of the aforementioned.
- Utility Coordination for utility modifications regardless of whether designed and/or constructed by the Design-Builder or by others.
- Pavement and Geotechnical Engineering.
- Storm Water Management (SWM) Design, Approvals, Construction and As-Built Certification.
- Erosion and Sediment Control (E&S) Design, Implementation and Approvals (including NPDES Approvals).
- Engineering Studies and Reports required to meet the contract or permit requirements or to address any comments from the Administration or other agencies related to meeting or modifying the contract or permit requirements.
- General Coordination with Administration.
- Additional Data Collection (includes surveying, geotechnical, etc.).
- Produce Required Deliverables.
- Environmental Permit Activities (including obtaining permits as described herein).
- Community Relations as defined in TC 3.21 – Public Outreach Performance Specification.
- Traffic Control Design and Implementation including the preparation of a Transportation Management Plan (TMP).
- Maintenance of project site(s) including mowing, watering, and dust control.
- Obtaining all required permit modifications from the appropriate regulatory agencies for any additional impacts to roadside trees, stormwater management, erosion and sediment control, or any other impacts not authorized by the original permits and approvals.
- Implementation of any required mitigation or remediation for additional impacts not included in the permit or due to any non-compliance with the permit conditions.
- Any other items required to successfully complete the project.

TC 2.08 PROPOSAL SUBMISSION REQUIREMENTS

2.08.01 Responsibilities of the Proposers

2.08.01.1 Review of RFP

Before submitting a proposal, the Prospective Proposer is responsible for examining the RFP and materials furnished to each Prospective Proposer. The Prospective Proposer is responsible for all site investigation and preliminary design necessary to submit proposals and accept responsibility that their Price Proposal is sufficient to complete all design and construction.

2.08.01.2 Site Investigation

The Administration is acquiring the Right of Way necessary to construct this project. All necessary Right of Way may not be acquired prior to Notice to Proceed. **As of the issuance of this RFP, the Administration has not advanced sufficiently in this process to permit Design-Builder's to inspect all of the project site. The Design-Builder is permitted to inspect the portions of the of the project site within the Administration's Existing Right-of-Way.** The Design-Builder invited to submit a Price Proposal must first examine all of the project site that is under Administration control. Examination of all other areas must be arranged with the owner.

The Prospective Proposer is solely responsible for all site conditions discoverable from a reasonable site examination. A reasonable site examination includes all utility and/or geotechnical investigation that the Prospective Proposer determines is necessary to properly price the Work. If the Prospective Proposer determines, before submission of the proposals, that additional utility designation, geotechnical and/or subsurface investigation or analysis are necessary to properly price the Work; it is the responsibility of the Prospective Proposer to perform such investigation and analysis at its expense. The Administration has performed a preliminary utility designation and geotechnical survey of the project site. The boring logs and test results have been included in the project files. The utility information is included in the data provided on ProjectWise. It is the Proposer's responsibility to verify that information as part of its utility and/or geotechnical investigation. The Price Proposal submission will be considered conclusive evidence that the Prospective Design-Build Team has determined that it has performed a reasonable site investigation to submit Price Proposal, necessary to design and construct the project.

All subsurface investigations performed by the Prospective Proposer, including sampling and laboratory testing, shall be performed by a Geotechnical firm experienced in subsurface investigations and in accordance with the 1988 AASHTO Manual on Subsurface Investigations, AASHTO Standards, the

Maryland State Highway Administration Standard Specifications for Subsurface Explorations, MSMT Standards, the Maryland State Highway Administration Book of Standards for Highway and Incidental Structures, and ASTM Standards. The Prospective Proposer shall be responsible for utility clearance and any traffic control required for his investigation. The Prospective Proposer shall submit all Maintenance of Traffic concepts related to site investigation to the SHA District 7 Traffic Division for approval. Any investigative methods that pose a safety threat to the traveling public shall not be used. Any borings taken in roadway or shoulder areas shall be backfilled before the area is re-opened to traffic. The Prospective Proposer shall restore to its current condition, any area of the site disturbed by his site investigation operations. If the Prospective Proposer encounters any abnormal conditions that indicate the presence of hazardous materials or toxic waste during his site investigation, he shall immediately suspend work in the area and notify the Administration. A Geotechnical Engineer who is registered in the State of Maryland shall supervise all subsurface investigations conducted by the Design-Builder.

2.08.01.3 Utility Coordination

Prior to submitting a Price Proposal, the Prospective Proposer must conduct utility research and coordination with all utility companies along with additional site research to determine:

a. What utility relocation work is planned, what is the status and anticipated schedule impact of this work.
b. What utility facilities actually exist within the project limits.
c. What additional utility relocation work must be included in their design and impact to the schedule that will result from the Design-Builder's activities.
d. What permitting modifications result from additional utility relocations.

The Price Proposal must represent a thorough consideration of these elements.

2.08.01.4 Additional Surveys

The Prospective Proposer may require additional survey or topographic information (including utility locations). The Design-Builder must account for these services within their project schedule and design submittals. It is the responsibility of the Prospective Proposer at its expense to obtain all additional information and the Administration accepts no responsibility for the lack of this information.

2.08.01.5 Duty to Notify if Errors Discovered

Proposers shall not take advantage of any error, omission, or discrepancy in the RFP or related materials, including all project information. If a Proposer

discovers such an error, omission or discrepancy, he shall immediately notify the Administration in writing; failure to do so notify shall constitute a waiver of any claim based upon such error, omission, or discrepancy. After such notification, the Administration will confirm or modify the RFP in writing as the Administration determines may be necessary to fulfill the intent of the RFP.

2.08.02 Pre-Submittal Requirements

2.08.02.1 One-On-One Meetings

The Administration will hold one-on-one meetings with the Reduced Candidate List (RCL). The purpose of these meetings will be to discuss issues and clarifications regarding the RFP and/or the Proposer's potential Alternative Technical Concept (ATC) submittals. The Administration reserves the right to disclose to all Proposers any issues raised during the one-on-one meetings, except to the extent the Administration determines that, in its sole discretion, such disclosure would impair the confidentiality of an ATC or would reveal a Proposer's confidential business strategies. Each meeting will be held independently with each Prospective Proposer on the RCL.

The one-on-one meetings are subject to the following:

a. The meetings are intended to provide Proposers with a better understanding of the RFP.

b. The Administration will not discuss any Proposal or ATC with any Proposer other than its own.

c. Proposers are not permitted to seek to obtain commitments from the Administration in the meetings or otherwise seek to obtain an unfair competitive advantage over any other Proposer.

d. No aspect of these meetings is intended to provide any Proposer with access to information that is not similarly available to other Proposers, and no part of the evaluation of Proposals will be based on the conduct or discussions that occur during these meetings.

The Administration reserves the right to disclose to all Proposers any issues raised during the one-on-one meetings which require addenda to the RFP. The Administration, however, will not disclose any information pertaining to an individual Proposer's Proposal, ATCs, or other technical concepts to other Proposers.

2.08.02.2 Letter of Interest

A Letter of Interest (LOI), on official letterhead of the Design-Build Team, notifying the Administration whether or not the DB Team intends to submit a Price Proposal must be delivered no later than **November 29, 2016 prior to 12 noon** (EST). The LOI must be delivered to the following email address:

HO1415170_MD_32@sha.state.md.us

The LOI must be signed by individual(s) authorized to represent the Major Participant firm(s) and the lead Constructor firm(s). A Major Participant is defined as the legal entity, firm or company, individually or as a party in a joint venture or limited liability company or some other legal entity, that will be signatory to the Design–Build Contract with the Administration. Major Participant(s) will be expected to accept joint and several liability for performance of the Design–Build Contract. Major Participants are not design subconsultants, construction subcontractors or any other subcontractors to the legal entity that signs the Design–Build Contract.

If the Design–Build contracting entity will be a joint venture, or some other entity involving multiple firms, all Major Participant firms involved must have an authorized representative sign the LOI.

2.08.02.3 Communications During Proposal Preparation

The Procurement Officer is the Administration's single contact and source of information for this procurement.

The following rules of contact will apply during the Contract procurement process, which begins upon the date of issuance of the RFP, and will be completed with the execution of the Contract. These rules are designed to promote a fair, unbiased, and legally defensible procurement process. Contact includes face-to-face, telephone, facsimile, electronic-mail (e-mail), or formal written communication.

The specific rules of contact are as follows:

1. Section 11-205 of the State Finance and Procurement Article, Annotated Code of Maryland, prohibits and penalizes collusion in the State procurement process.

2. Unless otherwise specifically authorized by the Procurement Officer, a Proposer may contact the Department and the Administration only through the Procurement Officer and only in letter format via e-mail and not orally. The Proposer's contacts with the Department and the Administration shall be only through a single representative authorized to bind the Proposer.

3. The Procurement Officer normally will contact a Proposer in writing through the Proposer's designated representative.

4. Neither a Proposer nor its agents may contact Department or Administration employees, including Department or Administration heads, members of the

evaluation committee(s) and any other person who will evaluate proposals, regarding the project, except through the process identified above.

5. Any contact by a Proposer determined to be improper may result in disqualification of the Proposer.

6. The Administration will not be responsible for or bound by: (1) any oral communication, or (2) any other information or contact that occurs outside the official communication process specified herein, unless confirmed in writing by the Procurement Officer.

All requests for additional information or clarification of the RFP and any other communication concerning this project shall be submitted via e-mailed with return confirmation receipt. No verbal requests or personal visits will be honored. All written contacts shall be addressed to the Procurement Officer:

Jason A. Ridgway, P.E.
Director, Office of Highway Development
State Highway Administration
e-mail address: HO1415170_MD_32@sha.state.md.us

During the Price Proposal Phase, as discussed in GP 2.09, Prospective Proposers on the RCL may make inquiries up to 4:00 p.m. (EST) on **November 22, 2016**. Inquiries received after that date and time will not be accepted. All responses to questions related to the Price Proposal Phase and any addenda to the RFP will be disseminated by email to the primary contact for those firms invited to submit Price Proposals.

2.08.02.4 Addenda

Interpretations, clarifications or modifications to this RFP will be made by Addenda. Only interpretations, clarifications and answers to the questions included in Addenda or such writings shall be binding on the Administration.

2.08.02.5 Request for Information (RFI)

Responses to all RFI's not part of an addendum, will be provided through email and shall be considered contractually binding. The Administration will provide a comprehensive list of questions and answers to the Reduced Candidate List 7 days prior to the Price Proposal due date.

2.08.02.6 Substitutions

Proposers are advised that, in order for a Proposer to remain qualified to submit a Price Proposal after it has been placed on the Reduced Candidate List, its organization, and Key Staff identified in the Technical Proposal, must remain intact for the duration of the procurement process. A Proposer may propose substitutions for participants after the Technical Proposal submittal; however, such changes will require written approval by the Administration, which approval

may be granted or withheld in the Administration's sole discretion. Requests for changes must be made in writing no later than thirty (30) calendar days prior to the due date for submittal of Price Proposals.

2.08.02.7 Compliance with Applicable Law

In connection with this RFP and the Contract, Proposers shall comply with all applicable laws in all aspects in connection with the procurement process of this project and in the performance of the Contract.

2.08.02.8 ATC Submittal and Review

TC Section 2.08.02.8 through 2.08.02.13 set the process for the submittal and review of Alternative Technical Concepts (ATC) that conflict with the requirements for design and construction of the project, or otherwise require a modification to the technical requirements of the project. The process is intended to:

- Allow Proposers to incorporate innovation and creativity into the Proposals.
- Allow the Administration to consider Proposer ATCs in making the selection decision.
- Avoid delays and potential conflicts in the design associated with deferring of reviews of ATCs to the post-award period.
- Obtain the best-value for the public.

ATCs eligible for consideration hereunder are limited to those deviations to the requirements of the as-issued Contract Documents that result in performance and quality of the end product that equal to or better than the performance and quality of the end product absent the deviation, as determined by the Department at its sole discretion. **Equal to or better ATCs that include the application of practical design alternatives that will advance the project goals without compromising the performance, quality, and safety of the end product are encouraged.**

A concept is not eligible for considerations as an ATC if, in the Administration's sole discretion, it is premised upon or it would require:

- A reduction in project scope, performance, or reliability.
- The addition of a separate Administration project to the Contract (such as expansion of the scope of the project to include additional roadways).
- An increase in the amount of time required for Substantial Completion or Contract Time.

Any ATC that, if implemented, would require further environmental evaluation or permit modifications for the project, may be allowed, provided that the Proposer bears the schedule and cost risk associated with such additional environmental

reevaluation or permit modifications. If the Proposer is not able to obtain the approvals necessary to implement the ATC, the Proposer is obligated to develop the project in accordance with existing approvals and without additional cost or extension of time.

If a Proposer is unsure whether a concept is consistent with the requirements of the RFP or if the concept would be considered an ATC by the Administration, the Administration recommends that the Proposer submit such concept for review as an ATC. The Proposer is also encouraged to submit standards or specifications that are approved for usage by other state Departments of Transportation as ATCs. If a concept is submitted as part of the Technical Proposal that the Administration considers to be an ATC, and the Proposer has not received ATC approval prior to submission of the Price Proposal, the Proposer will be required to revert back to the RFP requirements if selected.

The Proposer may submit an ATC for review by the Administration on or before **November 7, 2016 at 4:00 p.m.** (prevailing local time). Inquiries received after that date and time will not be accepted.

All ATCs shall be submitted in writing via email only to HO1415170_MD_32@sha.state.md.us, with a cover letter clearly identifying the submittal as a request for review of an ATC. If the Proposer does not clearly designate its submittal as an ATC, the submission will not be treated as an ATC by the Administration

The Administration will review each ATC submitted. If an ATC is summarily approved or not approved, the Administration's comments will inform the Proposer that its technical concept appears to be generally acceptable, or the Administration will identify areas in which the approach appears to be incompatible with the project goals and requirements. If the Administration needs more information to determine whether or not the ATC will be approved or not approved, the Administration will submit written questions to the Proposer and/or request a one-on-one meeting in order to better understand the details of the ATC. The Administration may conditionally approve an ATC based on required revisions to a portion or portions of the ATC.

If an ATC is not approved or conditionally approved and the Proposer feels that the non-approval or the conditions for approval were due to an incorrect conclusion on the part of the Administration, it may re-submit the ATC for one additional review via email only to HO1415170_MD_32@sha.state.md.us. If a re-submittal is made, it shall be accompanied by a cover letter clearly identifying such submission as an ATC submitted for an additional review. Resubmission of an ATC will not entitle the Proposer to an extension of the Proposal due date.

The Proposer shall advise the Administration in its ATC if it believes a one-on-one meeting is appropriate.

The Administration will return its approval, non-approval, conditional approval, or additional questions pertaining to any specific ATC no later than two weeks after receipt of that ATC. If the Proposer does not receive a return response from the Administration within two weeks of the Administration's receipt of the ATC, the Proposer shall presume that the Administration has rejected the ATC. The non-approval of an ATC will not entitle the Proposer to an extension of the Proposal due date.

2.08.02.9 Content of ATC Submittal

Each ATC submittal shall include a sequential ATC number and shall include the following:

A) Description: Detailed descriptive information and other appropriate information as appropriate such as conceptual drawings, production details, standards, specifications, and a traffic operations analysis.

B) Location: The locations where, and an explanation of how, the ATC will be used on the Project.

C) Maintenance: Any change in routine maintenance requirements associated with the ATC, including ease of maintenance.

D) Design Life: Any change in the anticipated design life of the item(s) comprising the ATC.

E) Time Savings: Any reduction in the time period necessary to design and construct the Project resulting from implementing the ATC, including, as appropriate, a description of method and commitments.

F) RFP References: References to requirements of the RFP that are inconsistent with the proposed ATC, an explanation of the nature of the deviations from said requirements, and a request for approval of such deviations. Any requested deviation from the requirements from the RFP related to the ATC must be listed in this section.

G) Analysis: The analysis justifying the use of the ATC and why the deviation, if any, from the requirements of the RFP should be allowed.

H) Potential Impacts: A preliminary analysis of potential impacts (both during and after construction) including but not limited to user impacts, Right-of-Way, geotechnical, utilities, environmental permitting, local community, safety, and life-cycle project and infrastructure costs, including impacts on the cost of repair, maintenance, and operation.

I) Other projects: A description of other projects on which the ATC has been used, the degree of success or failure of such usage, and the names and contact information (including telephone numbers and e-mail addresses) of project owner representatives who can confirm such statements.

J) Added Administration Risk: A description of added risk to the Administration or third parties associated with implementing the ATC.

K) Added Design-Builder Risk: A description of added risk to the Design-Builder associated with implementing the ATC.

L) Additional Costs: An estimate of any additional Administration, Proposer, or third-party cost associated with implementation of the ATC.

M) Price Proposal Adjustment: An estimate of the Price Proposal adjustment should the ATC be approved and implemented.

N) Equal or Better: An analysis of how the ATC is equal or better in quality and performance than the requirements of the Contract Documents and how it would advance the project goals, as applicable.

O) Miscellaneous: Any additional information that would assist the Administration in the review of this ATC.

2.08.02.10 Determination By The Administration

The Administration will make one of the following determinations with respect to each properly submitted ATC:

A) The ATC is acceptable for inclusion in the Proposal.

B) The ATC is not acceptable for inclusion in the Proposal.

C) The ATC is conditionally approved in its present form and may be included in the Proposal upon satisfaction, in the Administration's sole discretion, of identified conditions, clarifications, or modifications.

D) The ATC is not acceptable in its present form, but may be acceptable upon satisfaction, in the Administration's sole discretion, of certain identified conditions (such as additional information and/or a one-on-one meeting) which must be met or clarifications or modifications that must be made through a submittal of a revised ATC.

E) The submittal does not qualify as an ATC but may be included in the Proposal because it appears to be within the requirements of the RFP.

F) The Administration requires additional time to further review the ATC, and expects to provide a response to the Design-Builder on (Date).

Approval of an ATC will constitute a change in the specific requirements of the Contract Documents associated with the approved ATC and for that specific Proposer. Should the Design-Builder be unable to obtain required approvals for any ATC incorporated into the Contract Documents, or if the concept otherwise proves to be infeasible, the Design-Builder will be required to conform to the original RFP requirements. Each Proposer, by submittal of its Proposal, acknowledges that the opportunity to submit ATCs was offered to all Proposers, and waives any right to object to the Administration's determinations regarding acceptability of ATCs.

2.08.02.11 Incorporation Into Proposal

Proposer may incorporate zero, one or more pre-approved ATCs into its Proposal including conditionally approved ATCs. If the Administration responded to an ATC by identifying conditions to approval, those conditions become part of the Contract Documents. Copies of the ATC submittal and the Administration's ATC approval letters for each incorporated ATC shall be included in the Price Proposal.
Except for incorporating approved ATCs, the Price Proposal may not otherwise contain exceptions to or deviations from the requirements of the RFP Documents.

2.08.02.12 ATC Confidentiality

ATCs properly submitted by a Proposer and all subsequent communications regarding its ATCs will be considered confidential. If a Proposer wishes to make any announcement or disclosure to third parties concerning any ATC, it shall first notify the Administration in writing of its intent to take such action, including details as to date and participants, and obtain the Administration's prior approval to do so.

2.08.02.13 One-On-One Meetings

Prior to or after submission of ATCs, the Administration may conduct one-on-one meetings with a Proposer to gain information or a better understanding regarding its ATC and to discuss issues and clarifications regarding the ATC. The Administration reserves the right to disclose to all Proposers any issues raised during the one-on-one meetings. However, the Administration will not disclose any information pertaining to an individual Proposer's ATCs or other technical concepts to other Proposers.

2.08.03 Proposal Delivery Formalities

The Price Proposal shall be submitted on the Proposal Form supplied by the Administration and shall be delivered in a sealed envelope capable of holding 8½" x 11" documents without folding and clearly marked as follows:

Prospective Proposer's Name

Price Proposal

MD 32 (Phase 1) – MD 108 to north of Linden Church Road
Contract No. HO1415170

Container ___ of ___

The Proposal Guaranty shall be delivered with the Price Proposal in a sealed business-sized envelope clearly marked as follows:

Prospective Proposer's Name

Proposal Guaranty

MD 32 (Phase 1) – MD 108 to north of Linden Church Road
Contract No. HO1415170

Price Proposals must be delivered no later than **December 6, 2016 prior to 12 noon** (EST). The proposal must be delivered to the following location:

Office of Procurement and Contract Management
Fourth Floor, C-405
707 N. Calvert Street
Baltimore, Maryland 21202

A single original of the Proposal Guaranty and a single original of the Price Proposal shall be submitted as specified in this section. **The Lump Sum Cost Breakdown as outlined in TC Section 7.10 and the signed Stipend Agreements shall also be submitted with the Price Proposal.**

2.08.03.1 Effect of Submitting Proposal

Signing of the Design-Build Proposal Submission Form and Price Proposal Form, and delivery of the Proposal represents (a) an offer by the proposer to perform the Work for the Price submitted within the time(s) specified in accordance with all provisions of this RFP and (b) the Prospective proposer's agreement to all the provisions of the RFP and Contract governing requirements and procedures

applicable through execution of the Design – Build Contract. **The Technical Proposal will become part of the Design – Build Contract.**

By so signing the above referenced terms and by delivering the Proposals, the Prospective Proposer makes the following affirmative representations.

a. The Proposer has reviewed all documents and undertaken all investigations that could significantly impact the cost, timeliness, quality, or performance of the Work. Specifically, the Proposer has (a) carefully examined the RFP and all documents included or referenced therein, (b) carefully examined all available reports and data related to subsurface conditions, (c) become familiar with all applicable federal, state and local laws and regulations, (d) visited the site and made all reasonable visual investigations, and (e) correlated the information obtained from the above examinations and investigations.

b. The Proposer has given the Administration written notice of all errors, omissions, or discrepancies in the RFP in accordance with Section TC 2.08.01.

c. The Proposer has determined that the RFP are generally sufficient to convey an understanding of all terms and conditions that could significantly impact the cost, timeliness, quality, or performance of the Work.

2.08.03.2 Withdrawals and Resubmittals of Proposals

A proposer may withdraw Proposals after delivery, provided the request for such withdrawal is made in writing or in person before the date and time set for submission of Proposals. The proposer may revise and resubmit a Proposal so withdrawn before said date and time.

2.08.03.3 No Public Opening

There will be no public opening of Proposals. After the Proposal Date, all Proposals will be opened in the presence of two or more Administration employees and reviewed for completeness. A register of Proposals will be prepared that identifies each Proposer.

Neither the identity of any Proposer nor the register of Proposals will be publicly disclosed until after the Procurement Officer makes a determination recommending award of the Contract.

TC-2.09 PRICE PROPOSAL

2.09.01 General

09-15-2016

Price Proposals will be accepted only from those Proposers invited by the Administration in writing to submit Price Proposals. Price Proposals must be submitted using the Proposal Form included in this RFP.

Price Proposals shall be submitted on a lump sum basis, and shall include all engineering, design, research investigation, construction, labor, materials, and all incidentals necessary to complete the details and construction of this project.

Alternate bids utilizing foreign steel will not be allowed for this contract.

2.09.02 Wetland and/or Waterway Impact Reduction Incentive

See Section 3.20.07.04.03

2.09.03 Forest Impact Reduction Incentive

See Section 3.20.07.05.02

2.09.04 Forest Mitigation Incentive

See Section 3.20.07.05.03

2.09.05 Erosion Sediment Control Incentive/Liquidated Damages Payment

The Design-Build Team is advised that both an incentive and a liquidated damage will be imposed on this contract related to their erosion sediment control and will be tied to the Quality Assurance Ratings. See Special Provisions 308.01.04, Quality Assurance Ratings contained within this RFP for the contract requirements.

2.09.06 Price Proposal Irrevocable

The Contractor's prices are irrevocable for 120 days following receipt of the Price Proposal or Best and Final Offer.

2.09.07 Proposal Guarantee

The Contractor's proposal guarantee shall represent 5% of the Price Proposal amount in accordance with the provisions of GP 2.07.

2.09.08 Liquidated Damages

In the event a complete project is not provided by the calendar date, a liquidated damage will be charged in accordance with the provisions of GP 8.09. The dollar amount of liquidated damages is stated on page 54 of 55 in the Proposal Form of the Request for Proposals. The Administration will be the sole approving authority in determining when

the project is considered a usable facility.

2.09.09 Contract Time and Ramp Closure Time

The Proposer shall establish the Total Contract Time for the project. **The Total Contract Time shall be a calendar date and entered by the Proposer on page 53 of 55 in the Proposal Form of the Request for Proposals.** The calendar date shall consider that the Notice to Proceed for this contract will be issued by the Administration on or before March 15, 2017 and consider all other contract requirements. Note: The Notice to Proceed date will be the date the Notice to Proceed letter was sent to the Design-Builder.

The Ramp Closure Time is the number of **calendar days** that the Design Builder will need from start of Ramp Closure from Linden Church Road to MD 32 Southbound until the new ramp is open to traffic. **The Proposer shall enter the Ramp Closure Time in the area noted on page 53 of 55 in the Proposal Form of this Request for Proposals.**

TC-2.10 EVALUATION OF PROPOSALS, OPENING AND SELECTION

2.10.01 Evaluation of Price Proposals

Price evaluations will be performed based on the Proposal Price as reflected in the Schedule of Prices, the Cost Breakdown as defined in TC Section 7.10, price accuracy, completeness and reasonableness.

Each Price Proposal shall specify the lump sum for which Work will be performed according to the RFP and the Contract Time and Ramp Closure Time as discussed in TC 2.109.09. In addition, a lump sum breakdown will be required as part of the Price Proposal submittal as defined in TC 7.10. The lump sum breakdown shall be submitted in a format of the Design-Build Teams choice.

The Administration reserves the right to reject any Proposal if it determines that the Price Proposal is unacceptable, including a determination that the Proposal is significantly unbalanced or front end loaded to the potential detriment of the Administration.

An unbalanced Proposal is considered to be one (a) which is front-loaded or (b) for which the line item amounts or amounts shown in the Cost Breakdown do not reflect reasonable actual costs plus a reasonable proportionate share of the Proposer's anticipated profit, overhead costs, and other indirect costs which are anticipated for the performance of the items in question.

A Price Proposal shall be deemed unacceptable if the Administration determines, in its sole discretion that it fails to conform to the conditions of the RFP in any manner. A Price Proposal may be unacceptable if it:

A) Is significantly unbalanced relative to the scope of Work,

B) Does not provide all information in conformance with the RFP, and/or
C) Contains inaccurate, incomplete, and/or unreasonable prices on the Cost Breakdown.

Once the Price Proposal is determined to be accurate, complete, and reasonable, the Administration will determine the Adjusted Price Proposal amount. This Adjusted Price Proposal will take into account not only the Price Proposal submitted by the Proposer, but the Contract Time and Ramp Closure Time entered by the proposer on page 53 of 55 of the Proposal Form package. **The Adjusted Price Proposal, as determined in the method described below, shall be utilized in the Determination of the Successful Proposer as described in TC 2.10.07.**

The calendar days for Contract Time will then be multiplied by the daily loss of public benefit cost of **$18,300** per calendar day, the calendar days for Ramp Closure Time will then be multiplied by the daily loss of public benefit cost of $**5,100** per calendar day and then both will be added to the aggregate amount of the Price Proposal to determine the Adjusted Price Proposal. For example, the Adjusted Price Proposal for a Price Proposal with an aggregate amount of $30,000,000, a Contract Time of 300 calendar days and Ramp Closure Time of 50 calendar days would be as follows:

Adjusted Price Proposal = $30,000,000+((300 calendar days)x($18,300/calendar day))+((50 calendar days)x($5,100/calendar day))
Adjusted Price Proposal = $30,000,000+$5,490,000+$255,000
Adjusted Price Proposal = $35,745,000

The preceding formula will only be used to determine the Adjusted Price Proposal. The Contract award amount and final payment to the Design-Build Team will be based upon the aggregate amount in the Price Proposal.

2.10.03 Communications

The Administration may engage in communications with the Proposers after receipt of Proposals, allowing Proposers to provide clarifications to their Proposals or otherwise to address issues that might prevent the Proposal from being placed in the Competitive Range. This process will be initiated by delivery of a written request from the Administration to the Proposer identifying the information needed and a date and time by which the information must be provided. The Proposer shall provide the requested information in writing by the date and time indicated. If the requested information is not timely received, the Proposer's ratings may be adversely affected and/or Proposal may be declared unacceptable.

The Administration may waive technical irregularities in the proposal of the Proposer that does not alter the quality or quantity of the information provided.

2.10.04 Competitive Range

The term "Competitive Range" means a list of the Proposers invited to submit a Price Proposal which submitted Price Proposals determined to be responsible in Step Two.

2.10.05 Discussions

The Administration reserves the right to make an award without Discussions. However, the Administration may, at its sole discretion, conduct Discussions (that is written or oral exchanges) with the Proposers in the Competitive Range, with the intent of allowing the Proposers to revise their Proposals.

2.10.05.1 Purpose

If the Administration decides to engage in Discussions, the areas of Discussions may include the following:

A) Attempting to resolve any uncertainties and obtaining any significant additional understanding concerning the Proposal;
C) Resolving any suspected mistakes by calling them to the attention of the Proposers as specifically as possible without disclosing information concerning other competing Proposals or the evaluation process;
D) Providing the Proposers a reasonable opportunity to submit any other supplemental information to their Proposals;
E) Facilitating execution of a contract that is most advantageous to the State.

2.10.05.2 Procedures

The following specific procedures will apply to Discussions:

A) Discussions will only be conducted with Proposers in the Competitive Range. If Discussions are held, they will be held with all Proposers in the Competitive Range;
B) Information disclosed by Proposers in the Competitive Range during Discussions will not be made public until after execution of the Contract;
C) Discussions may be written and/or oral, and more than one round of Discussions may be conducted; and
D) No disclosure will be made of any information derived from a Proposal of, or from discussions with, another Proposer.

2.10.05.3 Prohibited Contact

During Discussions, Administration personnel involved in the acquisition shall not engage in the following conduct:

A) Revealing a Proposer's technical solution, including unique technology, innovative and unique uses of commercial items, or any information that would compromise a Proposer's intellectual property to another Proposer;

B) Revealing a Proposer's price without that Proposer's permission. However, the Administration may inform a Proposer that its price is considered by the Administration to be unbalanced based upon the Scope of Work and may provide information regarding the analysis supporting that conclusion;
C) Revealing the names of individuals providing references information about a Proposer's past performance; or
D) Revealing selection information in violation of the Administration's procurement policies and the laws of the State.

2.10.06 Proposal Revisions

Although the Administration reserves the right to hold Discussions and request proposal revisions and Best and Final Offers (BAFO) when in the best interest of the State, the Administration is under no obligation to do so. The Administration may make its selection and award based on the initial Proposals as submitted.

At the conclusion of Discussions (if held), the Administration will request a proposal revision or BAFOs from all Proposers in the Competitive Range to provide Proposers an opportunity to revise their Proposals, including correction of any weaknesses, minor irregularities, errors, and/or Deficiencies identified to the Proposers by the Administration following initial evaluation of the Proposals. The request for proposal revision or BAFOs will allow adequate time, as determined by the Administration, for the Proposers to revise their Proposals. Upon receipt of the proposal revisions or BAFOs, the process of evaluation will be repeated. The process will consider the revised information and re-evaluate and revise ratings as appropriate.

The Administration may require more than one series of proposal revision submissions followed by a request for a BAFO submission, but only if the Administration makes a written determination that it is in the State's best interest to conduct additional Discussions following receipt of proposal revisions or to change the Administration's requirements and require another BAFO submission.

2.10.07 Determination of Successful Proposer

In accordance with COMAR 21.05.03.03(F), award of the Contract to the responsible offeror whose proposal is determined to be the most advantageous to the State, considering price and the evaluation factors set forth in the Request for Proposals. The Administration has determined that the most advantageous to the State will be the Proposer from the Reduced Candidate List which submits the lowest Adjusted Price Proposal in Step Two.

The Technical Proposal will become part of the contract documents and all concept ideas provided to the Administration are expected to be included in the Price Proposal, final plan, design and construction phases. The Administration or successful proposer may use ideas and approaches excluding proprietary or protected information.

NOTE: All materials, conferences, proposals and other matters related to this project shall remain confidential until the contract is executed with the successful DB Team.

TC-2.11 AWARD AND EXECUTION OF CONTRACT

All conditions of award and execution procedures will be in accordance with GP-Section 3 of the Specifications.

The Design-Builder will be given Notice to Proceed after Execution of the Contract has been completed. At this point, additional field investigation may continue and design work may proceed with payment to be made as outlined in TC Section 7.11.

The Administration understands that the successful Proposer will need to start design activities as soon as possible after notification of selection and prior to the issuance of the Notice to Proceed. The Administration understands this approach is an effort to maximize the available time for construction activities. The Administration also recognizes the benefits to the public by providing an opportunity to accelerate project activities and project completion. It is reasonable that these design activities should not place the Design-Builder at risk should the Administration not award the contract and issue a Notice to Proceed for events outside of the control of the Design-Builder.

The Administration will diligently process contract documents and procedures to Award and issue a Notice to Proceed within the shortest time frame possible. In the event that the Administration does not issue a Notice to Proceed to the selected Proposer for reasons beyond the control of the Proposer, the Administration will reimburse all actual documentable design costs incurred by the Design-Builder after notification of selection. To receive reimbursement, the Design-Builder must submit all related work product including, but not limited to, design calculations, plans, surveys, boring data, updated electronic files, personnel time sheets and other materials to the Administration for its use.

Actual construction work may not begin until the additional requirements specified elsewhere in this RFP have been satisfied, including but not limited to receipt of permits, right-of-way acquisition, and pre-construction conference.

TC-2.12 STIPEND

The Administration understands that firms invited to submit Price Proposals on Design-Build projects may incur higher than normal Price Proposal preparation costs in their engineering effort to submit responsive Price Proposals for the project. Such efforts are likely to involve geotechnical investigations, development of horizontal and vertical geometry, development of concept design plans, cross sections, field surveys, stormwater management investigation, preliminary storm drain design, development of extensive

design details to establish materials and quantities to prepare and submit a price.

A stipend in the amount of $60,000.00 will be paid to each Proposer meeting at least one of the following terms and conditions:

(a) The Proposer (including any BAFO) was in the Competitive Range and was not the most advantageous to the State or was not selected for award;

(b) The Proposer was selected for award, but the Contract was not executed or it was terminated by SHA for its convenience prior to issuance of a notice to proceed for events outside the control of the Design-Builder and the Design-Builder is not seeking reimbursement for design activities undertaken after notice of selection;

(c) The Proposer was not in the Competitive Range, but it submitted an Alternative Technical Concept (ATC) approved by the Administration and that the Administration wishes to utilize the ATC in the final design.

Those firms invited to submit Price Proposals will be required to sign a contract with the Administration for payment of the stipend in exchange for electronic copy and hard copy of all documents used to develop the Price Proposal. The firm submitting the Proposal considered the most advantageous to the State shall not be eligible to receive the stipend.

In payment for the services covered by this Agreement, the Design-Build Team agrees that all materials, electronic files, marked up drawings, cross sections, quantity lists and other material used in the development and submission of the Price Proposal will become the property of the Administration and may be used in any manner at their discretion without any additional compensation to the Design-Build Team.

Three completed, signed originals of the enclosed Agreement must be submitted to Mr. Jason A. Ridgway, Director, Office of Highway Development, in the time frame outlined in the Stipend Agreement, Section 2.2(a).

One original invoice signed (in blue ink) and two copies along with supporting engineering materials noted above must be submitted to Mr. Jason A. Ridgway, Director, Office of Highway Development, in the time frame outlined in the Stipend Agreement, Section 2.3.

As noted in the Stipend Agreement, Section 2.3, Invoices and supporting engineering work for stipend payment shall not be submitted until notification from SHA that the contract has been awarded or there has been a cancellation of the procurement. Invoices must be received within 30 days of said notification by SHA to be honored for payment. Invoices received prior to notification from SHA will not be processed for payment.

Invoices shall contain the following information:

Date -

Invoice # - created by the Design-Build Team

Bill To: Maryland State Highway Administration
707 N. Calvert Street
Baltimore, MD 21202

Federal Tax I.D. number

Remittance Address

FMIS # - HO141A51

Contract Description – MD 32 (Phase 1) – from MD 108 to north of Linden Church Road

Construction # - HO1415170

Payment Amount - $60,000.00

Description of Work: example: "payment for Design-Build team to perform preliminary design work to prepare a proposal for contract"

STIPEND AGREEMENT

Contract No. HO1415170
Project Description: MD 32 – MD 108 to North of Linden Church Road

THIS STIPEND AGREEMENT (the "Agreement") is made and entered into as of the ___ day of _____, 201_, by and between the STATE OF MARYLAND, acting by and through the Maryland Department of Transportation, State Highway Administration (the "SHA"), and _____ ("Proposer"), with reference to the following facts:

A. On _September 15, 2016_, the SHA issued a Request for Proposals ("RFP") for design and construction of the MD 32 – MD 108 to North of Linden Church Road Design-Build Project ("Project"), pursuant to procurement authority granted in State Finance and Procurement Article of the Annotated Code of Maryland and the Code of Maryland Regulations ("COMAR"), Title 21. The Project will be owned and operated by the State Highway Administration (SHA or Administration), which owns all non-tolled state highways and bridges in the State of Maryland ("State"). The Administration is responsible for administration of design and construction of the Project.

B. The RFP requires each Proposer to complete and deliver a Stipend Agreement to the SHA within the time frame noted below in 2.2 (a).

NOW, THEREFORE, Proposer hereby agrees as follows:

1. Work Product.

1.1 The SHA hereby retains Proposer to prepare and submit, in response to the RFP a price proposal that conforms in all material respects to the requirements of the RFP, as determined by the SHA, are timely received by the SHA, and satisfy the provisions set forth in the RFP.

1.2 All work performed by Proposer and its team members pursuant to this Agreement shall be considered work for hire, and the Work Product (as defined below) shall become the property of the SHA without restriction or limitation on its use. Neither Proposer nor any of its team members shall copyright any of the material developed under this Agreement.

1.3 Proposer agrees that all Work Product is, upon receipt by the SHA, the property of the SHA. The term "Work Product" shall mean all submittals made by Proposer during the RFP process, including the Proposal, exchanges of information during the pre-proposal and post-proposal period. However, the term "Work Product" shall specifically exclude patented rights in previously existing proprietary technology.

1.4 In consideration for the SHA's agreement to make payment hereunder, Proposer agrees that the SHA shall be entitled to use all Work Product, without any further compensation or consideration to the Proposer, in connection with the RFP, the Contract Documents, the Project and future procurements by the SHA. Notwithstanding the foregoing, SHA shall not be entitled to use information submitted by Proposer to the SHA in which the

SHA determines is exempt from disclosure under the Maryland Public Information Act ("PIA"), Title 10, Subtitle 6, Part III of the State Government Article of the Annotated Code of Maryland, unless the RFP otherwise provides.

1.5 The SHA acknowledges that the use of any of the Work Product by the SHA or the Design-Builder is at the sole risk and discretion of the SHA and the Design-Builder, and shall in no way be deemed to confer liability on the unsuccessful Proposer.

2. Compensation And Payment.

2.1 Compensation payable to Proposer for the Work Product described herein shall be $60,000.00 if any of the following conditions are met:

(a) The Proposer was in the competitive range and was not the most advantageous to the State or was not selected for award;

(b) The Proposer was selected for award, but the Contract was not executed or it was terminated by SHA for its convenience prior to issuance of a notice to proceed for events outside the control of the Design-Builder and the Design-Builder is not seeking reimbursement for design activities undertaken after notice of selection;

(c) The Proposer was not in the competitive range, but it submitted an Alternative Technical Concept (ATC) approved by the Administration and that the Administration wishes to utilize the ATC in the final design.

2.2 In its sole discretion, the SHA may pay compensation to Proposer, in an amount to be determined by the SHA, for the Work Product described herein under the following conditions:

(a) For any Proposer meeting the criteria identified in Section 2.1, above.

Any amount paid under this subparagraph (a) will not exceed $60,000.00 and will be subject to audit of the costs incurred by the Proposer in preparing its Technical Proposal and Price Proposal. Auditors shall have access to all books, records, documents and other evidence and accounting principles and practices sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred. Failure of the Proposer or its team members to maintain and retain sufficient records to allow the auditors to verify all or a portion of the claim or to permit the auditors access to the books and records of Proposer and its team members shall constitute a waiver of the right to be paid a stipend and shall bar any recovery hereunder.

Any Proposer wishing to apply for a stipend under this subparagraph (a) shall submit the completed Agreement to the SHA concurrently with the price proposals being submitted. Eligibility of receipt of a stipend is dependent upon meeting the conditions set forth in Section 2.1. of this Agreement and TC Section 2.12 of the RFP.

(b) If the procurement is cancelled prior to the Proposal Due Date, Proposers will be provided the opportunity, at their option, of delivering to the SHA the Work Product of their Proposal preparations to date. There is no specific format required for such Work Product. Those Proposers that choose to deliver their Work Product may be paid an amount that the SHA deems to be appropriate consideration for the Work Product. No portion of the stipend amount will be paid in the event a Proposer chooses not to deliver its Work Product. Any amount paid under this subparagraph (b) will not exceed the amount identified in Section 2.1 and will be subject to the audit criteria in Section 2.2 (a).

2.3 Any payment of compensation owing hereunder will be made (i) within 30 days after receipt of a proper invoice submitted to the SHA under this Section 2.3 or (ii) if an award is made. Such invoice and supporting engineering work shall not be submitted until one business day after the earlier to occur of (a) notice by SHA that award of contract has occurred, or (b) cancellation of the procurement. **Invoices must be received within 30 days of said notification by SHA to be honored for payment.**

3. Indemnities.

3.1 Subject to the limitations contained in Section 3.2, Proposer shall indemnify, protect and hold harmless the SHA and its directors, officers, employees and contractors from, and Proposer shall defend at its own expense, all claims, costs, expenses, liabilities, demands, or suits at law or equity arising in whole or in part from the negligence or willful misconduct of Proposer or any of its agents, officers, employees, representatives or subcontractors or breach of any of Proposer's obligations under this Agreement.

3.2 This indemnity shall not apply with respect to any claims, demands or suits arising from use of the Work Product by the SHA or its contractors.

4. Compliance With Laws.

4.1 Proposer shall comply with all federal, state, and local laws, ordinances, rules, and regulations applicable to the work performed or paid for under this Agreement and covenants and agrees that it and its employees shall be bound by the standards of conduct provided in applicable laws, ordinances, rules, and regulations as they relate to work performed under this Agreement. Proposer agrees to incorporate the provisions of this paragraph in any subcontract into which it might enter with reference to the work performed pursuant to this Agreement.

4.2 The Proposer agrees (a) not to discriminate in any manner against an employee or applicant for employment because of race, color, religion, creed, age, sex, marital status, national origin, ancestry or disability of a qualified individual with a disability; (b) to include a provision similar to that contained in subsection (a) in any subcontract except a subcontract for standard commercial supplies or raw materials; and (c) to post and to cause subcontractors to post in conspicuous places available to employees and applicants for employment, notices setting forth the substance of this clause.

5. Assignment.

Proposer shall not assign this Agreement without the SHA's prior written consent. Any assignment of this Agreement without such consent shall be null and void.

6. Miscellaneous.

6.1 Proposer and the SHA agree that Proposer, its team members, and their respective employees are not agents of the SHA as a result of this Agreement.

6.2 All words used herein in the singular form shall extend to and include the plural. All words used in the plural form shall extend and include the singular. All words used in any gender shall extend to and include all genders.

6.3 This Agreement, together with the RFP, as amended from time to time, the provisions of which are incorporated herein by reference, embodies the entire agreement of the parties with respect to the subject matter hereof. There are no promises, terms, conditions, or obligations other than those contained herein or in the RFP, and this Agreement shall supersede all previous communications, representation, or agreements, either verbal or written, between the parties hereto.

6.4 It is understood and agreed by the parties hereto that if any part, term, or provision of this Agreement is by the courts held to be illegal or in conflict with any law of the State of Maryland, the validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Agreement did not contain the particular part, term, or provisions to be invalid.

6.5 This instrument may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

6.6 This Agreement shall be governed by and construed in accordance with the laws of the State of Maryland.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

STATE OF MARYLAND by STATE HIGHWAY ADMINISTRATION

WITNESS/ATTEST:

_____

_____

Approved for Execution:

_____

Authorized Signature

Director, Office of Highway Development

Date: _____

Approved as to form and legal sufficiency:

_____

Assistant Attorney General

[Signature for Corporations/LLCs]

WITNESS/ATTEST:

_____

_____
Proposer Name

By_____(Seal)

Title:_____

_____
Printed Name

_____
Printed Name

_____
Federal ID # or Social Security #

TC SECTION 3
SCOPE OF WORK FOR DESIGN-BUILD
TERMS AND CONDITIONS

ADD: After section TC 3.04

TC 3.05 DESIGN-BUILD - DESIGN AND CONSTRUCTION SCOPE OF SERVICE

This project includes, but is not limited to the following items of work, which the Design-Build Team shall perform and provide. This section sets forth provisions that are design and construction related; however, this section also impacts construction activities and other work.

Specific design and construction criteria are discussed separately following this section.

3.05.01 General Requirements

The Design-Build Team shall complete all design and construction work in two phases, Phase IV - Final Design and Phase V – Partnering during design and construction, Review Shop Drawings, Revisions, Redesign Under Construction, As-Built Plans and provisions for expert court testimony.

The Design-Build Team shall provide the services and perform tasks described in this Request for Proposals in compliance with the policies and procedures of the Administration and requirements set forth in "Volume II -Specifications for Consulting Engineers' Services," dated April 1986, Sections as follows:

A) Section V Highway Design - (Phase IV)

B) Section VI Structure Design - (Phase IV & V) Parts I through III

C) Section VII Surveys and Plats (Phase IV)

D) Section VIII Traffic Engineering (Phase IV)

E) Section IX Landscape Architecture

F) Section XI Critical Path Method

The Design-Build Team shall comply with all Federal, State and local laws, ordinances and regulations applicable to the activities and obligations associated with this project.

3.05.02 Design Personnel Identified in Proposal

The designer and design subcontractors shall utilize the key personnel identified in their Technical Proposal (TP) to manage the project and supervise engineers and technicians in completing the design in a timely manner to permit construction activities. **Changes in key staff**

identified in the TP must be approved in writing by the Administration, and replacement personnel must have equal or better qualifications than the key personnel identified in the proposal. The format for replacement staff resumes must be in the same format as required for the TP including requirements thereof. The Administration shall be the sole judge as to whether replacement staff members are acceptable.

3.05.03 Qualified

The Design-Build Team shall have experienced personnel qualified in the development of plans, specifications and estimates for the following: Highway Design; Hydrologic/Hydraulic Engineering (including stormwater management, erosion & sediment control); Structural Engineering; Geotechnical/Pavement Engineering; Arboriculture and Landscape Architecture including roadside planting, SWM planting and Reforestation; Traffic Engineering including signing, marking, lighting, signalization, ITS, and traffic control. The Design-Build Team shall be knowledgeable in coordinating utility designs, utility connections, working with other agencies and the public as outlined in TC 3.15 and TC 3.21.

3.05.04 Design Constraints

The Design-Build Team shall construct the project within available right of way. This includes the final Project, as well as any and all work required to maintain drainage and traffic during construction (including detour roads) and any and all work required to control erosion and sediment laden water. The Design-Build Team may have to use features not shown on the Concept Plans to keep work in the right-of-way, including but not limited to mechanically stabilized embankment slopes, retaining walls, drainage pipes, etc.

3.05.05 Design Exceptions

Any elements of design that fall below the design standards listed in TC 3.08 will require a design exception or design waiver.

The Design-Build Team shall submit the design exception or waiver request to the Administration's Director, Office of Highway Development, and receive written approval before proceeding with the design. Requests for design exceptions or waivers that affect construction underway or complete shall not be a basis for approval of the exception.

- The request will explain and justify the use of the proposed design and include the following information (at a minimum):
- A description of existing conditions, including existing design values and design speeds.
- A description of AASHTO or other design standards that would normally be applied.
- A description of the actual design values proposed.
- A description of R/W impacts, environmental considerations or other factors that justify

the exception.

- A 3-year accident history within the area an exception is being sought.
- A description of any potential mitigating features.

The Administration reserves the right to deny design exceptions or waivers that, in its judgment, are unsafe, otherwise contrary to normal practice, and/or inconsistent with the project or community goals.

3.05.06 Quality of Design and Construction

3.05.06.1 Design Quality Control Plan

The Design-Build Team shall develop a Design Quality Control Plan (DQCP). The DQCP must be a complete and clear plan to achieve a high quality design, including all related elements and lower tier subcontractors/Design-Build Teams. The DQCP shall present both the overall organization plan for design quality control and detailed plan elements to meet the CPM requirements for this project. The DQCP must include an organization structure and reporting requirements that demonstrate that quality control personnel have sufficient independence to allow them to be primarily concerned with quality, as opposed to the schedule and budget. As a minimum, the DQCP shall include calculations, plans, specifications, design coordination, construction coordination for material activity and document control.

The Design-Build Team must adhere to the approved DQCP throughout the duration of the project.

The DQCP must be available for review and discussion at the first partnering meeting.

3.05.06.2 Responsibility of Design-Build Team

The Design-Build Team's Lead Design Firm shall be fully responsible for performing a complete, coordinated, economical, timely, fully functional quality design, including survey and geotechnical elements, all in compliance with the RFP. The Design-Build Team shall follow the DQCP.

The Design-Build Team' Lead Design Firm shall include a complete check of all design and other calculations, plans and specifications in this plan. This check shall include both the overall concept and various element coordination check and the detail check of the calculations for each plan and specification. The design and the check shall be performed by experienced design professionals, licensed in the State of Maryland that have not participated in any of the design up to the checking process. These individuals may be employed either by the Designer or by another design firm other than the Lead Design Firm.

3.05.07 Calculation Certification

The Design-Build Team shall provide the following certifications concerning the calculations:

3.05.07.1 Designer

Within 30 days of the Notice of Award the corporate officer responsible for quality for the Design-Build Team and the Designer shall certify that the calculations, plans, specifications and other technical documents for which they are responsible shall be prepared in conformance with the DQCP.

3.05.07.2 Checker

Within 30 days of the Notice of Award, the corporate officer responsible for quality for the Design-Build Team and all organization(s) that will check the calculations shall certify, in writing, that the design check shall be performed in conformance with the DQCP.

3.05.07.3 Transmittals

On the transmittal for each submittal of calculations, plans, specification, shop drawings, as-builts and other technical documents, the Design-Build Team, Lead Design Firm (as appropriate) and the checker shall certify that the documents were prepared and checked in conformance with the DQCP.

3.05.07.4 Conclusion of Work

At the conclusion of the Work and with the transmittal of the Record Documents to the Administration, the corporate officer responsible for quality for the Design-Build Team, the Lead Design Firm, and all organizations that have checked the documents shall sign, seal, and certify in writing, that all calculations, plans, specifications and technical documents, for which they were responsible, were prepared in conformance with the DQCP.

3.05.07.5 Professional Seals

All calculations, plans, specifications and other technical documents transmitted to the Administration shall be signed and sealed by both of the Professional Engineers licensed in the State of Maryland who are responsible for the design and checking of that document. Landscape plans shall be prepared, signed, and sealed by a Landscape Architect licensed in the State of Maryland. Reforestation plans and application shall be signed and sealed by either a Maryland Licensed Landscape Architect, Licensed Forester, or a qualified professional that is certified by the MD DNR/Forest Service. The certifications at the start and conclusion of the Work, required in Section TC 3.07.03,

shall also be sealed by a Professional Engineer licensed in the State of Maryland and signed by the corporate representative of the Design-Build Team, Lead Design Firm and checker(s).

3.05.07.6 Design Quality Management

The Design-Builder shall utilize the services of an Independent Design Quality Management (IDQM) Firm to review all design elements to ensure they are in compliance with the Contract requirements and the DQCP. The IDQM Firm will be responsible to sign and certify that all design submittals are in conformance with the Contract requirements prior to construction. This is in addition to the additional certifications and seals required of the Lead Design Firm.

3.05.08 Highway Engineering

The Design-Build Team shall prepare roadway, typical section, drainage, geometry, superelevation, profile, maintenance of traffic, erosion sediments control and special detail plans as part of the highway construction plans using the latest CADD Standards and as outlined in TC 3.09 Roadway Performance Specification.

3.05.09 Pavement Engineering

The Design-Builder shall be responsible for all pavement engineering for all Roadway Elements for the Project as outlined in TC 3.10 Pavement Performance Specification.

The Design-Builder will have the flexibility to make Project changes that produce benefits or savings to the Administration or for the Design-Builder without impairing the essential functions, characteristics, or quality of the Project, such as safety, traffic operations, ride, long term durability, desired appearance, maintainability, environmental protection, drainage, and other permitted constraints.

3.05.10 Structural Engineering

The Design-Build Team shall develop all structural calculations, details, reports and plans for all the culverts (those meeting MD SHA criteria for classification of a Small Structure), retaining walls, and any other incidental structure specifically design for this project as outlined in TC 3.11 Structural Performance Specification. All plans developed shall meet the prescribed CADD Standards and drafting requirements outlined in the Office of Structures Policy and Procedure Memorandums.

3.05.11 Traffic Engineering

The Design-Build Team shall prepare signing, marking, lighting, signal, and Intelligent Traffic System plans using the latest CADD Standards available from the SHA Office of Traffic & Safety (OOTS) as outlined in TC 3.12 Traffic Performance Specification.

All catalog cuts and working drawings pertaining to traffic items shall be reviewed and approved by the Design-Build Team.

The Design-Build Team shall maintain all existing traffic control devices operations throughout the project limits. All traffic control device modifications to existing and/or temporary signals shall be reviewed and approved by the Office of Traffic & Safety Traffic Engineering Design Division.

3.05.12 Roadside Landscape Planting and Reforestation

The Design-Build Team shall prepare landscape and reforestation plans as outlined in TC 3.13 Landscaping Performance Specification. Plans shall include schedules of all materials proposed for use.

3.05.13 Geotechnical Engineering

The Design-Build Team shall conduct supplemental subsurface explorations, analyses, design and construction for all geotechnical components of the Project in accordance with all applicable criteria and standards cited herein and in accordance with TC 3.14 Geotechnical Performance Specification.

3.05.14 Utility Relocations and Permits

The Design-Build Team shall be responsible for coordination of all activities during design and construction with regard to utilities and permits as outlined in TC 3.15 Utility Design and Relocation Performance Specification.

3.05.15 Stormwater Management (SWM) Design and Erosion and Sediment Control Approvals

The Design-Build Team shall design SWM in accordance with the criteria established in TC 3.17 Drainage, Stormwater Management, and Erosion and Sediment Control Performance Specification and TC 3.20 Environmental Performance Specification.

The Design-Build Team shall ensure that copies of the most current approved plans are available to all personnel involved in the construction and inspection of the project. The Design-Build Team shall be responsible for coordinating all reviews and approval submissions with the appropriate review entities.

3.05.15.1 Stormwater Management and Erosion and Sediment Control Review and Approval

The Design-Build Team is responsible to make any necessary adjustments to the initial stormwater management concept design and to finalize the SWM design for all approvals. The final design shall be acceptable to the SWM/ESC approval.

The Design-Build Team shall design ESC in accordance with the criteria established in the Drainage, Stormwater Management, and Erosion and Sediment Control Performance Specification.

The Design-Build Team shall be responsible for producing a completed set of ESC plans for the roadway construction activity. These plans shall be submitted to the SWM/ESC approval authority in conformance with the contract requirements for review and final approval when deemed appropriate.

A Pre-Permitting meeting must be held once the notice of selection has been made. This meeting will be scheduled by the Administration upon request by the Design-Build Team and will include the Design-Build Team's H&H Engineer, Project Design Manager, Construction Manager, E&S Manager, IDQM Firm H&H Engineer; representative of the SWM/ESC authority, and Administration's Highway Hydraulics Division Project Manager and Design Project Manager. The purpose of the meeting is to preview and discuss the Design Build team's approach to completing SWM/ESC design and obtaining approvals, the SWM and erosion and sediment control concepts developed by the Design-Build Team, submission schedules proposed by the Design-Build Team, approval timeframes, submission requirements and the SWM/ESC approval authority's quality expectations.

The Design-Build Team's Lead Design Firm's Professional Engineer licensed in the State of Maryland must review and certify by signature that the Stormwater Management and Erosion and Sediment Control plans have met the SWM/ ESC requirements prior to any submission to SWM/ESC approval authority for review.

Submissions for SWM/ ESC approval must be delivered directly to the SWM/ESC approval authority with a copy to the SHA Highway Hydraulics Division and SHA Project Design Manager. Electronic copies of the submission including checklist, application, plans and reports as applicable must be provided through Projectwise along with a hard copy of all information delivered directly to the SWM/ESC approval authority. Comments or approval will be provided within 28 calendar days beginning the day after receipt of the submittal. A signed and sealed title sheet shall be submitted to the SWM/ESC approval authority prior to final approval. Review time for submissions to the SWM/ESC approval authority shall not be the basis of a claim or time extensions against the Administration.

The Concept SWM report suggests certain locations of SWM facilities. Other types of facilities may be used, but they shall meet all requirements of the 2000 Maryland Stormwater Design Manual (and any subsequent revisions) and must be approved by the Administration's Highway Hydraulic Division. Once approval is gained from the Administration, the Design-Build Team shall acquire all other approvals and necessary permits.

3.05.15.2 MDE Dam Safety Division Small Pond Review and Dam Safety Approval

All ponds, culvert crossings (in relation to the roadway embankment), and sediment traps designed must be checked for MDE Dam Safety Division Review Criteria. Summary sheets for each pond and sediment trap for Dam Safety requirements will be submitted to the SWM/ESC approval authority. Refer to section B.1.2 in the MDE 2000 Maryland Stormwater Design Manual, Volumes 1&2. If one or more ponds fall under MDE Dam Safety Division Small Pond Review Criteria, the pond design must be submitted to MDE

Dam Safety Division. Approval from Dam Safety Division shall be required before any E&S or SWM package will be approved by the SWM/ESC approval authority. Submissions shall be made directly to MDE Dam Safety Division.

The SHA-HHD and the SWM/ESC approval authority shall be concurrently copied on all correspondence, including comment letters, phone conversation transcripts, transmittals, reports, plans revisions to plans and report, computations, and/or point-by-point response letters; delivered to MDE Dam Safety Division.

Review time for submissions to MDE Dam Safety Division shall not be the basis of a claim or time extensions against the Administration.

3.05.15.3 MDE Plan Review Division Small Pond Review

All ponds, culvert crossings (in relation to the roadway embankment), and sediment basins/ traps designed must be checked for Pond Code 378 criteria. Summary sheets for each pond or sediment trap of Code 378 requirements will be submitted to the SWM/ESC approval authority. Refer to section B.1 in the MDE 2000 Maryland Stormwater Design Manual, Volumes 1&2. If one or more ponds fall under Code 378 criteria, the pond design must be submitted to MDE Plan Review Division. Approval from MDE plan review division shall be required prior to SWM/ESC final approval.

The SHA-HHD and the SWM/ESC approval authority shall be concurrently copied on all correspondence, including comment letters, phone conversation transcripts, transmittals, reports, plans, revisions to plans and report, computations, and/or point-by-point responses; delivered to MDE Plan Review. SHA will provide an expedited reviewer to help facilitate the small pond review, but Final approval will still be required from MDE staff.

Review time for submissions to MDE Plan Review Division shall not be the basis of a claim or time extension against the Administration.

3.05.15.4 Stormwater Management (SWM) Site Development Criteria Review and Approval

All stormwater management facilities shall be designed in accordance with the SHA Stormwater Site Development Criteria Review Guidelines, prepared by the Administration's Highway Hydraulics Division.

The SWM facilities shall be designed with the input of a licensed landscape architect and shall adhere to the accepted standards for the profession concerning aesthetics and site planning. This includes not only planting but also grading, landforms, site layout, safety criteria and choice of materials.

The SWM facilities shall integrate well visually with the surrounding environment, developments, communities, roadways, and corridor landscaping. This means that facility types, outfall structure designs, detailing, colors, planting palette, landforms, surface area shapes, and fencing (if required) should be consistent or complementary.

3.05.15.5 Stormwater Management (SWM) As-Built Certifications

The Design-Build Team shall provide an SWM As-Built (AB) Inspector to inspect the various stages of construction for each SWM facility and provide documentation to the Administration that certifies that the SWM facilities have been constructed as specified in the Contract Documents including certification that the constructed SWM facilities provide the functionality as designed. The AB Inspector shall be a licensed Professional Engineer or Land Surveyor in the State of Maryland with experience in SWM design and construction.

The As-Built Certification Package shall be prepared according to the special provision, 300 – Stormwater Management Facility As-Built Certification, included in this package. Copies of As-built Certification shall be maintained at the Administration's field office at all times for verification and compliance until it is complete and submitted for approval. The As-Built Certification signature block, checklists and tabulations are also included on ProjectWise.

The Design-Builder shall submit the completed As-Built Certification Package to SHA's Construction Project Engineer and once concurred by the Construction Project Engineer, it shall be submitted via the SHA toolkit system or mailed to:

Highway Hydraulics Division Chief, Mail Stop C-128
Maryland State Highway Administration
707 North Calvert Street
Baltimore, Maryland 21202

Highway Hydraulics Division may provide comments or request additional information to suffice as necessary for submission to the SWM/ESC approval authority for final acceptance. SHA's construction engineer, Highway Hydraulics Division or SWM/ESC Approval Authority may require corrective action to the constructed facility prior to final acceptance in order to ensure the constructed facility functions as intended. Any and all corrections shall be completed and all updated information; including the updated as-built certification; shall be provided in a timely fashion for review and approval.

3.05.16 Surface Storm Drainage Design

The Design-Build Team shall design all surface drainage conveyances (including but not limited to open channels, stream relocations, inlets, closed storm drainage systems, cross culverts, and pipes under entrances and driveways) in accordance with the Drainage, Stormwater Management, and Erosion and Sediment Control Performance Specification.

If Waterway Construction (COMAR 26.17.04) review and approval is required, submittals for MDE approval shall be delivered directly to MDE. At the discretion of the Administration, Highway Hydraulics Division, subsequent submittals may be delivered directly to MDE. If this is allowed, a copy of the complete MDE submittal package, including MDE comment letter and point-by-point response to comments, shall be concurrently delivered to the Administration, Highway Hydraulics Division. Review time for submissions to the Administration or MDE shall not be the basis of a claim or time extensions against the Administration.

3.05.18 Noise Abatement

Noise abatement is not required on this project.

3.05.19 Engineering Studies

The Design-Build Team shall be responsible for engineering studies as required to determine solutions to any unforeseen situations that may be discovered during this project, and submission of these studies to the Administration for approval. These studies shall be prepared as per the "Volume II -Specifications for Consulting Engineers' Services".

3.05.20 Design Review and Coordination

It is the Design-Builder's sole responsibility to provide Design Plans, Project Specifications and Working Drawings enabling the development of a finished product in accordance with the Contract Documents. As part of this, the Design-Builder is responsible for the Design Quality Management including Design Quality Control and Design Quality Assurance. This will include the Design-Builder providing both a Lead Design Firm and an Independent Design Quality Management (IDQM) Firm who have no contractual relationship. The Lead Design Firm shall be responsible for the Design Quality Control and the IDQM Firm responsible for the Design Quality Assurance and review and certification that all design submittals are in compliance with the Contract Documents.

The Lead Design Firm shall develop its Design Quality Control Plan (DQCP) for review and approval of the IDQM Firm. Upon approval, it shall be forwarded to the Administration for concurrence.

All design shall be developed by the Lead Design Firm in accordance with this DQCP. Once the Design Quality Control process has been completed, the Lead Design Firm shall provide the design package to the IDQM Firm who will perform an independent review to conform the design package meets the requirements of the Contract Documents. The IDQM Firm shall document all submissions from the Lead Design Firm and all reviews it performs on Projectwise. The Administration will review this documentation to further ensure the design review process and submissions are in compliance with the DQCP and Contract Requirements. The Administration may provide additional review comments as it deems necessary. **Note: All Structures submittals for Type, Size, and Location, Foundation Report, Structure Details, and Final Plans for all bridges and box culverts required for this project shall be submitted concurrently to the IDQM Firm and the Administration. The Administration will provide formal comments on each submittal within 14 calendar days, beginning the day after acknowledgment of receipt of the submittal.**

In the event that there is an ambiguity in the interpretation of the Contract Requirements between the Lead Design Firm and the IDQM Firm, it shall be immediately raised to the SHA's project design manager for resolution.

Subsequent to the completion of a design package which is Ready for Construction, it shall be

signed and sealed as required by the Lead Design Firm and signed and certified by the IDQM Firm and submitted to the Administration. All permits and modifications do not need to be received to submit to the Administration. Administration approval of the design package will not be required to begin construction. However, all permits related to the design package must be received, any environmental reevaluation (if necessary) completed, and the Administration must have certified that any right-of-way required for the design package is in the possession of the Administration. Upon submission of a certified design package from the Design-Builder, the Administration may provide further review as determined necessary to ensure the design package is in compliance with the Contract Requirements. The Administration will require a minimum 7 calendar day notice for submission of a completed design package and will provide any comments noting non-compliance with Contract Requirements within 21 calendar days, beginning the day after acknowledgement of receipt of the submittal. The Design-Builder shall provide a maximum of 20 copies of each Ready for Construction design package and any subsequent revisions for Administration field personnel.

3.05.21 Additional Services

The Design-Build Team shall be responsible for all necessary field surveys required for the project, which shall conform to Maryland Grid System NAD 83/91 and NAVD 88.

3.05.22 Environmental Permits

The Design-Build Team shall procure all other approvals, permits and licenses pay all charges, fees and taxes and give notices necessary or appropriate for the prosecution of the Work. This includes approvals for on-or off-site staging, stockpiling areas, disposal sites and borrow pits.

The Design-Build Team cannot alter the concept activities in such a manner that increases or creates new wetland, buffer, waterway, floodplain impacts compared to those impacts which were authorized by the original permit, without obtaining all required permits or modifications from the appropriate regulatory agencies. If the Design-Build team determines that wetlands, buffers, or floodplains will be impacted, the Design-Build team shall coordinate the changes with the Administration who will coordinate the permit modifications with the agencies. The Design-Build Team shall be responsible for addressing any comments or issues the regulatory agencies and/or the Administration may have, including those pertaining to avoidance and minimization measures. The Design-Build Team shall also be responsible for designing, implementing, and monitoring any mitigation which may be required due to the additional wetlands, buffers, or floodplain impacts proposed by the Design-Builder. It is not the responsibility of, nor guaranteed by, the Administration that approval or authorization will be granted by the regulatory agencies.

If the Design-Build Team determines that additional trees must be removed, the Design-Build Team shall request a field review with the LAD/LOD and is responsible for providing the Administration with all information requested. If the Administration concurs with the request, it shall be the responsibility of the Design-Build Team to obtain and comply with the terms of the

modified permit(s) from MDNR at no additional cost.

A. As part of this RFP, the Administration is providing the following permits and approvals based on the proposed activities:

1) US Army Corps of Engineers (USACE) Corridor Permit and MDE Non-Tidal Wetlands and Waterways Permit

2) Reforestation Site Review Permit (from Maryland Department of Natural Resources, DNR)

3) Conditional Letter of Map Revision (CLOMR) from FEMA for the 2 floodway crossings

B. The Design-Builder shall obtain the following permits and/or approvals:

1) Erosion and Sediment Control Approval (from SWM/ESC Approval Authority)

2) Stormwater Management Permit (from SWM/ESC Approval Authority)

3) NPDES Permit (from MDE).

4) Letter of Map Revision (LOMR) from FEMA. The design build team is responsible for all application fees associated with this permit.

5) Surface Water Appropriation Permit (from MDE) will be required if the Design-Build Team intends to use water from the streams for any purpose other than rerouting the water with stream diversion

6) All other approvals, permits and licenses, pay all charges, fees and taxes and give notices necessary or appropriate for the implementation of the Project beyond those obtained by the Administration. This includes but is not limited to approvals for on or off-site staging, stockpiling areas, disposal sites and borrows pits; and

3.05.23 Phase V Services

Phase V services consist of partnering during design and construction, checking shop drawings, redesign under construction, revisions, as-built plans, and provisions for expert court testimony.

The Design-Build Team shall provide all services and perform tasks described in compliance with the requirement policies of Administration as stipulated throughout this resume and "Volume II -Specifications for Consulting Engineers' Services".

3.05.24 Construction Personnel Identified in Proposal

The Design-Build Team, all key staff and construction-related key personnel, and all other Major

Participants identified in the proposal shall be utilized in the same manner and to the same extent set forth in the Technical Proposals (TP) and for the duration of the project. **Changes regarding the Design-Build Team shall not be allowed. Changes regarding key staff, construction-related key personnel and all other Major Participants require prior written approval by the Administration.** Requests for such changes must be submitted to the Administration in writing and replacement personnel must have equal or better qualifications than the key personnel identified in the TP. The format for replacement staff must be the same format as required for the TP including the requirements thereof. The Design-Build Team acknowledges that any such changes are for the convenience of the Design-Build Team alone and shall not increase the Design-Build Team's Price or change the project schedule. The Administration will approve such requests only if it determines that such change will not detrimentally affect the long term quality, durability, maintainability, timeliness of the Work.

3.05.25 Conformance with Contract and Proposal

All construction, construction-related work, and all other work must conform to the Contract, to the Technical Proposal submitted by the Design-Build Team and to the construction plans prepared by the Design-Build Team.

3.05.26 Check Shop Drawings

The Design-Build Team shall check all shop drawings for hydraulic structures, non-standard drainage structures and all other designed structures prior to manufacture and/or placement of such structures. The Lead Design Firm and the IDQM Firm shall check all such shop drawings and stamp their approval prior to sending approved shop drawings to the Administration. The shop drawings for larger hydraulic structures and designed structures should be submitted to SHA according to TC-4.01, Working Drawings. The approved shop drawings for hydraulic structures, non-standard drainage structures (including stormwater management) along with the necessary structural computations shall be submitted to Ed Johnson; Office of Highway Development, C-102, Maryland State Highway Administration, 707 North Calvert Street, Baltimore, MD 21202.

All shop drawings relating to the structures shall be reviewed in accordance with *SHA OOS PPM No. OP-82-34 (G), Checking of Working Drawings, Form Plans and/or Erection Plans*. The primary review shall be undertaken by the Lead Design Firm with a secondary review undertaken by the IDQM Firm. Once reviewed and accepted by the Lead Design Firm and IDQM Firm, they shall be stamped as accepted by each firm and submitted to the SHA. A final review will be undertaken by SHA. Comments or approval will be provided in no more than 7 calendar days, beginning the day after receipt of the submittal. Once reviewed and approved by SHA, the structural shop drawings shall be stamped as approved with the stamped plans being designated as the documented approval. No construction activities are permitted in conjunction with any structural shop drawings that have not been approved by SHA.

The Design-Build Team shall correct any errors or omissions found by the Administration at no additional cost to the Administration.

The Design-Build Team shall challenge all the work of the detailer, approving that, which is correct, or most appropriate and red lining and commenting on incorrect or less appropriate details or design. The importance of this approach is emphasized since inferior detailed design could negate the benefits of quality general design. Each shop drawing shall bear the official stamp of the Design-Build Lead Design Firm Engineer, attesting to their review and approval by the Lead Design Firm. This work is to be done under the supervision of and shall be the responsibility of a Maryland Registered Professional Engineer.

3.05.27 Conformance with Approved Plans and Specifications

3.05.27.1 Construction Plans and Project Specifications

All work shall be done in conformance with the details and dimensions shown on the approved Final Plans and Specifications, and shall meet the requirements in the specifications/special provisions approved as a part of the Final Plans and Specifications submission and portions thereof.

3.05.27.2 Plan Revisions after Approval of Final Plans and Specifications

All plan revisions made after Final Plans and Specifications approval shall have approval of the IDQM Firm prior to implementation.

3.05.27.2.1 Revisions

Redesigns after Final Plans and Specifications approval shall be superimposed on the original project plans in red. Old design details, dimensions and notes shall not be erased, but X'd out in red. The date that the revision was made shall be indicated in the title block of each revised plan sheet. Submission to the Administration shall follow the process outlined in TC 3.05.20.

3.05.27.2.2 As-Built Drawings

Field changes/variances from the details and dimensions shown on the plans shall be superimposed on the approved set of drawings in green. Old details, dimensions and notes shall not be erased, but X'd out in green. Each revision must be identified with a Hexagon with the letter A in the center. This symbol is available in MD SHA's Cad Standards. The date that the revision was made shall be indicated in the title block of each revised plan sheet. The As-Built Plans shall reflect any field revision made during construction.

The Design-Build Team shall submit one comprehensive set of As-Built plans at the completion of the project that are signed and sealed by the Engineer. The comprehensive set of As-builts will include an index sheet and a key plan which graphically represents and annotates each phase of the plan submittal if there are multiple submittals. The comprehensive set of as-builts will be assembled and

numbered consecutively, beginning with sheet one of the first submittal and ending with the last sheet of the final submittal. The index and key plan will allow for more easily understood and navigatable drawings within the overall project limits in the future.

The Stormwater Management Facility As-Built Certification will be a separate submittal as described in 3.05.16.3.

3.05.27.2.3 Computer Files

The Design-Build Team shall also submit Black and White images, at 200 DPI-TIF and PDF files, of the As-Built Plans on CD ROM. The As-Built plans shall be scanned starting with the Title Sheet. The file names will be the Construction Contract Number, followed by a dot (.), followed by a sequential number beginning with 1001. The sequential number must correspond with the plan sheet numbering. This number is followed by another (.) and then the TIF and PDF extension. Example: AW8965170.1001.tif. All scanned TIF and PDF images will be scanned in such a way that they do not appear upside down upon opening. The cover of the CD ROM shall be labeled with the SHA contract number, date, route number, and project description.

3.05.27.2.4 Permits

The Design-Build Team shall obtain approvals from the appropriate regulatory agencies for any changes in design and/or construction activities that affect any permit conditions.

3.05.28 Coordination with Other Contractors

The Design-Build Team shall coordinate all design and construction, including that of any subcontractors, with other designers, contractors, the utility companies, governmental agencies, Howard County; Administration personnel, and operating personnel concerning site access, establishment and use of temporary facilities, work schedules, and other elements of the specified work, which require interfacing with others.

It is anticipated that various utility companies will relocate their underground and overhead facilities prior to and during the construction operations. See TC 3.15 Utility Design and Relocation Performance Specification.

3.05.29 Community Relations

The Design-Build Team will establish a program of public contact for conducting effective relationship with the community and businesses that are in proximity to construction areas. This program shall meet the requirements outlined in TC 3.21, submitted to the Administration within 45 days of Notice to Proceed and included as part of the Lump Sum Price for this Contract. As part of this program, the Design-Build Team shall establish and maintain continuing liaison with

persons occupying property or doing business in the immediate area of the work site for the purpose of minimizing inconveniences resulting from construction. The plan will detail how the Design-Build Team intends to keep the property owners and businesses informed of the work schedule and include a program for notifying them at a minimum of every 30 days of what will occur within the next 30 days. The Design-Build Team's Technical Proposal shall also name a Public Relations Officer who is responsible for this work and who the Administration and citizens can contact for project information and answers to project related questions. See TC Section 3.21, Public Outreach Performance Specification, for all the requirements.

3.05.29.1 Toll Free Telephone Number

The Design-Build Team shall establish a toll free telephone number. This telephone number shall be used for the public to contact the Design-Build Team in the case of an emergency. The Design-Build Team shall maintain a log of all calls made to the number, including date, time, name of caller, reason for call, caller's address and phone number. These logs shall be accessible to SHA for review and submitted every two months once the phone line is made available to the public. The Design-Build Team shall respond in person or by telephone within one hour of the time of the call and shall arrange for resolution of any issues as soon as possible. The Design-Build Team shall post the toll free telephone number prominently within the project limits and the Administration project field office. The telephone number shall be shown on all flyers distributed on the project.

3.05.29.2 Public Relations Materials

All public relations materials, advertisement, flyers, and meeting handouts and graphics shall be approved by the Administration's Project Manager and Office of Customer Relations and Information prior to public release.

TC 3.06 Administration Services

The Administration will provide the following services:

3.06.01 General Administration Services

A. Provide CADD standards, engineering standards, design criteria, as-built plans, existing R/W plats and prints of other design projects for use as examples or guides.

B. Provide erosion and sediment control standard sheets, traffic design standard details, Maintenance of Traffic (MOT) standard plates, etc.

C. Provide accident statistics and other traffic data Average Daily Traffic (ADT), Design Hourly Volume (DHV), percentage of trucks, etc.

D. Provide overall management and liaison services related to project phases.

E. Coordinate times and places of all of the Design-Build Team's community and public meetings.

F. Provide existing Right-of-Way plats and/or Right-of-Entry agreements.

G. Acquire Right-of-Way for roadway construction as determined by the Administrations design concept plans.

3.06.02 Traffic Services

The Administration's Office of Traffic and Safety (OOTS) will provide the following:

A. Design charts for ground mounted sign supports and foundations.

B. Copies of existing standard sheets; however, these may require some revisions by the Design-Build Team.

C. Engineering standards, design criteria, and copies of the past design projects for use as examples or guides.

D. Functional operation and requirements for the traffic signals.

E. Handwritten Structure Design Sheets.

F. Once notified by the Design-Build Team when each service drop is needed, SHA may arrange the final electrical service request letters when directed by the utility company.

G. SHA will supply all controllers and cabinets and the related internal equipment, the required traffic signal mounted signing and the ground mounted W3-3 signs only. The Design-Build Team shall install all SHA traffic signal supplied equipment.

3.06.03 Structural Services

The Administration's Office of Structures (OOS) will provide the following:

A. Copies of existing standard sheets; however, these may require some revisions by the Design-Build Team.

B. Engineering standards, design criteria, and copies of the past design projects for use as examples or guides.

3.06.04 Construction Inspection

The Administration will follow its normal construction inspection policies and procedures.

However, measurement of quantities will serve to verify that the plan and specification requirements are met and for other purposes at the discretion of the Administration. The Design-Build contract does not alter the authorities of the Administration's District Engineer, Project Engineer, or construction inspection personnel in their Administration of the construction contract.

3.06.05 Conduct Pre-Construction Conference

The Administration will conduct the conference and take minutes. Representation at the conference shall include:

3.06.05.1 Preconstruction Conference Attendees

- A responsible officer of the Design-Build Team;
- The Project Manager;
- The SHA Construction Project Engineer;
- The SHA Design Project Manager;
- Public Affairs Representative;
- Maryland DNR and SHA Landscape Operations representative;
- SHA Landscape Architecture representative;
- A responsible officer of any major subcontractors;
- The Environmental Monitor and SHA Environmental Programs Division representative;
- SHA Highway Hydraulics Division representative;
- SHA Office of Structures representative;
- District Utility Engineer, and
- Howard County Representatives.

3.06.05.2 Pre-Construction Conference Topics

The Design-Build Team should be prepared to discuss the following issues at the conference (at a minimum):

- Designation of responsible personnel;
- Design Quality Control Plan;
- Correspondence/communication;
- Distribution of contract documents;
- Approval of subcontractors;
- Tree Impact Minimization and Avoidance Report;
- Locations and protections devices of forested areas.
- Stake out and approval of tree protection devices and fence locations.
- Progress schedule (design and construction);
- Critical work sequencing;
- Permits and licenses;
- Submission schedule;
- Submittal of Shop Drawings, project data and samples;
- Itemized schedule listing dates by which other submissions will be forwarded to the Administration;
- Major equipment, deliveries and priorities;
- Site utilization plans;
- Office and storage area;
- Construction constraints;
- Coordination of all interface activities;
- Training;
- Availability of utilities/need for temporary services;
- Procedures for maintaining Record Documents;
- Material submittals and approvals;

- Processing of field decisions and change orders;
- Close-out procedures;
- Review of miscellaneous procedures;
- Safety;
- Utility relocations, and
- Utility connections to all existing and proposed TCD's.

3.06.06 Conduct Progress Meetings

The Administration will conduct progress meetings on a regular basis, as scheduled at the project initiation meeting and pre-construction conference. The Design-Build Team shall prepare all meeting minutes and distribute them to attendees and team members for review and comment within one week. Additional progress meetings may be necessary at the discretion of the Administration to maintain coordination of design and construction activities. Representatives at the meetings shall be qualified and authorized to act on behalf of the entity each represents.

3.06.06.1 Progress Meeting Attendees

- The Design-Build Manager, Design-Build Project Manager and associates as needed,
- The Administration's Project Engineers, Construction, Design and associates as needed,
- Subcontractors as appropriate to the agenda,
- Utility companies, and other concerned parties as appropriate.

3.06.06.2 Progress Meeting Topics

The meetings will serve as a forum to establish and maintain close coordination of work activities, resolve problem issues and expedite construction operations. Schedules, change orders, work activities, DQCP reviews, and other issues will also be addressed.

3.06.07 Permits

As part of this RFP, the Administration is providing the permits and approvals based on the proposed activities. See Section 3.05.22, Environmental Permits, for a list of the permits that have been obtained by the Administration.

TC 3.07 Deliverables

Deliverables will be produced in both the design and construction phases. They include construction documents, reports, public relations materials, design exceptions and property owner information.

3.07.01 Plans

At a minimum, the following separate plan sheets shall be produced for this project.

- Title Sheet
- Index of Sheets
- Abbreviations Sheet
- Typical Section Sheets
- Superelevation Sheets
- Pavement Detail Sheets
- Miscellaneous Detail Sheets
- Geometry Sheets
- Intersection Detail Sheets
- Gore Detail Sheets
- Roadway Plan Sheets
- Roadway Vertical Profile Sheets
- Maintenance of Traffic Plan Sheets
- Storm Drain Profiles with 25 year hydraulic gradeline shown and Structure Schedules Sheets
- Drainage Details Sheets, including ditch type/linings, outfall protection, and non-standard structures
- Stormwater Management Plans and Details
- Erosion and Sediment Control Plans and Details
- Stream Diversion Plans and Detail Sheets

- Landscape/Reforestation/SWM Planting Plan Sheets
- Structure Plans and Details
- Culvert Extension Plans, Elevation and Details
- Retaining Wall Plans, Elevation and Details
- Traffic Signalization Plans
- Interconnect Plans (if applicable)
- Signing and Pavement Marking Plans
- Intersection/ Interchange Lighting Plan Sheets
- ITS Plans
- Grading Tables
- Cross Sections

3.07.01.1 General Requirements

The Design-Build Team shall deliver upon request and at no additional cost hard copies of maps, plans and drawings as well as electronic copies of all computer files. This includes Microstation files used to develop the design and drafting of this project. These files must be logically indexed and labeled to enable Administration personnel to use at any time.

3.07.01.2 Contract Plans and Specifications

The Design-Build Team shall provide contract plans and any required specifications, in accordance with "Volume II Specifications for Consulting Engineers" and this RFP. The Design-Build Team will develop specifications for construction that identify the details of the proposed work. The intent is that the work will be done in accordance with the Standard Specifications, project specific Special Provisions, the "standard" Special Provisions, and the Special Provisions Inserts which are normally included in an Administration advertised RFP. All of these "standard" Special Provisions Inserts and Special Provisions are included in this RFP even though the work items to which they apply might not be included in this project. The intent is that if the item is included in the construction, then these "standard" Special Provisions and Special Provisions Inserts will apply.

The specifications to be prepared by the Design-Build Team and submitted to the Administration for review and approval will, in addition to all of the specifications

mentioned above, include any specifications developed by the Design-Build Team that supplement or modify what is provided in the RFP.

Throughout the design phase, the Design-Build Team shall prepare and update 50 scale reproducible maps of the design to be used for meetings, briefings, etc. Where needed for added clarification, 20 scale reproducible maps shall be provided for use by the Administration. The scale of the roadway plans should be 30 scale unless more detail is needed.

The Design-Build Team shall provide the Administration with sufficient data to answer property owners' and other requests for information concerning the project's effects, status, etc.

3.07.01.3 Drafting and CADD Standards

The Design-Build Team shall utilize SHA supplied Microstation files, including data collector survey and photogrammetry in their design and drafting. The Design-Build Team shall utilize the Microstation drafting software packages Version V8i or later, and/or Inroads/Geopak. All of the design and drafting will utilize all Administration CADD Standards including but not limited to feature tables, file-naming standards, parameter files, font libraries, cell libraries and color tables.

3.07.01.4 Stormwater Management (SWM) and Surface Drainage Plans

The following items shall be included in the design plan documents:

- Pipe profiles and structure schedules for all storm drain systems and culverts.
- Profiles shall be at a scale of 1 in. = 30 ft. horizontal and 1 in. = 3 ft. vertical. The 25-year hydraulic gradient and existing and proposed ground, proposed pipe, existing and proposed utilities, proposed outlet protection, and existing structures shall be shown on all storm drain profiles.
- Details for all non-standard drainage structures.
- SWM Systems including details, profiles, grading and layout plans, planting plans and BMP ID numbers.
- Side, median and outfall ditch elevations, offsets, section geometry, and surface treatments.
- A BMP As-Built Certification sheet shall be developed for each SWM facility (see 3.05.15.3). Examples of the checklists and tabulations are included in this package and checklists for other types of facilities may be available from the Administration, Highway Hydraulics Division, upon request. The Design-Build

Team may expand the checklist as necessary.

- Hazardous material spill containment plans as necessary.
- Underdrain connections, locations (including linear filter cleanouts), and outlets.
- Cross culvert locations, headwater pool areas, and channel changes required to adjust streams to culverts.
- Spring box and outlet locations and configurations.

3.07.01.5 Erosion and Sediment Control (ESC) Plans

The Design-Build Team shall develop ESC Plans that include the following in addition to the highway plan requirements.

- Plans for both initial and final phases of the construction are required. Plans for interim phases may also be required by SWM/ESC approval authority to ensure adequate controls throughout project duration. These interim phase plans shall be coordinated with traffic control stages. The plans require one foot contouring for all phases at the same scale as the roadway plans.
- The initial phase plan shall detail the implementation of erosion and sediment control measures necessary to complete the clearing and grubbing and the initial stages of the Traffic Control Plan (TCP).
- The final phase shall detail the control measures required to move to final grade and accommodate interim traffic control phases.
- Plans shall provide a detailed description of the Limit of Disturbance (LOD). A schedule of stations and offsets shall be provided with stations and offsets established at a minimum of 50 foot intervals and at all break points in between.
- Larger scale drawings (1 in. = 200 ft.) shall be included in the plans depicting off-site drainage areas, sensitive environmental resource areas such as wetlands, woodlands, streams, and locations of major diversions and sediment controls.
- Maintenance of stream flow and maintenance of storm drain flow plans as required.
- This plan will be coordinated with the MDE Non-Tidal Wetland and Waterways Division to ensure compliance with ESC measures in areas subject to waterway construction permits. The Design-Build Team shall be responsible for all revisions due to MDE review and comment.
- The plans shall be sealed and signed by a Maryland Registered Professional

Engineer.

3.07.01.6 Traffic Control Plans

The Design-Build Team shall prepare detailed Traffic Control Plans (TCPs) as required for various stages of construction showing traffic patterns, signs, barricades, etc. These plans will be developed at a scale of 1 in. = 20 ft. or 1 in. = 50 ft. and shall layout in detail each phase of construction as coordinated with the erosion and sediment control and landscape plans. Final TCPs may include cross-sections, temporary signals and/or signal phasing modification plans and interim drainage. All existing highway lighting systems, sign lighting and traffic signals are to be kept fully operational throughout the construction period. In the event some or all of the existing lighting must be taken out of service, consideration should be given to temporary lighting systems and maximizing usage of new lighting systems. All lane closures shall be as outlined elsewhere in this RFP.

3.07.01.7 Structure Plans

All structure plans developed by the Design-Build Team shall conform to the following requirements:

Title Block information in accordance with Maryland State Highway, Office of Structures PPM P-79-16(G).

All views in accordance with Maryland State Highway, Office of Structures PPM P-75-7(4).

All lettering in accordance with Maryland State Highway, Office of Structures PPM P-76-9(G).

3.07.01.9 Utility Map

The Design-Build Team shall develop a utility map graphically showing all existing utilities within proposed Right-of-Way. This map shall be at the scale of the roadway plans. Existing utilities are to be clearly indicated and labeled. Connections between valve boxes, manholes, poles, etc., are to be shown and labeled with the type of existing service (i.e. 2" electric, fiber optic, etc.). This map is to be kept current with all proposed utility relocations shown and made available for review and use by Administration and Utility Company staff. Existing utilities are to be shown and clearly labeled on plans, profile and cross-sections.

3.07.01.10 Roadside Landscape and Reforestation Plans

The Design-Build Team shall prepare landscape and reforestation plans with a scale appropriate for the project, but not less than 1"=30'. Plans shall include schedules of all

materials proposed for use, and shall be submitted to the Administration, Landscape Architecture Division and Landscape Operations Division, for review and approval. Roadside Landscape and Reforestation plans should include the following information:

- Vicinity map of site location for both on-site and off-site reforestation areas
- Density and quantity of plantings area provided for mitigation
- Limit of Disturbance
- Tree preservation fence line
- Plans should include environmental/surface features, extending at least 100' beyond Property Line or Right-of-Way of adjacent parcels. Ownership and parcel numbers should be identified for each adjacent parcel
- A schedule of materials, indication plant quantities for each type and size of plant material, proper nomenclature for plant species, root of materials; B&B or Container Grown (CG), and proposed spacing
- Defined limits of mowing and limits of mulching where applicable
- Critical Root Zones for individual significant or specimen trees, as defined by the Maryland Department of Natural Resources: Measured from the center of the tree's trunk; 1.5 foot of radius per inch of DBH (Diameter at Breast Height)
- Tree preservation details including but not limited to fencing, fertilizing, root aeration, signage, and root pruning/sequencing of construction indicating any additional requirements for tree preservation not identified in the specifications.

3.07.02 Cross Sections

The Design-Build Team shall prepare cross-sections cut at even 50 foot stations, at driveways, and at critical stations for clarity along the baseline of construction at a scale of 1 in. = 10 ft. horizontal and vertical. Cross sections shall be provided for the mainline and side roads. Cross-sections shall show: existing ground, proposed grade, roadway slope, curb/gutter, existing and proposed right-of-way and easements, traffic barrier, proposed and existing traffic control device and sign structure foundations, grading limits, pavement section and all existing and proposed storm drains, swales, storm water management facilities, noise walls, and all utilities. Cross-sections shall have the P.G.E.(s) and all proposed ditches and swale inverts labeled with offsets and elevations. Cross-sections shall have all existing and proposed (including relocated) utilities and storm drains drawn to scale at the correct offset and elevation, and have type, size, and invert elevation (if known) labeled. Cross-sections shall be placed on sheets measuring 22 in. x 34 in. with grid lines spaced at 0.1 in. horizontal and 0.1 in. vertical. Each section shall be identified by the baseline name, station and a datum elevation. Elevations shall be shown in the Maryland Grid System Datum, NAVD 88.

The cross sections should be annotated according to SHA Highway Design Policy and Procedures Manual including offset and elevation for all significant figures.

Existing and proposed utilities, proposed drainage conveyances including pipes, drainage structures, cross culverts and ditches shall be drawn on to the cross-sections. The cross-sections will be used by the Administration to verify adequate cover at pipes and clearance at utilities.

Interim and final cross sections containing drainage design components and annotations shall be submitted for use in the Administration's review of drainage design.

3.07.03 Reports

The Design-Build Team shall perform engineering computations and/or analysis and maintain all backup data. This data must be available to the Administration at all times; and clear, legible copies shall be furnished to the Administration upon request. Stormwater Management reports, drainage reports, geotechnical report and field inspections reports, computations, and maps shall be submitted to the Administration for review and/or approval and placement in permanent files. These computations shall be for the total project and in accordance with Administration procedures. Design Exceptions shall be documented in report form and submitted to the Administration.

3.07.03.1 Stormwater Management (SWM) Report

Upon completion of the project, the Design-Build Team shall submit two (2) copies of the approved, final SWM Report to the SHA HHD. During the review and approval process, the report can be submitted in phases. Electronic and Hard Copies of all items within the report are required.

3.07.03.1.1 SWM Report Format

- The report and accompanying mapping shall be compiled according to the SHA HHD SWM Design Report Standard Format (included in this package).
- The report shall be written in a clear, well organized, and concise manner with all pages numbered and dated.
- The report shall be placed in 8½ by 11 inch, 3-hole binders that allow for insertion of revisions and removal of old data.
- Revisions to report as required. The date of the revision shall be placed on all pages and pages to be added, replaced or removed shall be designated. Revisions shall be 3-hole punched for easy placement in the reports. A document shall be submitted with each report detailing all of the changes.
- The final approved report, including all mapping and exhibits, shall be converted to PDF formatted file(s). The electronic file(s) shall be delivered to the Administration for their records.

3.07.03.1.2 SWM Report Contents

The SWM report shall contain the following:

- A signed SWM/ESC Checklist for each phase of approval (ie site development approval, final approval) with all the available items
- A SWM/ESC transmittal form.
- A SWM/ESC submittal letter.
- A thorough discussion explaining the extent of improvements at each outfall and the proposed quantitative and qualitative control methods of SWM, including reasons why other methods were not selected.
- An explanation of hydrologic/hydraulic analysis methodologies used. Final supporting computations, maps, schematics, cross-sections, details and computer outputs shall be included for each outfall location.
- Outfall stability analysis, including photographs of each outfall and receiving channel.
- Computations for riprap sizing and outlet protection.
- Maps and schematics clearly showing the location of subareas, structures, existing land use, time of concentration paths, soil types and SWM facilities. Maps shall be included in pockets within the report.
- Computer printout sheets in 8½ inch x 11 inch format. These sheets shall be clearly labeled for cross-reference to the supporting data and points of analysis.
- MDE Pond Summary Sheets.
- SHA Water Quality Summary Sheet (WQSS) submitted to the Administration, Highway Hydraulics Division, for signature. See Section 3.17 for more details. Maps detailing the impervious areas added, impervious areas treated, pavement removed, redevelopment areas, and areas where existing treatment is lost.
- MDE SWM Waiver Applications that differ from those submitted with the Concept SWM Report. These shall be submitted to the Administration, Highway Hydraulics Division, for signature.
- SHA BMP Identification Forms (included in this package) with SHA BMP numbers indicated. The Design-Build Team is responsible to obtain BMP numbers for all SWM facilities from the Administration, Highway Hydraulics Division.

3.07.03.2 Surface Drainage Report

Upon completion of the project, the Design-Build Team shall submit two (2) copies of the

Surface Drainage Report to the SHA HHD. The Surface Drainage Report shall include all drainage design computations performed according to the Administration's Highway Drainage Manual, drainage area mapping and schematics necessary to complete the design of the stormwater conveyances for the project.

All drainage computations shall be performed using the appropriate design charts within the Administration's Highway Drainage Manual and shall include clear references for all tables and charts used.

Culvert Analysis reports, when necessary for Waterway Construction Permit review and approval, shall be included as an attachment to the Surface Drainage Report and shall follow the format described below. The content shall be dictated by the MDE comment letter, approval or subsequent requirements issued by MDE in their review process.

3.07.03.2.1 Surface Drainage Report Format

- All the pages within the report shall be numbered and dated.
- The report shall be placed in an 8½ by 11 inch, 3-hole binder that allows for insertion of revisions and removal of old data.
- Revisions to report as required. The date of the revision shall be placed on all revised pages. Pages which are added or removed shall be indicated as such. Revisions shall be 3-hole punched for easy placement in the reports. A document shall be submitted with each report detailing all of the changes.
- The final approved report, including all maps and exhibits, shall be converted to PDF format file(s). The electronic file(s) shall be delivered to the Administration for their records.

3.07.03.2.2 Surface Drainage Report Contents

The report shall include, but not be limited to the following:

- Storm sewer design computations including schematics, inlet drainage area maps, 2 year inlet spacing, 10 year capacity, spread, 25 year hydraulic gradients, and structural design for non-standard drainage structures.
- Culvert analysis including 2, 10, 25 and 100 year frequency storms and design storms.
- Ditch computations and drainage area maps for ditch capacity, freeboard and lining stability.
- Evaluation of outfall stability, and outfall protection design, including photographs.
- Any deviations from the guidelines and Administration approvals for the

deviations.

- Culvert service life verification.
- Inspection documentation and evaluation of existing drainage structures, storm drains and culverts not being replaced.

3.07.03.3 Erosion and Sediment Control (ESC) Report

The ESC Report shall contain all computations for the ESC design and can be either a separate report or can be included in the SWM report. The ESC Report shall conform to SWM Report formatting described above (3.07.03.1.1).

The ESC Report shall contain the following:

- Drainage area maps to control devices for each phase.
- Computations for sizing control devices.
- Plans and procedures for converting sediment control devices into stormwater management facilities.
- Tracking of E&S quantities throughout the duration of the project.
- Identification of and placement of controls in sensitive areas.

3.07.03.4 Final Geotechnical Reports

The Design-Builder shall prepare Final Geotechnical Reports as described in TC 3.14 Geotechnical Performance Specification.

3.07.03.5 Pavement Report(s)

Interim Pavement Report(s) and FWD Result Report(s) shall be prepared as outlined in TC 3.10 Pavement Performance Specification.

3.07.03.6 Tree Impact Minimization and Avoidance Report

A report shall be prepared that shows the tree and forest locations and describes the alternative measures that the Design-Build Team proposes to use to avoid or reduce impacts to these trees and forest, including alignment or typical section modifications or protective measures as stated in Administration's 2008 Standard Specifications, Section 120. This report will be reviewed and approved in conjunction with the grading plans.

TC 3.08 GUIDELINES AND REFERENCES

All Project services shall be provide in accordance with these specifications and the relevant requirements of the Guidelines and References listed in Table 1 unless otherwise stipulated in these specifications. Unless noted, the most recent version as of the date of issuance of this RFP for each Guideline and Reference shall apply. Guidelines and references in Table 1 are listed alphabetically by Author or Agency and the order is not intended to imply a priority of one document over any other. Should the requirements in any Guideline conflict with those in another or any other requirement in the Contract Documents, the strictest requirement as determined by the Administration shall govern. It is the Design-Builder's responsibility to obtain clarification for any unresolved or perceived ambiguity prior to proceeding with design or construction.

Table 1

Design-Build Guidelines and References

Author or Agency	Title
AASHTO	A Guide for Transportation Landscape and Environmental Design, 1991
AASHTO	A Policy on Geometric Design of Highways and Streets, 2011
AASHTO	DARWin Pavement Design Software
AASHTO	Guide for Design of Pavement Structures, 1993
AASHTO	Guide for the Development of Bicycle Facilities, 2012
AASHTO	Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004
AASHTO	Guide Specifications for Structural Design of Sound Barriers, 2002
AASHTO	Highway Safety Design and Operations Guide, 1997
AASHTO	LRFD Bridge Design Specification, 7th Edition, 2014
AASHTO	M288 - Geotextile Specification for Highway Applications, September 2007
AASHTO	M320 - Performance-Graded Asphalt Binder
AASHTO	M323 - Superpave Volumetric Mix Design
AASHTO	Manual for Condition Evaluation of Bridges, 2nd Edition, 2011
AASHTO	Manual on Subsurface Investigations, 1st Edition, 1988
AASHTO	R25 - Superpave Volumetric Design for Hot-Mix Asphalt
AASHTO	Roadside Design Guide, 4th Edition 2011 with July 2015 Errata
AASHTO	Roadway Lighting Design Guide, 2005

AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 3rd Edition for traffic signal structures 4th Edition for sign structures (overhead, cantilever, and ground mounted)
AASHTO	Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 35th Edition, 2015
AASHTO	T 194 - Standard Method of Test for Determination of Organic Matter in Soils by Wet Combustion, 2008
AASHTO	T 88 - Standard Method of Test for Particle Size Analysis of Soils
AASHTO/AWS	D1.5M/D1.5: Bridge Welding Code, 2010
ACI	ACI 318 - Building Code Requirements for Structural Concrete, 2011
ACOE	HEC-RAS Software, Version 4.1.0
ADA	Americans with Disabilities Act Accessibility Guidelines
ANSI	ANSI A300 (Part 1) - American National Standard for Tree Care Operations - Tree, Shrub and Other Woody Plant Management - Standard Practices (Pruning), 2008
ANSI	ANSI A300 (Part 2) - American National Standard for Tree Care Operations - Tree, Shrub and Other Woody Plant Management - Standard Practices (Soil Management), 2011
ANSI	ANSI A300 (Part 3) - American National Standard for Tree Care Operations - Tree, Shrub and Other Woody Plant Management - Standard Practices (Supplemental Support Systems), 2013
ANSI	ANSI Z133.1 - Safety Requirements, 2012
ANSI	ANSI Z60.1 - American Standard for Nursery Stock, April 2014
ASTM	Annual Books of ASTM Standards
ASTM	D4694 - Standard Test Method for Deflections with a Falling-Weight-Type Impulse Load Device, 2015
ASTM	D6433 - Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys, 2011
ASTM	E274 - Standard Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire, 2011
ASTM	E501 - Standard Specification for Standard Rib Tire for Pavement Skid-Resistance Tests, 2008
ASTM	E950 - Standard Test Method for Measuring the Longitudinal Profile

	of Traveled Surfaces within an Accelerometer Established Inertial Profiling Reference, 2009
ASTM	Standards in Building Codes, 2014
ATSSA	Quality Guidelines for Temporary Traffic Control Devices and Features, 2014
CFR	Code of Federal Regulations (CFR)
COMAR	Code of Maryland Regulations
COMAR	COMAR Maryland's Lawn Fertilizer Law, October 2013
County	County Roadway Standards
DNR	Article 5-103 - Reforestation
DNR	COMAR 08.07.02 - Roadside Tree Care
DNR	COMAR 08.19 - Forest Conservation
Dunnicliff	Geotechnical Instrumentation for Monitoring Field Performance, 1986
FEMA	44 CFR Part 10 - Environmental Considerations, October 2011
FEMA	44 CFR Part 9 - Floodplain Management and Protection of Wetlands, October 2011
FEMA	Conditional Letter of Map Revision (CLOMR)
FHWA	"Bridge Rails" Memorandum, August 1986 and updated May 1997
FHWA	23 CFR 940.11 - Project Implementation, April 2008
FHWA	Durability of Geosynthetics for Highway Applications, January 2001
FHWA	FHWA NHI-01-031 - Subsurface Investigations (Geotechnical Site Characterization), 2001
FHWA	FHWA-ED-88-053 Checklist and Guidleines for Review of Geotechnical Reports and Preliminary Plans, 2003
FHWA	FHWA-HI-97-013 - Design and Construction of Driven Pile Foundations – Volume I, 1997
FHWA	FHWA-HI-97-014 - Design and Construction of Driven Pile Foundations – Volume II, 1997
FHWA	FHWA-HI-98-034 - Geotechnical Instumentation, 1998
FHWA	FHWA-NHI-00-043 - Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines, 2000
FHWA	FHWA-NHI-05-037 - Geotechnical Aspects of Pavements, 2006
FHWA	FHWA-NHI-09-087 - Corrosion/Degradation of Soil Reinforcements

	for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, 2009
FHWA	FHWA-NHI-10-016 - Drilled Shafts: Construction Procedures and LRFD Design Methods, 2010
FHWA	FHWA-RD-03-031 - Distress Identification Manual for the Long-Term Pavement Performance Program, 2003
FHWA	FHWA-SA-91-048 - Laterally Loaded Pile Analysis Program for the Microcomputer, (COM624P) Version 2.0
FHWA	FHWA-SA-94-035 The Osterberg Load Cell for Load Testing Drilled Shafts and Driven Piles, 1994
FHWA	FHWA-SA-97-070 - Micropile Design and Construction Guidelines, 2000
FHWA	FHWA-SA-98-074 - DRIVEN 1.0 User's Manual: A Program for Determining Ultimate Vertical Static Pile Capacity
FHWA	FHWA-SA-98-086 - Ground Improvement Technical Summaries Volume I
FHWA	Geosynthetic Design and Construction Guidelines, 1998
FHWA	Geotechnical Engineering Circular No. 1: Dynamic Compaction, 1995
FHWA	Geotechnical Engineering Circular No. 2: Earth Retaining Systems, 1996
FHWA	Geotechnical Engineering Circular No. 4: Ground Anchors and Anchored Systems, 1999
FHWA	Geotechnical Engineering Circular No. 5: Evaluation of Soil and Rock Properties, 2002
FHWA	Geotechnical Engineering Circular No. 6: Shallow Foundations, 2002
FHWA	Geotechnical Engineering Circular No. 7: Soil Nail Walls, 2015
FHWA	Geotechnical Engineering Circular No. 8: Design and Construction of Continuous Flight Auger Piles, 2007
FHWA	Ground Improvement Technical Summaries Volumes I and II
FHWA	Manual on Uniform Traffic Control Devices (MUTCD), 2009
FHWA	NCHRP Report 350 - Recommended Procedures for the Safety Performance Evaluation of Highway Features, 2004
FHWA	NCHRP Report 553 - Crashworthy Work Zone Traffic Control

	Devices, 1998 and later interim revisions
FHWA	NCHRP Report 672 - Roundabouts: An Informational Guide, 2nd Edition, 2010
FHWA	Standard Highway Signs, 2004 Edition & 2012 Supplement
FHWA	Traffic Noise Model, Version 2.5.
IEEE	Guide for Concept of Operations Document, 2007
IEEE	Guide for Developing System Requirements Specifications, 2009
IEEE	Independent Verification and Validation
IEEE	National Electric Safety Code, 2012
IES	DG-5-94 Recommended Lighting for Walkways and Class 1 Bikeways, 1994
IES	RP-19-01 Roadway Sign Lighting
IES	RP-22-11, American National Standard for Tunnel Lighting, 2011
IES	RP-8-00, American National Standard Practice for Roadway Lighting, 2000
ITE	Manual of Transportation Engineering Studies, 2nd Edition, 2010
ITE	Traffic Engineering Handbook, 7th Edition, December 2015
ITS MD	Maryland Statewide ITS Architecture
MDE	2000 Maryland Stormwater Design Manual, Appendix A, Landscaping Guidance for Stormwater BMPs, May 2009 Revision
MDE	2000 Maryland Stormwater Design Manual, Volumes I and II, May 2009 Revision
MDE	2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control
MDE	Antidegradation Review Checklist Major Linear Project Review Form
MDE	Antidegradation Applicant Review Checklist Enhanced Best Management Practices for Tier 2 Waters
MDE	Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated - Guidance for National Pollutant Discharge Elimination System, June 2011 Draft
MDE	Clean Water Act Section 401, Water Quality Certification for MD 404
MDE	COMAR 26.08.02 - Water Quality

MDE	COMAR 26.08.02.10 - Water Quality Certification
MDE	COMAR 26.17 - Water Management
MDE	COMAR 26.17.01 - Erosion and Sediment Control
MDE	COMAR 26.17.02 - Stormwater Management
MDE	COMAR 26.17.04 - Construction on Nontidal Waters and Floodplains
MDE	Environmental Site Design Process & Computations, 2010
MDE	Environmental Site Design Redevelopment Examples, 2010
MDE	Maryland's Waterway Construction Guidelines, Issued September 1999, Revised November 2000
MDE	National Pollutant Discharge Elimination System General Permit for Construction Activity, 2012
MDE	Stormwater Design Guidance – Addressing Quantity Control Requirements, 2012
MDE	Stormwater Design Guidance – Submerged Gravel Wetland, 2012
NEMA	National Electrical Manufacturers Association Standards
NFPA	502: Standard for Road Tunnels, Bridges and Other Limited Access Highways, 2014
NFPA	70: National Electrical Code, 2014
NFPA	National Fire Protection Association
NRCS	Pond Code MD-378, 2000
NTCIP	National Transportation Communications for ITS Protocol
OSHA	29 CFR 1910 - Occupational Safety and Health Standards
OSHA	29 CFR 1926 - Safety and Health Regulations for Construction
SHA	2035 LOS Wiring Diagram – Design Forecast Volumes
SHA	ABSCOUR Program
SHA	Accessibility Policy and Guidelines for Pedestrian Facilities Along State Highways, 2010
SHA	Accessible Pedestrian Signals Design Guidelines
SHA	Advance Street Name Sign Policy and Guidelines, 2012
SHA	Approved Propriertary Noise Barrier Systems, September 2009
SHA	Articulating Traffic Detector Mount (Plate ITS-21)
SHA	Bicycle Policy and Design Guidelines, January 2015
SHA	Book of Standards for Highways, Incidental Structures and Traffic

	Control Applications
SHA	Design Request Form Instructions and Guidelines
SHA	DMS Signface Layouts: CCTV (Plate ITS-1)
SHA	Field Guide for Erosion and Sediment Control, May 2013
SHA	Flagger Policy at Signalized Intersections
SHA	Guidance for the Use of Portable Changeable Message Signs (PCMS) in Work Zones, September 2013
SHA	Guidance on Maintenance of Traffic Alternatives Analysis (MOTAA), November 2016
SHA	Guidelines for Application of Rumple Strips and Rumple Stripes, August 22, 2011
SHA	Guidelines for the Use of Dynamic Lane Merging Strategies, November 2012
SHA	Guidelines for Traffic Barrier Placement and End Treatment Design, March 2006
SHA	High Visibility Apparel Policy, 2007
SHA	Highway Design Policy and Procedure Manual
SHA	Highway Drainage Manual Design Guidelines, 2009
SHA	Highway Drainage Manual, December 1981 or as amended herein and any revisions thereof
SHA	Highway Hydraulic Division Stormwater Management Facility Safety Policy for Design
SHA	Hinged CCTV Camera Pole Details (Plates ITS-18 to ITS-20)
SHA	Integrated Vegetation Management Manual for Maryland Highways, 2005
SHA	Landscape Design Guide, November 2015
SHA	Lighting Guidelines, 2013
SHA	Line Striping Material Selection Policy
SHA	List of Qualified Detectable Warning Surface, 2013
SHA	List of Qualified Loop Sealants, 2006
SHA	List of Qualified Permanent Pavement Markings, 2006
SHA	List of Qualified Removable Preformed Pavement Marking Material for Maintenance of Traffic, 2006
SHA	Manual for the Inspection of Highway Right of Way in Karst Areas

SHA	Maryland High Voltage Line Act
SHA	Maryland Manual on Uniform Traffic Control Devices (MD MUTCD), 2011
SHA	Maryland Standard Sign Book
SHA	Maryland State Police Criteria for Use in Work Zones
SHA	Maryland Statewide ITS Architecture, December 2009
SHA	MSMT 563 – Operation of the Inertial Profiler, June 2012
SHA	NEMA Size 5 UPS Battery Cabinet Details (ITS-24 and ITS-25)
SHA	Office of Structures Guide for Completing Structure Inventory and Appraisal Input Forms, June 2013
SHA	Office of Structures Manual on Hydrologic and Hydraulic Design, January 2016
SHA	Office of Structures Policy and Procedure Manual (PPM) including Draft PPMs included in the Appendix which shall be considered final for this Contract
SHA	Office of Structures Structural Standards Manual, Volumes I and II
SHA	Office of Traffic and Safety Approved Product List for Temporary Traffic Control Devices and Miscellaneous Items
SHA	Office of Traffic and Safety Capacity/Queuing Analysis Procedures for Intersections
SHA	OOTS TEDD Traffic Control Devices Design Manual, July 2006
SHA	Overhead DMS Structure and Access (Plates ITS-10 to ITS-16)
SHA	Pavement and Geotechnical Design Guide, January 2015
SHA	Pavement Marking Material Selection Guidelines, Revised January 2016
SHA	Pedestal DMS Access System (Plates ITS-2 to ITS-7)
SHA	Pedestal DMS Access System (Plates ITS-8 and ITS-9)
SHA	Policy for the Use of Temporary Traffic Barrier in Work Zones, November 2008
SHA	Preferred Plants List (PPL), 2015
SHA	Quality Assurance Toolkit Field Manual
SHA	Recommended Procedure for Determining Types of Left Turn Phasing
SHA	Roadway Delineation Policy

SHA	Roundabout Design Guidelines, October 2012
SHA	Roundabout Traffic Design Manual
SHA	Sediment and Stormwater Guidelines and Procedures for State Highway Administration (November 24, 2015)
SHA	SHA Office of Structures Standards for Ground Mounted Concrete Noise Barriers
SHA	SHA-MSP InterAgency Work Zone Service Agreement, 2009
SHA	Special Provisions and Special Provision Inserts to the Standard Specifications
SHA	Specifications for Consulting Engineer's Services, Volume II, Section VIII, April 1986
SHA	Standard Office of Traffic and Safety Shelf Typicals
SHA	Standard Specifications for Construction and Materials, 2008
SHA	Standard Specifications for Subsurface Explorations, 2012
SHA	Stormwater Management Site Development Criteria, June 2011
SHA	Transportation Management Plans: Guidelines for Development, Implementation and Evaluation, November 2006
SHA	Type 332/334 Cabinet Details (Plates ITS-22 and ITS-23)
SHA	Type 332/334 Cabinet Foundation Detail (Plate ITS-17)
SHA	Turfgrass Management Guidelines, February 2012 US F&WS Native Plants for Wildlife Habitat and Conservation Landscaping Chesapeake Bay Watershed
SHA	Utility Policy, Revised March 1998
SHA	V004-10 Surveyor
SHA	Work Zone Lane Closure Analysis Guidelines, November 2006
SHA	Work Zone Safety and Mobility Policy, 2006
SHA	Work Zone Safety Policy
SHA	Work Zone Safety Tool Box
SHA	Work Zones on 65/60 mph Roadways
SHA	Highway Noise Policy & Implementation Guidelines, Final, Effective Date July 13, 2011 (Revised August 19, 2011)
SHA/MDE	Application of Hydrologic Methods in Maryland, September 2010
SHA/MDE	Stormwater Management Process Agreements and Interpretations, April 2003

SHA/MDE	Stormwater Quality Management Banking Agreement, June 2, 1992 and amended March 1, 1994 and August 2003
TRB	Accessible Pedestrian Signals: Synthesis and Guide to Best Practices, June 2007
TRB	Highway Capacity Manual, 5th Edition, 2010
TRB	TCRP Report 19 - Guidelines for the Location and Design of Bus Stops, 1996
USACE	Clean Water Act Section 404 Permit Application and Authorization
USDA	The PLANTS Database (http://plants.usda.gov)
USDOT	National ITS Architecture

TC 3.09 ROADWAY PERFORMANCE SPECIFICATION

3.09.01 General

Design and construct roadways in accordance with the requirements of this specification, including performance requirements, standards and references, design and construction criteria, and required submittals.

This section is also intended to allow the flexibility to make Project changes that produce benefit of savings to the Administration and Design-Builder without adversely affecting the essential functions and characteristics of the Project in terms of safety, traffic operations, desired appearance, durability, ease of maintenance, environmental protection, drainage, and other permitted constraints

3.09.02 Guidelines

Roadway design and construction shall be in accordance with this Roadway Performance Specification and the relevant requirements of the Guidelines and References in TC 3.08.

3.09.03 Performance Requirements

Design and construct all roadways to meet the following performance requirements:

A. Meet or exceed all Maryland Department of Transportation State Highway Administration, AASHTO and other roadway design and safety guidelines as referenced in TC 3.08, outlined in these specifications, and in accordance with sound engineering principles.
B. All Roadway components shall be constructed within the defined right of way and easements.

3.09.04 Design and Construction Criteria

The Design-Builder shall design and construct all roadway geometrics including horizontal alignment, vertical alignment, superelevation, cross slopes, lane widths, shoulder widths, medians, and clear zone grading in accordance with the requirements of this section and the guidelines for roadway design.

A conceptual design for the Project, in the form of Concept Scroll Plans, and supporting electronic files are included to illustrate the general scope of the improvements and may contain some elements that require modification to meet the requirements of this Performance Specification. The Design-Builder shall verify all information prior to use to ensure compliance with the requirements of this Performance Specification.

3.09.04.01 Design Criteria

MD 32 Mainline Criteria	
Design Speed	60 mph
Posted Speed	55 mph
Functional Classification	Urban Other Principal Arterial
Terrain	Rolling
Minimum length of Horizontal Curve	Per AASHTO
Maximum Superelevation	Per AASHTO
Maximum Grade	Per AASHTO
Minimum Grade	Per AASHTO
Superelevation Transition Design	Per AASHTO

Linden Church Interchange On-ramp and Off-ramp Criteria	
Design Speed	35 mph
Functional Classification	N/A
Posted Speed	N/A
Terrain	Rolling
Maximum Superelevation	Per AASHTO
Maximum Grade	Per AASHTO
Minimum Grade	Per AASHTO
Superelevation Transition Design	Per AASHTO

The presence of roadway lighting shall not reduce the requirements for vertical sight distance on sag curves.

3.09.04.02 Full Dualization Limits

The southern limit of the full four-lane divided highway shall begin at Milepoint 10.34, approximately 575 feet south of the existing structure #13133 (MD 108).

The northern limit of the full four-lane divided highway shall end at Milepoint 13.01, approximately 1,320 feet north of the existing structure #1315900 (Linden Church Road). Proposed resurfacing and grading along southbound MD 32 shall extend to Milepoint 13.24 (approximately 2,530 feet north of the existing structure #1315900 (Linden Church Road)) to accommodate future dualization and culvert extensions.

3.09.05 Typical Section

Typical Section elements including number of lanes, lane widths, and shoulders shall be in accordance with the following criteria:

MD 32 – The typical section shall be a four lane divided highway with 12 foot travel lanes, 4 foot paved inside shoulders, and 10 foot paved outside shoulders. Rumble strips will be provided on the inside and outside shoulders. It shall include a 26 foot grass median with traffic barrier protection. Traffic barrier protection will be provided outside the roadway where clear zone requirements cannot be met. Full acceleration and deceleration lanes shall be provided at all interchanges. The acceleration/deceleration lanes shall be 12 feet wide and include 6 foot paved outside shoulders.

Emergency Turn-Around – An emergency crossover shall be provided at Milepoint 11.57, approximately 5,950 feet north of the existing structure #13133 (MD 108).

The median auxiliary lanes at the emergency crossover shall provide full deceleration lanes in accordance with AASHTO requirements. No acceleration lanes are required. The deceleration lanes shall be 10 feet wide.

Linden Church Interchange On-ramp and Off-ramp – The typical section shall be one 15 foot travel lane, 4 foot paved inside shoulders, and 6 foot paved outside shoulders. Traffic barrier protection will be provided outside the roadway where clear zone requirements cannot be met.

Any proposed modifications to these typical sections shall be consistent with requirements outlined in these performance specifications and project commitments. Modifications to typical sections shall meet AASHTO Standards.

Based on the concept design, no design exceptions are anticipated on this project.

3.09.06 Design Vehicle

The design vehicle for turning movements on MD 32 and interchange ramps shall accommodate the WB-67 vehicle and livestock trailers.

3.09.07 Pedestrian and Bicycle Facilities

There are no sidewalks as part of this project.

After construction of this project, bicycles will not be permitted on MD 32 from Burntwoods Road to MD 108. All existing bicycle lane signs and pavement markings along MD 32 and the ramps at

Linden Church Road shall be removed. The Design-Builder shall provide the necessary signing and marking to accomplish the following. Bicyclists traveling along MD 108, Linden Church Road, and Burntwoods Road approaching the MD 32 interchange ramps shall be guided by bicycle signs and pavement markings towards Ten Oaks Road, with the exception of traveling from Burntwoods Road towards northbound MD 32. Bicyclists traveling on southbound MD 32 approaching the Burntwoods Road interchange shall be directed to exit MD 32 at the off-ramp to Burntwoods Road and guided by bicycle signs and pavement markings towards Ten Oaks Road. Additionally, signs prohibiting bicycle and pedestrian access to MD 32 shall be provided on the following roadways at the intersection of the entrance ramps to MD 32: MD 108 (two ramps), Linden Church Road (two ramps) and Burntwoods Rd at the ramp to southbound MD 32 (one ramp). Detailed guidance shall refer to the requirements outlined in TC 3.12 Traffic Performance Specification.

3.09.08 Right-Of-Way and Easement Lines

The Design-Builder shall define right-of-way and easement lines of the Project for adjacent property owners, promptly upon request. The Design-Builder shall reset any disturbed or destroyed property corner(s) adjacent to the project upon request from the owner. The Design-Builder shall provide fencing for any properties which has an existing fence disturbed by construction. The Design-Builder shall reset the existing fence or provide black vinyl coated chain link fence with privacy slats. The fence shall be reset or replaced on the same day it is taken down. Once construction is complete, the existing fence which has been removed shall be reset or replaced by the Design-Builder. Any existing fence damaged shall be replaced by the Design-Builder in-kind with the new fence of the same material and aesthetics. Removal, relocation, or replacement of an existing fence shall be coordinated with the owner of the fence and adjacent property owners who may be affected by the fence construction. Every effort should be made to accommodate the scheduling needs of the property owners during fence construction, including those who have animals on the property.

3.09.09 Northbound Lane Drop and Southbound Roadway Crossover

The design for this project shall accommodate the future widening of MD 32 at the northern project limit. The future MD 32 Phase 2 project will continue to improve MD 32 from a two lane highway to a four lane divided highway from north of Linden Church Road to I-70. The Design-Builder shall design the northbound lane drop and southbound roadway crossover at the northern project limit for a design speed of 60 mph. The horizontal alignment shall provide a transition from the two lane northbound section to match the existing single lane. The southbound roadway crossover within the future median shall provide for a 4 foot left shoulder and a 10 foot right shoulder. Roadway runoff in this area shall not drain onto the northbound lane. This transition shall end no more than 2,530 feet north of the existing Linden Church Road structure #1315900.

TC 3.10 PAVEMENT PERFORMANCE SPECIFICATION

3.10.01 General

The Administration has provided pavement sections for various Roadway Elements in TC Section 3.10.06 of this RFP. The Design-Builder may utilize these pavement sections in accordance with TC Section 3.10.02 below. The pavement sections provided in Section 3.10.06 control any conflicts between them and the type of pavement improvement identified on the conceptual scroll plans and/or RFP Plan Sheets.

The Design-Builder may elect to design one or more alternate pavement sections, in accordance with TC 3.10.03, in lieu of utilizing the pavement sections in TC Section 3.10.06. The Design-Builder's pavement sections must be determined by the Administration, at its sole discretion, to be equal to or better than the sections provided in TC Section 3.10.06. The design and construction of alternate pavement sections shall be at no additional cost to the Administration.

The Design-Builder shall develop pavement sections for any Roadway element that is needed but not outlined in TC Section 3.10.06 of this RFP. The Design-Builder shall develop these pavement sections in accordance with TC 3.10.03.

It is the responsibility of the Design-Builder to determine patching quantities in the determination of their Price Proposal and assume all risks associated.

3.10.01.01 Guidelines and References

Design and construction of all pavements shall be in accordance with this Pavement Performance Specification and the relevant requirements of the Guidelines and References listed in TC 3.08.

3.10.02 Use of Pavement Sections Provided by SHA

3.10.02.01 General

The Design-Builder may use the pavement sections provided in Section 3.10.06.

3.10.02.02 Submittals

If the Design-Builder uses only the pavement sections provided in Section 3.10.06, the Design-Builder is required to submit the following, subject to review and approval as per TC Section 3.05.20:

(1) An Interim Pavement Report. This report shall state that the provided pavement sections will be used. If not all pavement sections provided in Section 3.10.06 are used, the report shall state for which Roadway Elements the provided pavement sections will and will not be used. Refer to Section 3.10.03 for submittal requirements if using pavement sections developed by the Design-Builder. This

Interim Pavement Report may be submitted separately from those submitted under Section 3.10.03.

(2) The results of all provided soil borings and pavement cores shown in TC 3.10.06 shall be shown on the roadway plan sheets. Boring log information shall be shown on the roadway profile sheets. Laboratory and in-situ test data may be shown on separate plan sheets. A full-size set of plans with pavement section typicals and pavement details shall also be included.

3.10.03 Use of Pavement Sections Developed by the Design-Builder

3.10.03.01 General

Where permitted, the Design-Builder may elect to design one or more alternate pavement sections in lieu of utilizing the pavement sections in TC Section 3.10.06. The alternate pavement section shall not impair the essential functions, characteristics, or quality of the Project, such as safety, traffic operations, ride, long term durability, desired appearance, maintainability, environmental protection, drainage, and other permitted constraints.

The Design-Builder's pavement sections must be submitted to and determined by the Administration, at its sole discretion, to be equal to or better than the sections provided in TC Section 3.10.06. It is recommended, but not required, that any alternative pavement section is submitted to the Administration as an Alternative Technical Concept. Deferring approval until after award will be at the sole risk of the Design-Builder.

If a Roadway Element is not specifically identified in TC Section 3.10.06 to be mainline/shoulder/ramp/access road etc., then it shall be considered to be a mainline element designed for mainline traffic. Auxiliary lanes shall be designed for mainline traffic, unless otherwise provided in Section 3.10.06. Ramp sections end at the gore, unless otherwise provided in Section 3.10.06. All new shoulders shall use the design traffic per Pavement and Geotechnical Design – Revised Shoulder Guidance provided on Projectwise. All existing shoulders that will carry traffic shall be designed and improved as necessary to perform under the given loading and environmental conditions for the specified service life periods for travel lane traffic. All existing shoulders that will not carry traffic shall receive the same surface as the adjacent lane.

3.10.03.02 Requirements

3.10.03.02.01 Pavement Engineering

The Design-Builder shall be responsible for all pavement engineering for Roadway Elements for which Section 3.10.03.01 applies. The pavement engineering for the Project shall include, but is not limited to, the pavement investigation, pavement type selection, new pavement design, pavement rehabilitation design and material selection.

All of the pavement engineering functions shall be directed, supervised, signed and sealed by a Maryland Registered Professional Engineer with a minimum of 5 years of

experience in pavement engineering.

3.10.03.02.02 Pavement Investigation

3.10.03.02.02.01 Preliminary Pavement Investigation

Any preliminary pavement investigation performed by the Administration is contained in Section 3.10.06. These studies, if performed, were completed in accordance with applicable standards and with reasonable care. The Administration assumes no responsibility with respect to the sufficiency of the studies for design, or their accuracy in representing actual pavement and subsurface conditions or existing thicknesses over the entire Project limits other than at the specific locations identified or sections tested.

3.10.03.02.02.02 Complete Pavement Investigation

The Design-Builder shall prepare and perform a complete pavement investigation program to obtain the data needed to fulfill any design requirements of the Project. The Design-Builder is responsible for supplementing the preliminary data with pavement data collected, tested and analyzed as part of the complete pavement investigation program. The pavement investigation shall be done with knowledge about and complimentary to the geotechnical subsurface exploration program. The complete pavement investigation shall be performed per the data requirements in the pavement construction and rehabilitation sections of the SHA Pavement Design Guide. The Design-Builder's complete pavement investigation may include, but is not limited to, the following items:

A) Review and evaluation of as-builts, existing construction and performance records;

B) Visual survey performed on all existing roadways following D 6433;

C) Pavement and soil borings;

D) Mainline and shoulder pavement cores of existing roadways;

E) In-situ sampling and test results;

F) Laboratory test results of field samples;

G) Complimentary data and results from the geotechnical subsurface exploration program;

H) Non-destructive structural deflection testing;

I) Data analysis of any and all field data collection; and

J) Pavement patching survey and estimate.

The complete pavement investigation shall be done under the direction and responsibility of the pavement engineer for the Design-Builder.

3.10.03.02.03 Pavement Type Selection

The Design-Builder shall provide either a rigid or flexible pavement structure for all new pavement construction according to the criteria set forth in this performance specification. The pavement shall have an initial structural design service life not less than what is specified in Section 3.10.06. The Design-Builder shall maintain a consistent pavement type throughout each Roadway Element.

3.10.03.02.04 Pavement and Subgrade Materials

All materials used on the Project shall meet or exceed the requirements established in the documents noted in Section 3.10.03.01 of this Pavement Performance Specification. No structural coefficient or pavement layer moduli improvement or structural benefit shall be considered through the incorporation of geosynthetic materials in the pavement structure. Geosynthetic Stabilized Subgrade may be used to improve the subgrade and is encouraged as a good foundation for construction of the pavement section.

3.10.03.02.04.01 Drainable Granular Pavement Base Materials

Materials containing any Recycled Concrete Aggregate (RCA) and Recycled Asphalt Pavement (RAP) are not acceptable as a drainable granular pavement base material. Capping Borrow and Graded Aggregate Base (GAB) are acceptable materials to be used for a drainable granular pavement base material.

In addition to the above materials, materials meeting the following criteria are acceptable as a drainable granular pavement base material:

1) A crushed aggregate with less than 8% passing the No. 200 sieve, a Plasticity Index (PI) of 7 or less, and meeting the aggregate quality requirements for Graded Aggregate Base; and
2) Natural soils with less than 20% passing the No. 200 sieve, a PI of 7 or less, and meeting the aggregate quality requirements for Bank Run Gravel - Base.

3.10.03.02.04.02 Non-Specification Pavement and Subgrade Materials

The Design-Builder may elect to propose a pavement section that utilizes a pavement material not identified in the current 2008 Standard Specifications for Construction and Materials book. In this case, the Design-Builder shall submit the following items as part of or prior to their Interim Pavement Report with a copy to the Office of Materials Technology's Pavement & Geotechnical Division:

A) Material design specification;
B) Material strength and engineering properties;
C) Construction and placement specification;
D) Material quality control plan specification;

E) Long-term performance history; and

F) Where the material will be used, in the subgrade or part of the pavement section.

Justification and an explanation of the structural value coefficients shall be provided for a pavement material not identified in the Standard Specifications for Construction and Materials. Construction of the pavement sections using the subject material shall not occur until the design, material and construction specifications, and material quality control plan have been through the Design-Builder's Design Management and Design Quality Assurance/Quality Control Plan.

3.10.03.02.04.03 Restricted Materials

The following materials shall not be used on the Project:

A) Rubber asphalt in hot mix asphalt materials;

B) Bottom ash; and

C) Slag, with the exception of blast furnace slag cement.

3.10.03.02.04.04 Recycled Materials

The Design-Builder may use Recycled Concrete Aggregate (RCA) or Recycled Asphalt Pavement (RAP) in conformance with the Recycled Materials Specification (SP 900.03) contained elsewhere in the documents.

Other recycled materials may be submitted for proposed use following the Non-Specification Pavement and Subgrade Materials requirements above with the following additional documentation:

A) Certification and test data demonstrating compliance with all MDE and EPA requirements for use of recycled materials.

B) Material Safety Data Sheets from the material supplier.

3.10.03.02.05 Pavement Analysis and Design

The Design-Builder shall design pavement sections in accordance with the requirements set forth in TC 3.08. In the SHA Pavement Design Guide, refer to chapters with "AASHTO 1993". The July 2008 AASHTO Mechanistic-Empirical Pavement Design Guide (MEPDG) shall not be used.

The Design-Builder may elect to use either flexible or rigid pavement sections, unless otherwise restricted in 3.10.06. The Design-Builder shall maintain a consistent pavement type and pavement section in terms of pavement materials and layer thickness for each Roadway Element throughout the limits of the Project. The pavement section is defined

as the aggregation of the individual pavement layers. The pavement type and pavement section shall also be consistent for any given ramp and ramp shoulders. The Design-Builder shall design and provide a positive drainage system for either pavement type to adequately drain the entire pavement structure.

No flexible/rigid combination pavement (composite) shall be constructed for the Project, except as needed for narrow base-widening (less than 4' wide) or for replacement of curb and gutter that does not involve base-widening. If a rigid pavement is selected by the Design-Builder, the pavement shall be constructed with Jointed Plain Concrete Pavement (JPCP) with load transfer devices or with Continuous Reinforced Concrete Pavement (CRCP). The pavement constructed shall address surface and subsurface drainage giving due consideration to the prevention of water becoming trapped in the granular base/subbase of the pavement.

The pavement section for the widening of any existing roadway element shall be designed to support the mainline traffic for that roadway element. In the case that the existing mainline pavement structure is composite, the pavement type for the widening shall match the existing surface type and be designed to support the mainline traffic for that roadway element.

Any construction on roadways not to be maintained by the State shall be designed and constructed in accordance to the standards and guidelines of the governing local municipality or other entity. The MDSHA Pavement Design Guide provides standard pavement sections that shall be used for driveways and bike paths.

3.10.03.02.05.01 Traffic

Refer to Section 3.10.06 for all traffic data to be used for pavement design purposes.

3.10.03.02.05.02 Pavement Design Criteria - General

The general design criteria necessary to develop the pavement design for each roadway element shall be in conformance with the criteria in Section 3.10.06. The Design-Builder shall design all pavements utilizing the "Desired Structural Coefficient" as specified in the "SHA Pavement Design Guide" in Section 4.07.

3.10.03.02.05.02.01 New Flexible Pavement Design Criteria

The Design-Builder shall design and construct all flexible pavement sections with Superpave asphalt mix layers developed using the Superpave mix design criteria.

The Design-Builder shall design and construct each flexible pavement layer based on the minimum thicknesses allowed using the layered design analysis approach per Part II, Section 3.1.5 of the "1993 AASHTO Guide for Design of Pavement Structures." For purposes of determining the minimum layer thickness, the following maximum layer moduli shall be used:

1) Select Borrow, Capping Borrow, or Modified Select Borrow, Mr = 10,500 psi;

2) Cement Modified Subgrade, Mr = 10,500 psi;

3) Graded aggregate base, Mr = 25,000 psi;

4) Any bound pavement layer, Mr = 40,000 psi;

3.10.03.02.05.02.02 New Rigid Pavement Design Criteria

The Design-Builder shall design and construct all rigid pavement sections using JPCP or CRCP. The Design-Builder shall design all rigid JPCP pavements with the following design requirements:

A) Utilizing a Portland Cement Concrete (PCC) mix with equivalent or better long-term performance than SHA Mix #7 per Section 902;

B) An unreinforced rigid pavement with load transfer devices (dowels);

C) A maximum transverse joint spacing of 15 feet;

D) Dowel bars shall be placed at the transverse joint 12 inches on center;

E) Longitudinal joint tie bar design based on the other rigid pavement design parameters; and

F) A single $^{1}/_{8}$" wide saw cut one quarter the depth of the PCC layer shall be made to form the location for the transverse joint. No joint reservoir shall be formed, use MD 572.92 as a reference.

G) A joint spacing slab layout including the location of contraction and expansion joints shall be prepared and submitted by the Administration for review and approval.

The shoulders shall be rigid pavement and be tied to the mainline roadway. No more than three lanes shall be tied together in the longitudinal direction. If the mainline adjacent to the shoulder is paved two feet wider than the lane stripe (essentially putting the longitudinal joint in the shoulder), no tie bars are required.

3.10.03.02.05.02.03 Pavement Rehabilitation Design Criteria of Existing Roadways

The Design-Builder shall provide pavement improvements for all existing roadway elements. Regardless of the type of pavement improvement identified on the Concept Plans, all pavement improvements performed by the Design-Builder must meet all design criteria.

All existing State roadways that are identified roadway widening shall be designed in the same manner as new construction roadways. All existing State roadways that are identified for reconstruction may instead be rehabilitated provided that all design criteria are met. All existing State roadways that are identified for resurfacing shall be designed with an appropriate rehabilitation strategy in accordance with SHA Pavement Design Guide. The depth and materials of all permanent patches shall match the depth and materials of the existing pavement and in accordance with the SHA Pavement Design Guide. All non-state roadways shall be designed in accordance with the local agency standards or per the SHA Pavement Design Guide if no standards exist.

The Design-Builder shall perform a complete pavement investigation for all existing roadways within the limits of the Project. The Design-Builder shall provide the rehabilitation strategy and design for all existing pavement sections of roadway identified for resurfacing within the Project.

All proposed patching locations or criteria shall be submitted to the Office of Materials Technology for approval 5 business days prior to beginning patching work. The depth and materials of all permanent patches shall match the depth and materials of the existing pavement and in accordance with the SHA Pavement Design Guide.

3.10.03.02.05.02.04 Temporary Pavement Sections for Maintenance of Traffic

If required for MOT, the Design-Builder shall provide a roadway pavement section capable of safely and structurally supporting mainline traffic. All temporary roadways shall be free of all medium or high severity distress during their operation. All distress and severity levels shall be as identified in D 6433-Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys. Any distress reaching medium or high severity level shall be repaired with 24 hours.

The Design-Builder shall evaluate the condition of any roadway or shoulder to be used to support maintenance of traffic during construction. This evaluation shall be done within the complete pavement investigation required of the Design-Builder. At a minimum, pavement cores of the existing roadway shall be obtained by the Design-Builder and the structural capacity validated through an appropriate analysis by the Design-Builder's pavement engineer. This shall be done in all cases where any existing roadway or shoulder will be used for maintenance of traffic purposes and is expected to have different traffic patterns than those that existed prior to the notice to proceed for the Project.

The Design-Builder's pavement engineer shall determine if the roadway has adequate structural capacity to support maintenance of traffic and what, if any, construction is required to provide a pavement structure capable of supporting mainline traffic volumes. The results of the pavement investigation along with the maintenance of traffic pavement design and structural improvements shall be provided to the Administration as part of the Design-Builder's design review process prior to moving any traffic on a roadway or

shoulder that was not supporting mainline traffic prior to the notice to proceed for the Project.

Existing roadways used for maintenance of traffic, and new pavement constructed for maintenance of traffic that will ultimately be used as permanent shoulders or roadways, shall be restored to a suitable condition and meet the ultimate design requirements at the completion of the work. The Design-Builder shall be responsible for maintaining roadways used for maintenance of traffic.

Design requirements for temporary flexible pavement for Maintenance of Traffic pavements are identified in the SHA Pavement Design Guide. The same minimum and maximum subgrade strength identified in 3.10.06 shall apply for temporary roadways.

3.10.03.02.05.03 Pavement Structure Drainage and Frost Protection

The pavement sections shall be of a sufficient depth to protect against pavement heaving due to frost. The depth of the pavements for frost protection purposes shall be as noted in Section 3.10.06. The frost protection pavement depth includes the surface layer, the granular and bound pavement base layers, and the granular and bound subgrade improvement layers.

The Design-Builder shall design and provide a positive drainage system to adequately drain the entire pavement structure. The pavement drainage system may include longitudinal underdrains, prefabricated edge drains, underdrain outlets, subgrade drains, a free-draining granular layer or combination and variations thereof.

If underdrains are used, space outlets for longitudinal underdrains at intervals as required by the applicable guidelines. If the required spacing for outlets cannot be achieved, the Design-Builder shall submit in writing the location of each spacing issue, their justification for why they are unable to obtain the required spacing and the spacing they can achieve based on the following guidelines:

- For distances exceeding the required spacing but not exceeding 600 feet the Design-Builder shall use 8 inch longitudinal underdrain.
- For distances exceeding 600 feet but not exceeding 900 feet the Design-Builder shall use l0 inch longitudinal underdrain.
- Under no circumstances will outlets be allowed to be space greater than 900 feet apart.
- The size of the longitudinal underdrain will be the same for the entire length of longitudinal underdrain between two outlets.
- Underdrain outlets shall be the same size as the longitudinal underdrain it drains.

The Administration will review each location and respond in writing whether or not the Administration agrees that no suitable outlet point exists and approves the outline underdrain spacing detailed for each location. Determination of the suitability of an outlet

point and approval of outlet spacing is at the Administration's sole discretion.

All pavement sections shall include, at a minimum, a 4" granular base layer in the pavement section to facilitate pavement drainage, and between the hot mix asphalt layer and any chemically stabilized base/sub-base/subgrade-stabilization. The use of open-graded granular layers shall require the use of properly designed aggregate or geosynthetic filters. Geotextiles used in subsurface drainage and separation applications shall be designed in conformance with AASHTO M288. The pavement drainage system shall be designed in a manner that will minimize the future maintenance of the system.

3.10.03.02.05.04 Subgrade

The Top of Subgrade shall be identified by the Design-Builder on the pavement details. Any material placed above the Top of Subgrade shall be considered part of the pavement structure. Any material placed below or other work below Top of Subgrade shall be considered a subgrade improvement.

3.10.03.02.05.04.01 Design of Subgrade for Pavements

Borings must extend a minimum of 10 feet below the proposed Top of Subgrade, and the spacing along the roadway alignment shall not exceed 500 feet. The minimum design subgrade resilient modulus (Mr) at the Top of Subgrade shall be 4,500 psi. When the native soils are not capable of providing the minimum design strength, a subgrade improvement strategy shall be included in the pavement design to reach the minimum strength requirement at the Top of Subgrade.

The Design-Builder shall specify the design subgrade strength, planned subgrade improvements, and as-needed subgrade improvements in the Interim Pavement Report. The same design subgrade strength value shall be used throughout the entire area of each roadway element. In the case that a subgrade improvement is used throughout a significant portion of a roadway element, it shall be shown in the pavement details.

The Project shall be test rolled in accordance with Section 204.03.01(c) of the Standard Specifications for Construction and Materials. Passing test rolling shall signify that a section of subgrade has reached a stable construction platform and that the minimum subgrade strength of 4500 psi, has been achieved at the Top of Subgrade.

In the case that the Top of Subgrade does not pass test rolling, the Design-Builder shall improve the failed area to a point that it meets or exceeds the minimum required design subgrade modulus specified by the Design-Builder in the Interim Pavement Report. Additional test rolling of the failed area shall be performed after improvement to verify the minimum required design subgrade modulus has been achieved at the Top of Subgrade. FWD testing results and field notes shall be required to confirm the minimum subgrade strength was achieved and shall be included in the FWD Results Report. Falling-Weight-Deflectometer (FWD) testing is only required for design subgrade resilient modulus values greater than 4500 psi.

3.10.03.02.05.04.02 Acceptable Subgrade Improvement Strategies

Acceptable subgrade improvement strategies include both mechanical and chemical subgrade improvements and are identified in the Standard Specifications for Construction and Materials. Subgrade improvement techniques not included in the Standard Specifications for Construction and Materials require the following justification documentation for review by the Administration's in the Design-Builders design review process:

A) Material design specification;

B) Material strength and engineering properties;

C) Construction and placement specification;

D) Material quality control plan specification;

E) Long term performance history; and

F) Material Safety Data Sheets for any recycled material.

Construction of the subgrade improvements using the subject techniques shall not occur until the design, material and construction specifications, and material quality control plan have been reviewed through the Design-Builder's design quality process and in the Interim Pavement Report. The Design-Builder shall adhere to the approved material and construction specifications.

Subgrade improvement techniques proposed by the Design-Builder shall have a proven history of performance in similar applications. Subgrade improvements shall not utilize materials or construction practices that could endanger the safety of the public or be detrimental to the environment in either the short or long term. Any subgrade improvement technique contained in the SHA Standard Specifications for Construction and Materials is considered acceptable without additional supporting documentation.

3.10.03.03 Submittals

For each Roadway Element that the Design-Builder designs, the Design-Builder is required to submit three reports:

(1) A Pavement Investigation Plan Report that details the pavement information that will be collected; and
(2) An Interim Pavement Report that details the information that was collected, and all analysis and designs.
(3) An FWD Results Report (only if FWD testing is done) that details the FWD testing pattern and results.

Multiple Roadway Elements may be combined for each of these reports. For Roadway Elements provided by the Administration that the Design-Builder uses, refer to TC

Section 3.10.02.

All submittals shall be subject to review and approval as per TC Section 3.05.20.

3.10.03.03.01 Pavement Investigation Plan Report

The Design-Builder shall prepare a Pavement Investigation Plan Report for the pavement needs of each Roadway Element. The Pavement Investigation Plan Report shall include the type, details, frequency, and approximate location of testing needed to perform a complete pavement investigation.

The Pavement Investigation Plan Report shall also include a checklist detailing whether each required item was completed. A Report with an incomplete checklist will not be reviewed. If the Design-Builder wishes to exclude any required item from the complete pavement investigation, an explanation of why the testing is not needed must be included.

The review of the Pavement Investigation Plan Report shall be incorporated into the Design-Builder's Design Quality Plan. The review of the report will be completed within the appropriate design stage for each Roadway Element and a copy of the Pavement Investigation Plan Report shall be sent to the Office of Materials Technology's Pavement and Geotechnical Division.

3.10.03.03.02 Interim Pavement Report

The Design-Builder shall develop and submit an Interim Pavement Report for each Roadway Element of the Project at the Readiness for Construction Review or Interim Review Stage. The Interim Pavement Report shall come with a full size set of plans of the area covered by the report, a copy of any reports referred to in the pavement report, and contain the Design-Builder's plans for addressing the pavement design sections for the following:

A) New roadways for mainline, shoulders and ramps;

B) Pavement rehabilitation treatments;

C) Widening and reconstruction for existing roadways and other paved areas;

D) Roadway and pavement base/subbase drainage;

E) Other pavement related matters on the Project; and

F) Pavement Material selection.

The Design-Builder shall provide a pavement section for each Roadway Element in the Interim Pavement Report and shall submit it to SHA's Office of Materials Technology for review and comment. The Administration will use AASHTO's DARWin Pavement Design Software to evaluate the pavements designs submitted. A Pavement Engineer for the Design-Builder, who is a registered P.E., shall supervise all work and seal the Interim

Pavement Report.

The Design-Builder shall obtain all information necessary to properly complete the Interim Pavement Report. The Interim Pavement Report shall include the design inputs and calculations used to develop the pavement sections.

The results of all soil borings and pavement cores, both the Administration's and the Design-Builder's, shall be shown on the roadway plan sheets. Boring log information shall be shown on the roadway profile sheets. Laboratory and in-situ test data may be shown on separate plan sheets. The recommendations contained in the Interim Pavement Report shall be incorporated into the plans and specifications developed for the Project.

The Interim Pavement Report shall contain pavement design items deemed important by the Design-Builder. The Interim Pavement Report shall contain, but is not limited to the following items:

1) Testing results from the Complete Pavement Investigation:

   a) Summary of records review of as-builts, existing construction and performance records;
   b) Pavement condition index (PCI) and distress summaries on all existing roadways following D 6433;
   c) Location and result of pavement and soil borings;
   d) Location and result of mainline and shoulder pavement cores of existing roadways;
   e) In-situ test results;
   f) Laboratory test results of field samples;
   g) Location and result of non-destructive structural deflection testing;
   h) Findings and summary of data analysis of any and all field data collection; and
   i) Estimate of pavement patching needs.

2) Summary of critical design values and elements from the Complete Pavement Investigation:

   a) Records review analysis of each existing and new pavement section;
   b) Analysis and pavement design of all roadways;
   c) All design input requirements for AASHTO and SHA Pavement Design criteria;
   d) Traffic data, analysis and calculation of the equivalent single axle load (ESAL) for each roadway element;
   e) Structural capacity values (required, effective and original) for each roadway element;
   f) Structural pavement layer calculations used to develop pavement sections needed for the required structural capacity; and
   g) Design subgrade resilient modulus (Mr) or modulus of subgrade reaction (k).

3) Subgrade improvement - treatments and stabilization strategies;

4) FWD testing program guidelines and testing qualifications if effective design subgrade strength values are greater than the minimum values required;

5) Temporary pavement details and design/construction approaches to meeting performance requirements during maintenance of traffic operations;

6) Specific material selections for each pavement layer within the pavement section for each roadway element;

7) Rehabilitation techniques used for existing roadways:

a) Selection criteria used in determining of pre-overlay treatments (patching and grinding needs) and the estimated quantity;
b) Reasoning for selection of rehabilitation technique with respect to the pavement performance criteria;
c) Structural improvement strategy for existing roadway;
d) Functional improvement strategy for existing roadway;
e) Existing roadway conditions; and
f) Existing Design subgrade Resilient Modulus (Mr).

8) Specifications for all materials to be used in the pavement section for each roadway element;

9) Pavement drainage design and construction strategies;

10) Use of unique or innovative construction techniques, i.e. automated dowel bar insertion, intelligent compaction, etc;

11) Pavement details; and

12) Full-size set of plans with pavement section typicals and pavement details included.

The Interim Pavement Plan Report shall also include a checklist detailing whether each required item was completed. A Report with an incomplete checklist will not be reviewed. If the Design-Builder wishes to exclude any required item from the Interim Pavement Report, an explanation of why the item is not needed must be included.

3.10.04 Pavement Construction

Construction of all pavement materials shall be in accordance with the Standard Specifications for Construction and Materials unless modified in this Pavement Performance Specification or in the specifications developed by the Design-Builder.

3.10.04.01 Construction of Pavement Subgrades

The Design-Builder shall be responsible for construction of a suitable and stable subgrade on which to place the pavement section. The Top of Subgrade shall be test rolled prior to placing the base course in the Pavement Section(s). Any movement in the Top of Subgrade during test rolling shall be an indication of unstable subgrade or the presence of unsuitable material. Unstable or unsuitable areas shall be treated as recommended in the Final Geotechnical Report. After treatment, the area shall again be test rolled. Any area still showing movement shall receive additional corrective treatment.

In the presence of surface water and/or within 3 feet below the proposed subgrade, the Design-Builder shall engineer the subgrade (e.g. Drainage Blanket, Subgrade drain) to handle the water and moisture conditions. In case of pumping of subgrade the D-B shall stabilize the subgrade prior to placement of sub base or base material.

FWD testing is required for cases where the design subgrade modulus is greater than 4500 psi, and shall occur after the Design-Builder has properly constructed and compacted the Top of Subgrade. The Design-Builder shall provide testing program guidelines and vendor qualifications for FWD testing in the Interim Pavement Report. The FWD testing program for subgrade resilient modulus shall adhere to the following test parameters and requirements:

A) ASTM D 4694 shall be followed in the data collection with the FWD.

B) No data collection shall occur on a frozen subgrade and ambient air temperature shall be greater than 40 degrees F.

C) The Design-Builder shall use a FWD testing vendor that can demonstrate at least 3 years worth of experience in FWD testing and analysis and submit that information with the Interim Pavement Report;

D) Load plate radius = 9 inches;

E) Minimum load applied = 4,000 pounds, maximum load = 9,000 pounds; and

F) All FWD data shall be collected and stored electronically and submitted as a package with the data analysis to verify subgrade resilient modulus strengths.

FWD set-up, load packages, spacing, and analysis shall be as specified in the following table:

ITEM	REQUIREMENTS	COMMENTS
Sensor Spacing	0”, 12”, 18”, 24”, 36”, 48”, 60”	Additional sensors are acceptable
Load Package	AA1B2	A = Seating Drop of 6,000 lbs. B = Seating Drop of 9,000 lbs. 1 = Recorded Drop of 6,000 lbs. 2 = Recorded Drop of 9,000 lbs.

ITEM	REQUIREMENTS	COMMENTS
Test Pattern	One per every 100 yd^2 of prepared subgrade in the mainline and shoulder, minimum of 5 tests.	
Analysis	$Mr = \frac{1.5pa}{\Delta_z}$	p = applied load (psi) a = radius of load plate (in) Δ_z = measured deflection (in)

The average subgrade strength as tested by the FWD must meet or exceed the design subgrade strength, no more than 20% of the test points may be below the design subgrade strength, and no individual point may be less than 80% of the design subgrade strength. The prepared subgrade shall be improved as appropriate to ensure that the design subgrade strength requirements are met. The limit of improvement may be modified through more frequent and additional FWD testing in the travel lane or shoulder in question.

The Design-Builder shall submit the results of all subgrade improvement testing including Falling Weight Deflectometer test results to the Administration's Pavement and Geotechnical Division within 72 hours of completion of the testing.

3.10.04.02 Removal of Pavement Markings

The Administration will allow the Design-Builder to eradicate all existing pavement markings that conflict with the Design-Builder's MOT markings by means of water blasting, sand blasting, covering with black tape, spot grinding, etc. For areas where existing pavement markings have been eradicated, the Design-Builder shall overlay the entire pavement surface, from shoulder edge to shoulder edge, and reinstall permanent pavement markings. If grinding, the depth shall be sufficient to remove the entire thickness of the existing surface layer of the pavement. The Design-Builder shall not install temporary pavement markings other than temporary marking tape on final roadway surfaces.

3.10.04.03 Repair of Damaged Pavement

The Design-Builder shall perform pavement repairs of all distressed areas related to the operations of the Project. Distressed areas shall be defined as any medium and high severity distress in existing pavement and any low, medium or high severity level for new construction or reconstruction pavement section. All distress and severity levels shall be as identified in D 6433-Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys. Any damage to the pavement in the Project or adjacent pavements caused by operations of the Design-Builder shall be repaired to the satisfaction of the Administration at the Design-Builder's expense. The depth and materials of all permanent patches shall match the depth and materials of the existing pavement and in accordance with the SHA Pavement Design Guide.

In addition, the Design-Builder shall perform patching and other necessary repairs to maintain traffic during all construction operations at no additional expense to the Administration.

3.10.05 Performance Criteria

The parameters that will be used to evaluate performance of all constructed pavements are:

A) Structural capacity;

B) Skid resistance;

C) Visual Appearance; and

D) Ride quality.

These parameters will be evaluated by the Design-Builder in coordination with the Administration, during construction and at Final Administration Acceptance. If corrective action needs to be taken, the Design-Builder shall coordinate all such activities to minimize disruption to the traffic at no additional cost to Administration.

3.10.05.01 Structural Capacity

The structural capacity (thickness and strength) of 100% of all pavement sections shall be evaluated during the design and construction phase through the Design-Builder's Quality Plan. The parameters that will be evaluated include thickness, strength, and quality of materials. The thickness, strength, quality, and proper placement of materials shall be evaluated to ensure compliance with the Design-Builder's Design and Construction Quality Plans. Final Acceptance will require meeting or exceeding the design criteria as well as meeting proper construction requirements. The Design-Builder shall provide documented field evidence and/or data that confirms the design thickness for each pavement layer, and tack/bond between each layer was achieved after final construction. If the structural capacity is determined to be deficient by the Design-Builder or the Administration, the Design-Builder shall take corrective action at no expense to the Administration.

3.10.05.02 Skid Resistance

The Design-Builder shall construct a pavement surface that shall meet or exceed an average friction number of 45 for each travel lane to provide adequate skid resistance for each roadway element. The friction number of the roadway shall be collected and determined in accordance with "Standard Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire" (E 274) and "Specification for Standard Rib Tire for Pavement Skid-Resistance Tests" (E 501). The Design-Builder shall be responsible for the friction number data collection. The Design-Builder may elect to request the Administration to collect friction data. If the Design-Builder disputes the friction number collected by the Administration, the Design-Builder must collect the data through other

means in accordance with this specification for justification of friction number dispute.

A friction number data test point shall be collected every two-tenths of a lane-mile for each travel lane, at a minimum testing frequency. The average of all test points collected for each roadway element shall meet or exceed a friction number of 45 with no single data point falling below 35. Roadway elements with pavements exhibiting values less than an average friction number of 45 or a single data point less than 35 shall require corrective action from the Design-Builder to provide average friction number values that exceeds 45 and is projected to provide that value for at least 5 years into the future. Data collection 5 years into the future shall not be required. The Design-Builder shall provide justification and evidence that the corrective action will provide the friction number of 45 for 5 years into the future. A flexible pavement constructed with a surface layer meeting the requirements of this specification with an approved high polish value aggregate source shall be considered as satisfying the skid resistance performance criteria.

3.10.05.03 Visual Appearance

The Design-Builder shall provide a pavement for each roadway element that is visually appealing and free of distress. The pavement surface shall have a consistent color and texture. The Design-Builder shall minimize the number of construction joints. The construction joints that do exist shall be visibly straight and performing as intended. The Design-Builder shall be required to provide a pavement surface that is free of any severity distress. All distress and severity levels shall be as identified in D 6433-Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys. A visual survey shall be done on a representative sample of the pavement per D 6433. The Design-Builder shall take corrective action to ensure the visual appearance is in accordance with this specification.

3.10.05.04 Ride Quality

Ride quality shall be evaluated in all travel lanes for each roadway element based on the SP 535 Pavement Surface Profile specification provided in the contract documents.

3.10.06 Project-Specific Data and Criteria

3.10.06.01 General

This section includes geotechnical and pavement data and pavement sections, and criteria for design. This section shall control any conflicts between TC 3.10.03 and this section.

3.10.06.02 Scope of Work

Based on the project concept plan, the current scope of the project includes the following items of work:

- Full-Depth construction of new MD 32 southbound from MD 108 to north of

Linden Church Road (**Dualization of MD 32**).

- Construction of two ramps to tie-in to Linden Church Road.
- Resurfacing of existing MD 32 within the project limits.
- Pavement removal at tie-ins.

3.10.06.03 Roadway Elements
The following Roadway Elements have been identified:

SHA Standards apply:

1. Roadway Element 1: This includes two new travel lanes and shoulders on MD 32 SB to accommodate a divided highway with wide median.
2. Roadway Element 2: This includes the new travel lane and shoulders on Ramps A and B and ends at the gore.
3. Roadway Element 3: This includes existing travel lanes and shoulders on MD 32

3.10.06.04 Pavement Sections
For Roadway Element 1 and 2, a concrete pavement section and an alternate asphalt pavement section are provided. The Design-Builder shall choose a pavement type for each of the Roadway Elements. Note that for all provided pavement details, information and details from corresponding standards in the Book of Standards that are missing from the provided details still apply.

The Design-Builder may choose to design the pavement for each Roadway Element in accordance with TC 3.10.03. The chosen pavement type shall be consistent in all aspects for the entire Roadway Element. If the scope of work changes so that a roadway is to be constructed and no pavement sections are provided, the pavement shall be designed in accordance with TC 3.10.03.

3.10.06.04.01 Concrete Pavement Sections - (Roadway Element 1)
If concrete is the chosen pavement type, the following minimum rigid pavement section shall be placed for Roadway Element 1 within the project limits:

12” Jointed Plain Portland Cement Concrete, Mix No. 7
6” Graded Aggregate Base Course

Notes:

1- Maximum transverse joint spacing shall be 15 feet and there shall be no mid-slab reinforcement.
2- Dowel bars for transverse joints: # 12 dowel bars, 18” long, epoxy coated and 12” spaced center to center.
3- Longitudinal tie bars at longitudinal slab/curb joint: # 4 smooth plain bars, 36” long, epoxy coated and spaced 36” center to center.
4- Joints saw cut:
   a. Single 1/8” saw-cut to a depth of 2” as per Section 520 of the

Specifications.
b. No joint sealant shall be used.

3.10.06.04.02 Concrete Pavement Sections - (Roadway Element 2)
If concrete is the chosen pavement type, the following minimum rigid pavement section shall be placed for Roadway Element 2 within the project limits:

10" Jointed Plain Portland Cement Concrete, Mix No. 7
6" Graded Aggregate Base Course

Notes:
1- Maximum transverse joint spacing shall be 15 feet and there shall be no mid-slab reinforcement.
2- Dowel bars for transverse joints: # 10 dowel bars, 18" long, epoxy coated and 12" spaced center to center.
3- Longitudinal tie bars at longitudinal slab/curb joint: # 4 smooth plain bars, 36" long, epoxy coated and spaced 36" center to center.
4- Joints saw cut:
   c. Single 1/8" saw-cut to a depth of 2" as per Section 520 of the Specifications.
   d. No joint sealant shall be used.

3.10.06.04.03 Asphalt Pavement Sections

3.10.06.04.03.01 (Roadway Element 1)
If Asphalt is the chosen pavement type, the following minimum flexible pavement section shall be placed for the construction of Roadway Element 1 within the project limits.

2" Gap-Graded Asphalt Mix 12.5mm for Surface, PG 64E-22, Level 5
3" Superpave Asphalt Mix 19.0mm for Base, PG 64S-22, Level 2
9" Superpave Asphalt Mix 25.0mm for Base, PG 64S-22, Level 2 (Two 4.5" Lifts)
12" Graded Aggregate Base (Two 6" Lifts)

3.10.06.04.03.02 (Roadway Element 2)
If Asphalt is the chosen pavement type, the following minimum flexible pavement section shall be placed for the construction of Roadway Element 2 within the project limits.

2" Gap-Graded Asphalt Mix 12.5mm for Surface, PG 64E-22, Level 5
9" Superpave Asphalt Mix 19.0mm for Base, PG 64S-22, Level 2 (Three 3" Lifts)
12" Graded Aggregate Base (Two 6" Lifts)

3.10.06.04.03.03 (Roadway Element 3)

3.10.06.04.03.03.01 Patching:
If patching is needed on existing MD 32 Pavement sections, the patching identification

shall be in accordance with the SHA Pavement Design Guide. Refer to standard 578.03 for patching guidance.

3.10.06.04.03.03.02 Grinding:
Grinding is not required on this project except for tie-in purposes and for maintaining the required clearance under structures.

3.10.06.04.03.03.03 Wedge/Level:
If wedge/level is needed to make grade or cross slope corrections, use the following material:

For a maximum 2" lift, use Superpave Asphalt Mix 9.5mm for Wedge/Level, PG 64S-22, Level 2
For 2" to 4" lifts, use Superpave Asphalt Mix 19.0mm for Wedge/Level, PG 64S-22, Level 2

3.10.06.04.03.03.04 Resurfacing:
The following surface layer shall be placed for the resurfacing of existing MD 32 within the project limits.

2" Gap-Graded Asphalt Mix 12.5mm for Surface, PG 64E-22, Level 5

3.10.06.05 Traffic Data

The Design-Builder shall use the following traffic data if developing alternate pavement designs for this Project.

	Elements 1, 3		Element 2	
	MD 32 (Patuxent Parkway		Ramps A and B	
Year	2015	2040	2015	2040
Average Daily Traffic (ADT)	29,475	43,200	2,948*	4,320*
Percent Trucks	10%	10%	10%	10%
Truck Factor - Rigid	2.19	2.19	2.19	2.19
Truck Factor - Flexible	1.44	1.44	1.44	1.44
Directional Distribution	50%	50%	100%	100%
Lane Distribution	90%	90%	100%	100%

*10% of the mainline traffic is considered for the Ramps.

Note: This traffic data shall only be used for pavement design purposes and shall not be used for any other traffic needs in the Project.

3.10.06.06 Pavement Design Criteria

The Design-Builder shall use the following requirements as the general pavement design criteria if developing alternate pavement designs:

Pavement Type	**Flexible**	**Rigid**
Roadway Element	1, 2 and 3	1 and 2
New Construction Design Life	25 years	25 years
Rehabilitation Design Life	15 years	15 years
Initial Serviceability	4.2	4.5
Terminal Serviceability	2.9	2.9
Reliability	90%	90%
Overall Standard Deviation	0.49	0.39
Load Transfer Coefficient	N/A	3.2
PCC Modulus of Rupture	N/A	685 psi
PCC Elastic Modulus	N/A	4,371,000 psi
Overall Drainage Coefficient	1.0	1.0
Minimum Modulus of Subgrade Reaction (static) *	N/A	230 psi/in
Minimum Resilient Modulus of Subgrade *	4,500 psi	N/A
Maximum Modulus of Subgrade Reaction (static) *	N/A	550 psi/in
Maximum Resilient Modulus of Subgrade *	10,500 psi	N/A

* The Design-Builder has the option of designing with a higher design subgrade modulus than the minimum requirement and less than the maximum requirement, providing field verification is submitted by the Design-Builder as per Section 3.10.03.02.05.04.01 of the Pavement Performance Specification and is approved by the Office of Materials Technology.

3.10.06.07 Minimum Pavement Thickness for Frost Depth
All pavement sections shall be of a sufficient depth to protect against pavement heaving due to frost. The thickness of the pavements for frost protection purposes shall be a minimum of 15 inches. The frost protection pavement depth includes the hot mix asphalt surface or Portland cement concrete layer, the granular and bound pavement base layers, and the granular and bound subgrade improvement layers.

3.10.06.08 Geotechnical Design Criteria
Refer to the Geotechnical Performance Specification (TC 3.14) for Geotechnical Design Criteria.

3.10.06.09 Soils Laboratory Test Results and Soil Samples Availability
Soils in jar samples from SPT boring are available for review and testing upon request.

Soil samples from auger borings were discarded after testing and they are not available for visual inspection.

The following soil laboratory testing was performed for selected soil samples recovered from the split barrel sampler and auger cuttings:

- Soil Classification
- Natural moisture content
- Gradation
- AASHTO Soil Mortar %
- USDA Soil Mortar %
- Atterberg Limits
- Proctor Testing

3.10.06.10 Boring Logs

3.10.06.10.01 SPT Boring Logs for Structures
Fifteen (15) SPT borings were drilled for five culvert structures along MD 32. For the selected soil samples of the structure soil classification, were performed and the test results are included in Appendix A of this report. SPT Boring Logs are included in Appendix C.

3.10.06.10.02 SPT Boring Logs for Roadways
Four (4) SPT borings were drilled for roadway embankment foundation and slopes. Jar samples were obtained from split barrel sampler for soil classification tests and the test results are included in Appendix A of this report. SPT Roadway Boring Logs are included in Appendix C.

3.10.06.10.03 Soil/Pavement Auger Boring Logs
Thirty Two (32) soil and pavement borings were drilled for the foundation of the pavement. Bulk samples were obtained from auger cuttings for soil classification and Proctor testing and test results are included in Appendix A. Boring logs are included in appendix B.

3.10.06.10.04 SWM-Boring Logs
Twelve (12) SWM-Borings were drilled for Storm Water Management facilities. Field classification were identified. SWM Boring Logs are included in Appendix B.

3.10.06.11 Top Soil
Top soil samples were not taken during this investigation. The Design Builder has to perform Top Soil sampling for testing if it is available within the project limit.

TC 3.11 STRUCTURAL DESIGN PERFORMANCE SPECIFICATION

3.11.01 General

Design and construct all structures in accordance with requirements of this specification and the structure description in the Special Provisions. The minimum design life for all permanent structures shall be 75 years. The minimum design life shall not apply to the existing portions of culverts that will remain and are being extended but shall apply to the new extensions.

The requirements in this specification apply to the design and construction of all temporary and permanent structures, including but not limited to culverts and retaining walls. A list of anticipated structures for this Contract is included in this Special Provision.

3.11.02 Guidelines and References

3.11.02.01 Guidelines

In addition to the requirements set forth in this specification, all structural analysis, design and construction shall be in accordance with the relevant requirements of the Guidelines and References in TC 3.08.

3.11.03 Structural Hydrology and Hydraulics Requirements

The Design-Builder shall study, analyze, design, obtain permit modifications and approvals for structures over waterways perform any in stream construction in accordance with requirements of this specification, including performance requirements, standards and references, design and construction criteria, maintenance during construction, and required submittals.

If the Design-Builder makes any changes to the SHA and MDE approved designs they shall analyze the hydrologic and hydraulic conditions of the modified options for use in the overall design and to secure regulatory agency approvals for the project.

02-13-11-06 (Middle Patuxent River Watershed) is classified as Use VI-P by the Code of Maryland Regulations 26.08.02 (Reference 3).

3.11.03.01 Structure Classification and Design Storm

The State Functional Classification for MD 32 is a "Urban Principal Arterial." This classification will remain the same after the highway dualization. This means that the highway should be designed to prevent inundation by a 100-year flood. Structures S-1 and S-3 are exempt from this requirement. For these 2 structures,

the highway should be designed to prevent inundation by a 50-year flood.

3.11.03.02 Existing and Ultimate Development Conditions Hydrology Requirements

MDE-approved peak discharges will be needed for, at a minimum, the 2-, 10, and 100-year flows to obtain a waterway construction permit. These discharges must be determined in accordance with the MDE/SHA Hydrology Panel recommendations. The Design-Builder will need to create a subdivided drainage area WinTR-20 model to verify discharges throughout the reach and the timing of the peak flows. The Design-Builder may determine that additional discharges are helpful in determining a design.

3.11.03.03 Scour Design Requirements

A) Scour analysis shall be performed using the latest available SHA ABSCOUR program and the guidance in Chapter 11 of the OOS Hydrologic and Hydraulic Design Manual.

B) Scour analysis shall be based upon the 100-year flood (design flood). Structures shall be designed for the design flood and checked for lateral stability under the 500-year flood as per Chapter 11 of the OOS Hydrologic and Hydraulic Design Manual.

C) Channel lateral migration distances and vertical degradation amounts as determined through the Stream Morphology study reports to be developed by the Design-Builder shall be used in conjunction with computed scour depths to determine total scour depths.

D) Scour analysis shall be performed for all bottomless structures over waterways.

E) Scour analysis shall not take into account scour countermeasures for the purposes of calculating scour depths.

F) Scour countermeasures shall be designed to protect substructure elements. Piers and abutments shall be structurally designed based on the estimated scour depths for the 100-year flood and checked for lateral stability under the 500-year flood.

G) All scour analyses shall be documented in accordance with the OOS Hydrologic and Hydraulic Design Manual.

3.11.03.04 MDE Hydraulics

Major drainage structures shall be located and designed in accordance with the OOS Hydrologic and Hydraulic Design Manual and MDE regulations (COMAR 26.17.04 "Construction on Nontidal Waters and Floodplains"). The design will provide fish and aquatic organism passage as required for the extension or replacement of the existing culverts as required by MDE. Structures adherent to this section are S-1, S-2, S-3 and S-5. Additional structures covered by this section shall be determined jointly by the Design-Builder and the SHA.

3.11.03.05 Stream Morphology

Lateral migration distances and vertical degradation amount shall be used in conjunction with the scour analysis for foundation design.

3.11.03.06 FEMA Hydraulics and CLOMAR Requirements

FEMA Floodplain Map Change Requirements: The proposed design will impact the FEMA-regulated 1-percent annual chance floodplain limits and water surface elevations. The administration will provide the design build team with a FEMA Floodplain Conditional Letter of Map Revision (CLOMR). The Design Builder shall be responsible for obtaining the Letter of Map Revision (LOMR)) for structures S-1 and S-3. The Design-Builder shall coordinate with SHA throughout the duration of submitting and securing and meeting all subsequent requirements of the required FEMA acceptance. The Design-Builder shall provide SHA with copies of the LOMR submission, approval and all related documents.

3.11.03.07 In-Stream Structure Design

If required by the regulatory or environmental agencies, design in-stream structures to stabilize the channel bed or bank within the character of the proposed design strategy. Any in-stream structures proposed and constructed by the Design-Builder may not create a barrier for any aquatic species that may be reasonably expected to be present at the site presently or anticipated following

construction. Materials for the structures must be designed to resist the range of forces and velocities in the channel in proximity to the structure(s) at discharges up to the 100 year storm event. Design computations must be provided to the Administration indicating the resistance and/or design life of any stone, wood, or other materials integral to the structural stability of all in-stream structures, prior to final approval of the design plans. A design narrative and the computations described above must be included in the Stream Stability Assessment and Design Report. Details and specifications depicting the materials, methods, and means of construction must be provided to the Administration in each plan submittal.

3.11.03.08 Deliverables

A. Design Report.

The Design-Builder must provide a Design Report and plans. At minimum the report must include all the elements described in 3.11.03.07. The Design-Builder is responsible for rectifying any deficiencies perceived by the regulatory agencies prior to issuance of the required permit modifications.

Design plans and specifications must include details to describe the structure in layout, materials, methods and means. The specifications must be in the format of the SHA Specification Guide dated 1/26/2012.

B. Requirements for Design-Builder Hydrologic and Hydraulic Analysis Reports

If any design modifications are required, the Design-Builder will perform all hydrologic and hydraulic studies needed to secure MDE permit modifications and approvals for the proposed work. At minimum, the studies shall include the following items:

1. The Hydrologic Analysis Report for the existing and ultimate development land use conditions.
2. A geomorphic study of the reach through the project limits as discussed above.
3. The Hydraulic Analysis Study and Report for the existing and

proposed conditions, as well as the surveys and mapping needed to complete the hydraulic studies.

The Hydrologic and Hydraulic Analysis Reports shall contain the completed text, exhibits, summary tables, computer input and output data, and other technical information. The reports will include a digital full copy of the report as well as the appropriate computer models used for the analyses. The format and content of report shall be prepared in conformance with the instructions in the OOS Hydrologic and Hydraulic Design Manual. The Design-Builder shall include the impacts the proposed project would have on the hydraulic characteristics such as water surface elevations, flow velocities, Froude numbers and shear stress in the channel in the report.

All Design-Builder study reports shall be self-contained documents to the extent practicable. When necessary, reference may be made to outside sources of information used by the Design-Builder in their preparation of data or exhibits for the reports. All references shall be clearly stated, listed and described as related to the Hydraulics Analysis Report. All the pages within the report shall be numbered, dated and shall be placed in an 8 ½-inch by 11-inch, three-hole binder.

Upon completion of the Hydrologic and Hydraulic Analysis Reports, the Design-Builder shall submit the report to SHA's Highway Hydraulics Division for review and concurrence prior to submittal to MDE. The Design-Builder shall submit the Hydraulic Analysis Report to MDE for review and approval and copy SHA. Upon approval from MDE, the Design-Builder shall provide two copies of the final, approved report, files on CD/DVD, and the notification of the MDE approval to the OHD Highway Hydraulics Division.

3.11.03.10 Structure Hydrology and Hydraulics Construction Requirements

In-stream construction shall adhere to the requirements in the Nontidal Wetlands & Waterways Permit and Section 404 Individual Permit.

3.11.04 General Structure Design Requirements

Design calculations shall be performed in Customary U.S. units. Only Customary U.S. units shall appear on the plans.

3.11.04.01 Design Methodology

The following references are for AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications, including all interims.

A. Concrete.
All reinforced concrete members shall be designed in conformance with AASHTO LRFD specifications, including all applicable provisions for service, fatigue, strength and extreme event limit states.

B. Prestressed Concrete.
The use of prestressed concrete substructures will not be permitted for this project.

C. Load Ratings.
All box culverts and pipe culverts shall be rated using the load factor and resistance factor (LRFR) method of analysis using the latest edition of the AASHTO Manual for Bridge Evaluation (MBE). Load Ratings shall be in accordance with Policy and Procedure Manual D-97-47(4) and shall include the existing portions of structures if as-built plans are available. All ratings for each individual structure shall be forwarded to the Office of Structures in a summary letter with a table indicating the individual ratings. The HL-93 inventory rating factor for all new structure construction shall be greater than 1.

3.11.04.02 Loads and Forces

All loads and forces applied to structures shall be in accordance with AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications except as modified below.

A. Dead Loads (DL)

1) Design loads shall be in conformance with the Administration's Office of

Structures Policy and Procedure Memorandum D-89-40(4) and AASHTO LRFD Bridge Design Specifications.

2) Unit weights of materials shall conform to AASHTO specifications which includes the weight of embedded reinforcement.

B. Highway Loads (LL)

1) Live loading, designated HL-93 shall be in accordance with AASHTO.

2) Retaining walls including wing walls and headwalls shall be designed to accommodate the horizontal surcharge and traffic impact loads caused by live load per AASHTO criteria.

C. Wind Loads

1) Wind Loads for culverts, shall be in accordance with AASHTO LRFD Design Specifications**.**

D. Thermal Forces

1) Moderate Temperature Climate Changes shall be used per AASHTO criteria.

2) Normal Temperature shall be 60 degrees Fahrenheit.

E. Seismic Forces.

1) Structures are located within seismic zone 1.

2) No detailed seismic analysis need be performed.

F. Miscellaneous Lateral Forces.

Wind loads, longitudinal traction forces, stream flow forces, etc. shall be in accordance with AASHTO LRFD Specifications.

G. Construction Loads.

Where the Design-Builder, during construction, anticipates passing truck traffic in excess of the design load over structures designed and constructed under this

Project, the structure shall be designed for the higher truck load. The Inventory and Operating Rating Factors shall be greater than 1.0 for the higher truck load. The Design-Builder shall receive written concurrence from the Administration's Office of Structures before developing a design using a live load in excess of that specified above.

3.11.04.03 Materials

A. Foundations

1) Piling

a) Steel H piles shall conform to conform to A 36, Grade 36 or A 709, Grade 50 Steel.

b) Steel pipe piles and steel mini/pin piles shall conform to A252, Grade 3 steel (Fy = 45,000 psi.).

c) Concrete for steel pipe piles shall conform to Mix No. 3 with a slump range of 4-6 inches in accordance with Section 902.10 of the Administration's Standard Specifications for Construction and Materials.

d) Reinforcement for steel pipe piles shall conform to Section 908.01 of the Administration's Standard Specifications for Construction and Materials.

2) Drilled shaft materials shall conform to Section 412 of the Administration's Standard Specifications for Construction and Materials.

B. Structural Steel.

1) Structural Steel for secondary members shall conform to A 709, Grade 50 or 50W and 909.01. All structural steel, weathering or non-weathering, shall be fully painted as indicated in accordance with Section 435 of the Administration's Standard Specifications for Construction and Materials and the Special Provisions.

2) Fracture critical member structures are prohibited.

3) Minimum sizes for steel members and welds shall conform to the Administration's Policy and Procedure Memorandum D-87-34(4).

4) Electro-slag welding is prohibited in conformance with the Administration's Policy and Procedure Memorandum D-77-11(4).

5) All bolts shall conform to A 325.

6) All bolted connections shall be designed as Class A slip critical connections.

7) Steel sheet piling shall conform to A328.

C. Concrete.

1) Mix No. 6 (4500 psi – Design for 4000 psi) normal weight concrete shall be used at the following locations:

Top Slab of Culverts with a minimum depth of fill 18 inches or less.

Precast portions of box culverts.

Precast headwalls for pipe culverts.

Parapet Portion of Wing Walls including Retaining Walls and Culvert Headwalls.

2) Mix No. 3 (3500 psi – Design for 3000 psi) normal weight concrete shall be used at the following locations:

Retaining Walls
Top Slab of Culverts with a minimum depth of fill greater than 18 inches and all cast-in-place box culvert walls, bottom slabs, cutoff walls, headwalls, and wing walls.

3) Subfoundation concrete shall be normal weight Mix No. 4 (3500 psi) concrete.

4) The use of prestressed concrete substructures is prohibited. The use of lightweight concrete for structures is prohibited.

D. Reinforcement Steel

1) Reinforcement steel bars shall conform to 908.01.

2) Welded Wire Fabric (WWF) reinforcing shall conform to 908.05.

3) Epoxy coated reinforcement steel bars and WWF shall conform to 917.02 and shall be used at the following locations:

   Barriers and Parapets
   Parapet Portion of Wing Walls including Retaining Walls and Culvert Headwalls.
   Top portions of pipe headwalls.
   Portions of Retaining Walls, located within 10 ft of the outside edge of shoulder measured vertically and/or horizontally.
   Top mat of the top slab, including truss bars and any reinforcement extending into the top of the top slab, for box culverts with less than 18" of cover.

4) Unless noted otherwise minimum clear cover to reinforcement steel shall be as follows:

Location	Clear Cover
Top of Box Culvert Slabs Built to Grade	2-1/2 in.
Box Culvert Slab Not Built to Grade	2 in.
Toewall – Top, Bottom and Sides	3 in.
Culvert Bottom Slab – Bottom	3 in.
Footings – Bottom and Sides	3 in.
All Other Locations – Main Reinforcement	2 in.
All Other Locations – Stirrups	2 in.
Precast Concrete Elements	2 1/2 in.

5) Welding of reinforcement steel is prohibited.
6) Box culverts shall be designed to allow the reinforcing steel in the top mat to be laid out parallel to the headwalls or perpendicular with the culvert sidewalls when using a headwall edge beam. A fanned reinforcing layout will also be permitted provided the minimum clearance between all reinforcing is 3".
7) Mechanical rebar couplers may be used.
8) Substructure units shall be designed so that the largest reinforcement steel bar utilized will be No. 11 bars.

E. Pipe Culverts

1) All new pipe culverts shall be constructed with the use of gasketed concrete

pipe.

2) Existing culverts requiring replacement shall utilize gasketed concrete pipe regardless of the material used for the existing pipe.

3) Existing pipes requiring extension shall be extended with the use of a material that matches the original construction.

4) The use of corrugated steel or metal pipes, including structural plate pipe, is strictly prohibited.

3.11.04.04 Foundations and Construction

The Design-Build Team shall prepare a Foundation Plan and Report for each new or replacement structure, including pipe culverts, in conformance with the Administration's Policy and Procedure Memorandum D-79-17(4) and the following requirements.

3.11.04.04.01 Foundation Boring Requirements.

Foundation borings for each structure were obtained for the preliminary engineering of this project and are included on Projectwise. The Administration guarantees the accuracy of the borings provided but not the sufficiency of the data for the foundation design. Samples from the borings are available for review by contacting the Field Explorations Division Chief, 7450 Traffic Drive, Hanover, MD 21076, 1-866-926-8501. The Administration has evaluated the borings and recommendations and/or restrictions have been established for each structure as indicated in the Special Provisions.

The Design-Build Team shall determine the sufficiency of the borings provided for the final foundation design and obtain their own geotechnical data to supplement the data provided by the Administration. The Design-Build Team shall obtain supplemental borings in accordance with the Administration's Standards for Subsurface Exploration if the foundation borings provided by the Administration are more than 10 ft outside the proposed footprint of the structure foundation. Supplemental borings shall also be obtained by the Design-Build Team, if proposed pile tip elevations are below the foundation boring depths provided by the Administration. Any supplemental borings shall extend at least 10 ft below the proposed pile tip elevations. The location of supplemental borings shall be selected

by the Design-Build Team in conformance with the Administration's Policy and Procedure Memorandum D-79-17(4). For bridges, at least two borings are required for each substructure unit. Both of the borings shall be within the above space limitations (i.e. if one boring is more than 10' outside the foundation footprint and one is within the footprint, at least one supplemental boring would be required). The Design-Build Team's geotechnical engineer may request in writing that the Administration reduce the number of required borings to one boring per substructure element provided the soil conditions at a particular structure appear to be consistent. Supplemental foundation borings, rock cores, laboratory testing, etc. shall be in conformance with appropriate Administration, AASHTO and ASTM policies and specifications.

3.11.04.04.02 Foundation Design Requirements.

Structures foundations shall be designed in accordance with AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications and as required below.

A. Spread Footings.

The bottom of a spread footing, including leveling pads for a proprietary retaining wall, shall be placed so that the top of the footing is a minimum of 1 ft below the proposed ground line and the bottom of the footing is a minimum of 3 ft below the proposed ground line. If the footing is to be placed on rock as determined by the Engineer, it shall be keyed into the sound rock at least 1 ft. The Plans developed by the Design-Build Team shall specify the maximum allowable bearing pressure for each substructure element and its footing.

Setting spread footings or leveling pads for proprietary retaining walls in embankment or fill material is prohibited. Any spread footing, including leveling pads for a proprietary retaining wall, shall be set into existing in-situ soil or sound rock.

The allowable bearing capacity for spread footings shall be established by the Design-Builder based on additional site investigation, AASHTO Specifications and FHWA Geotechnical Engineering Circular No. 5 – Evaluation of Soil and Rock Properties. The proposed bearing capacity will be reviewed by the

Administration as part of the foundation evaluation.

The Design-Builder shall have the exposed subgrade of any spread foundation inspected during construction by their geotechnical engineer with a written recommendation of their findings forwarded to the Office of Structures.

B. Driven Piles.

Steel H-piles, steel pipe piles, or steel mini/pin piles are acceptable pile types for use on this project. In the case of box culvert extensions, and new culverts, where driven pile foundations are required, timber piles may be utilized. No other driven pile type, including concrete piles, will be considered. Pile tips shall be applied to driven piles where warranted. Piles shall extend below the elevation of the roadway that is being crossed.

Only one type of pile shall be used on each individual substructure unit. However, different substructure units of the same structure may have different foundation types.

Any driven pile that reaches refusal with less than 20 feet of pile length embedment in original competent in-situ soils will be unacceptable and shall be extracted and holes shall be augured a minimum of 10 feet into competent rock or 5 feet into sound rock. The piles shall be embedded into the augured hole and the void area around the piles shall be filled with Mix No. 4 concrete.

The proposed pile spacing for design shall conform to the following:

1. Spacing in the front row of a pile group shall not exceed 8 ft.
2. Spacing for all other rows shall not exceed twice the spacing of the front row and/or a maximum spacing of 10 feet.
3. The Design-Build Team shall use battered piles to resist all horizontal loads
4. Pile patterns shall be designed so that no piles are in tension or uplift.

As-built pile foundation data should be documented in the final As-Built plans in conformance with the Administration's Policy and Procedure Memorandum P-93-35(4).

C. Augered or Drilled Piles**.**

Augered or drilled piles, including steel mini/pin piles, reinforced cast in place drilled shafts (caissons), are acceptable for use on this project. No other augered or drilled pile type, including helical piles, will be considered. Any augered or drilled pile foundation that encounters rock shall have its final tip elevation a minimum of 10 ft into competent rock or 5 ft into sound rock. Steel mini/pin piles shall have a 5' deep grout bulb below the final tip elevation. The augered or drilled pile spacing shall conform to the same criteria as driven piles, excluding mini/pin piles. Pile patterns shall be designed so that no piles are in tension or uplift. Design strength shall be maintained for the full length of the pile.

3.11.04.04.03 Subsurface Condition Requirements.

The following chart represents the minimum subsurface requirements that must be present for the various structure and foundation types. This information does not supersede any other foundation design criteria.

Structure /Foundation Type	Spread Footing	Deep Foundation (Piles)
Subsurface Conditions	N > 30 for 10 feet of sampling*	**

N = Blow counts representing penetration resistance as defined in AASHTO T-206

* - In accordance with SHA's Standard Specifications for Subsurface Exploration

****In consideration of the soils that were discovered as a part of the preliminary boring program conducted by SHA, it appears there are poor and irregular soils present that overly a rock substrata. Potential Design/Build teams should be aware of these conditions and the fact that, removal and replacement of unsuitable material, preconsolidation measures, or ground improvements may be required to provide adequate bearing strength for the placement of the proposed pipe and box culvert structures. If piles are used, the Design-Builder will be required to verify the capacity of all test piles through re-striking and dynamic monitoring, except for timber test piles which shall have their capacity verified by re-striking.**

In the case of retaining walls, the wall footings shall only be placed on original

undisturbed material/rock with adequate bearing capacity or a pile foundation.

3.11.04.04.04 Rock Definition.

The definition of competent rock shall be material with a minimum Rock Quality Designation (RQD) of 80% and a minimum Rock Core Recovery (REC) of 80%. The Engineer shall determine, by observations of the exposed in-situ materials and the operation of the excavation equipment, if the competent rock has been encountered for spread footings and the bottom of caisson holes. For mini/pin piles, competent rock will be determined by the Engineer based on observations of the operation of the drilling equipment and the cuttings retrieved.

3.11.04.05 Aesthetic Criteria

No aesthetic treatment is required for the culverts and walls located within the limits of this project.

3.11.05 Structure Specific Design and Construction Requirements

3.11.05.02 New Box Culverts, Pipe Culverts, and Pipe Culvert Extensions

3.11.05.02.01 Description

S1 – Replacement of an existing single steel pipe culvert with a new single cell 9’-0” high x 10’-0” wide concrete box culvert located at station 125+40.

S2 - Extension of an existing single 48” RCP at station 144+00.

S3 - Replacement of an existing single steel pipe culvert with a new single cell 8’-0” high x 9’-0” wide concrete box culvert located at station 150+75.

S4 - Replacement of an existing 36” RCP with a new single cell 4’-0” high x 10’-0” wide concrete box culvert at station 156+50.

All pipe culverts shall be constructed to a distance sufficient enough to allow for the placement of the roadside grading and w-beam traffic barriers. All proposed headwalls/wing walls taller than 5’-0” shall have Type III Chain Link Fence placed on top of them.

3.11.05.02.03 Foundations

A. All culverts and retaining walls shall be founded on spread footings or pile foundations as determined by the foundation boring program and associated foundation design.

B. Refer to 3.11.04.04 for specific foundation requirements.

C. Anticipated scour depth and scour protection information shall be developed by the Design-Builder and incorporated into the foundation design, when applicable.

D. Structures shall be designed and detailed for all forces that result from maximum calculated vertical, horizontal and rotational movement of foundation elements. The limiting values in AASHTO 4.4.7.2.5 shall not be exceeded.

3.11.05.02.04 Hydraulics

Box culverts and pipe culverts shall be constructed in stages so at least one cell is available for stream flow at all times. The Design-Builder operations shall not result in flooding beyond the limits of right-of-way or 2 year flood plain.

3.11.05.02.05 Support of Excavation

Temporary support of excavation may be required in order to maintain the roadway embankment during the construction of the new pipe culverts, pipe culvert extensions, box culverts, and retaining walls.

3.11.05.03 RETAINING WALLS

At this time the need for retaining walls is not anticipated within the limits of this project. If the Design-Build Team's proposed design solution requires retaining walls, the following requirements shall also apply.

3.11.05.03.01 Geometric Design Criteria for Retaining Walls.

The Design-Build Team shall layout retaining walls in accordance with the following geometric design criteria:

A. Retaining walls on curved horizontal alignments may be constructed on chords, unless otherwise stated, provided the angle of deflection between

segments does not exceed 5 degrees.

B. The horizontal offset of the wall from the baseline shall not change abruptly. All changes in offset shall be accomplished using curves or chorded construction as described above.

C. The top of retaining walls shall not be stepped or contain sharp breaks in slope to accomplish a change in elevation. The top shall be level or shall vary using a smooth linear or curved transition.

D. The completed retaining wall, and all associated structural elements, shall be located entirely within the Administration's Right-of-Way. Construction easements shall only be used to facilitate construction efforts.

E. The ground line behind the retaining wall shall be placed a minimum of 9" below the top of the wall, unless a barrier is required on top of the wall.

3.11.05.03.02 Structural Details for Retaining Walls.

Standard Details, as developed in the Administration's Structural Standards Manual shall be utilized whenever possible. Any proposed deviation from the established standards shall be approved of in writing by the Office of Structures. The following structural details shall be used where appropriate:

A. For retaining walls supporting roadways and adjacent to the shoulder, an F-Shape Barrier shall be placed on top of the proposed retaining wall. The height of the proposed barrier shall be 42" in accordance with the roadway design requirements.

B. For retaining walls adjacent to and supporting sidewalks, a 2'-8" vertical face barrier with a one strand rail resulting in a combined barrier height of 3'-6" shall be utilized. For retaining walls adjacent to and supporting hiker/biker facilities, a 2'-8" vertical face barrier with a two strand rail resulting in a combined barrier height of 4'-6" shall be utilized. All railing elements shall meet the horizontal clear spacing requirements outlined in section 13.8 of AASHTO. These spacing requirements may not be exceeded.

C. For barriers placed on top of MSE walls, a moment slab shall be utilized to resist the horizontal loads applied to the barrier. The moment slab and barrier shall be cast-in-place.

D. For retaining walls supporting private property or other facilities that are accessible to pedestrians, type III fencing 3'-0" in height shall be provided on top of the wall. If an ornamental fence is required per the structures aesthetic specifications, the fencing details shall be developed in accordance with those requirements.

E. All retaining walls shall contain the appropriate details for drainage. The drainage system for cast-in-place cantilever walls shall be in accordance with Standard No. RW-301.

3.11.05.03.03 Design Alternates for Retaining Walls.

The design for permanent retaining walls shall follow one of the following alternates, unless otherwise stated in the Special Provisions. Only one alternate shall be used per wall location Retaining Wall Plans shall be developed in accordance with the Administration's Policy and Procedure Memorandum P-94-38(4).

A. Cast-in-Place Cantilever Retaining Walls.

The Design-Build Team shall design and detail proposed concrete cantilever retaining walls in accordance with Structural Standards No. RW-101 through RW-403.

B. Proprietary Retaining Walls.

The Design-Build Team shall design and detail proposed proprietary retaining walls in accordance with the manufacturer's approved details. The list of proprietary retaining wall systems that have been approved by the Administration are located on the Administration's website www.marylandroads.com under the section Business with SHA.

1) Mechanically Stabilized Earth (MSE) retaining walls that are to be placed adjacent to streams, floodplains, SWM ponds, or other water features shall be placed so that no stream flows up to the 100 yr flood elevation or standing water comes in contact with the face of the wall. A solid concrete barrier may be designed to protect the base of the wall and shall

contain the appropriate scour countermeasures.

2) The leveling pads for proprietary retaining walls shall be cast-in-place concrete. They are considered spread footings and shall follow the design requirements for spread footings.

3) The reinforced zone backfill for Mechanically Stabilized Earth (MSE) walls shall be comprised of No. 57 stone. A phi angle of 34 degrees shall be used for No. 57 stone in the design calculations.

C. Top-Down Retaining Walls.

The Design-Build Team shall design and detail proposed top-down retaining walls in accordance with AASHTO and the following:

1) All loads shall be resisted by the soldier piles, lagging, or other elements in direct contact with the retained soil.

2) Only concrete lagging shall be used for permanent retaining walls. <u>The use of any type of timber lagging will be strictly permitted.</u>

3) A concrete facing shall be provided that will not be considered structural in nature. The aesthetic finish for the concrete facing shall be as outlined in the contract documents.

4) Portions of permanent steel elements, which are exposed after excavation, shall be coated in accordance with Section 465.

3.11.06 Structure Plan Development

The Design-Build Team shall prepare structure plans as part of the Contract using the latest SHA MicroStation CADD Standards and Plan Development Checklists. Specific details are shown on the conceptual plans provided on Projectwise. Each structure plan sheet shall be prepared on the Office of Structure's standard border and title block sheet.

Plan Development Checklists included in the contract documents are developed for various types of structures (Concrete Girder Bridges, Retaining Walls, etc.) and indicate the minimum amount of information that is required on the Structure Contract Plans. If a

checklist is not provided for the type of structure that is proposed by the Design-Build Team, the existing checklists shall be used as a general guide to provide similar information.

The development of views on all Structure Contract Drawings shall be in conformance with the Administration's Office of Structure's Policy and Procedure Memorandum P-75-7(4).

3.11.07 Submittals for Structures

All plan submittals shall include the pertinent structural details and also the following plan information in areas adjacent to the pertinent structure:

1. **Structure Key Plan**
2. **Roadway Plans**
3. **Roadway Profile Plans**
4. **Maintenance of Traffic Plans**
5. **Erosion and Sediment Control Plans**
6. **Stream Diversion Plans (if required)**

Note: All Structures submittals for Type, Size, and Location, Foundation Report, Structure Details, and Final Plans for all pipe culverts, box culverts, and retaining walls required for this project shall be submitted concurrently to the Independent Design Quality Assurance (IDQA) Firm and the Administration. The Administration will provide formal comments on each submittal within 14 calendar days, beginning the day after receipt of the submittal.

3.11.07.01 Type, Size, and Location Submission.

The first submission required for each structure in this Contract shall be the Type, Size and Location (TS&L) Plans. The materials developed for this submission shall represent approximately 30 percent complete construction documents. It is recommended that the roadway alignment and profile and any other pertinent information be finalized and accepted prior to this submission.

3.11.07.02 Foundation Report.

The Foundation Report and Plan submission shall be made in conformance with the Maryland Department of Transportation Policy and Procedure Memorandum

D-79-17(4), the Structure Descriptions, and other requirements specified in the Special Provision. The submission of the foundation report can be made concurrently with the TS&L submission.

3.11.07.03 Structural Detail Submissions.

Following acceptance of the TS&L Plans and Foundation Report, the Design-Build Team shall submit detailed plans for various structural elements. Structural details for an individual structure may be submitted as a number of sub-plan set packages or as a complete set. The Design-Build Team shall have adequately developed the load contributing elements prior to finalizing the design of any structural details that are impacted by these loads. If load conditions change during the design, previously submitted elements shall be resubmitted for acceptance.

3.11.07.04 Revisions to Structure Plans.

Any modifications or revisions to the structural drawings after acceptance has been received shall be submitted in writing to the Administration and accepted prior to proceeding with any change to the approved structural drawings. If the request for modifications or revisions is accepted, all changes must be documented as Red Line Revisions in accordance with Maryland Department of Transportation Policy and Procedures Memorandum P-75-6(4). The Design-Builder is responsible for preparation of all Red Line Revisions

3.11.07.05 Working Drawing Review Process.

All shop drawings relating to the structures shall be reviewed in accordance with *SHA OOS PPM No. OP-82-34 (G), Checking of Working Drawings, Form Plans and/or Erection Plans*. The primary review shall be undertaken by the Lead Design Firm with a secondary review undertaken by the Independent Design Quality Management (IDQM) Firm. Once reviewed and accepted by the Lead Design Firm and IDQM Firm, they shall be stamped as accepted by each firm and submitted to the SHA. A final review will be undertaken by SHA. Comments or approval will be provided in no more than 7 calendar days, beginning the day after receipt of the submittal. Once reviewed and approved by SHA, the structural shop drawings shall be stamped as approved with the stamped plans being designated as the documented approval. No

construction activities are permitted in conjunction with any structural shop drawings that have not been approved by SHA.

3.11.07.05.01.1 Final Plans and Computations.

The Design-Build Team shall submit a complete set of structure plans once all structural details have been accepted. A full set of plans (details, standards etc.) shall be developed for each of the structures. A structure key plan sheet shall be developed to show the location of multiple structures. The complete set shall consist of one (1) full size paper print sets, one (1) half size paper print sets, and one set of .tif files provided on CD. The General Plan & Elevation sheet for each of the structures shall be sealed by the Design-Build Team structural key staff member thus denoting it as the final construction documents.

Field changes/variances from the details and dimensions shown on the plans shall be superimposed on the original project plans in green. Old details, dimensions and notes shall not be erased, but X'd out in green. The date that the revision was made shall be indicated in the title block of each revised plan sheet. The As-Built Plans shall reflect any field revision made during construction. The Design-Build Team shall submit reproducible As-Built plans at the completion of the project that are signed and sealed by their Engineer.

The Design-Build Team shall submit a complete set of structure computations once all structural details have been accepted for each structure including all designed elements. All computations shall be on 8 ½" x 11" paper with the initials of the designer and checker indicated on each page. The computations shall be submitted in a three ring binder and subdivided into relevant design sections. A coversheet shall be included in each binder and shall be signed and sealed by the Design-Build Team structural key staff member, who is a Professional Engineer registered in the State of Maryland with experience in bridge design, responsible for performing or oversight of the pertinent design work. A copy of the design calculations shall also be provided in .pdf format.

The Design-Build Team shall submit completed Structural Inventory and Appraisal (SIA) and PONTIS information forms for each structure for use by

SHA in entering the structure data into their structural inventory system. The Design-Build Team shall submit Final Load Rating Computations in accordance with Policy and Procedure Manual D-97-47(4). SHA's Standard Load Rating Summary Sheet and all electronic software files are required as part of the submittal.

TC 3.12 TRAFFIC PERFORMANCE SPECIFICATION

3.12.01 General

The Design-Builder shall be responsible for the design and construction of the Project traffic control devices (TCD), including signing and sign structures (overhead and cantilever); pavement markings; roadway and sign lighting; traffic signals; signal systemization; and ITS devices, and coordination of TCD design and construction with all other disciplines involved with the project. The Design-Builder shall be responsible for completion of traffic analysis and submission of Design Requests where the Design-Builder proposes modifications to the Project's general geometric layout and traffic operations/control.

For any traffic control device or methodology not adhering to the Administration's guidelines, the Design-Builder shall submit the proposed device or methodology to the Administration for review and approval prior to construction or implementation. Submissions shall include engineering support and documentation as appropriate.

3.12.02 Standards and References

Traffic analysis and TCD design and construction shall be in accordance with this Traffic Performance Specification and the relevant requirements of the Guidelines and References in TC 3.08.

3.12.03 Coordination with Other Contracts

The Design-Builder shall coordinate the design and construction of all TCD for the Project with those required for other SHA, County, and local jurisdiction Projects.

3.12.04 Traffic Operational Analysis

3.12.04.01 Operational Assessment of Design Alternative(s)

If a change is proposed to the general geometric layout and/or traffic control included in the RFP, the Design-Builder shall submit the proposed changes to the Administration for review and approval. The submission should include analysis of the proposed configuration using the Project Design Year Build Volumes and analysis techniques in this specification. All modifications to the general geometric layout and traffic control concept shall provide traffic operations equal to or exceeding the conceptual design completed by the Administration. Where interpretation of the traffic analyses is required (i.e. if a change results in some improvements and some decreases in operations) it will be the Administration's determination whether the change is acceptable.

3.12.04.02 Preparation and Submittal of Design Request Form

If the Design-Builder proposes modifications to the general geometric layout and traffic control concept that would necessitate a change in the operation of traffic control devices,

as outlined in the Administration's Design Request Form Instructions and Guidelines, the Design-Builder shall prepare the Administration's Office of Traffic and Safety's Traffic Control Device Request Design Request Form in accordance with the Design Request Form Instructions and Guidelines. All Design Request Forms will be submitted to the Administration (with accompanying traffic operational analysis/documentation and signal warrant analysis) for consultation, written comment, and approval prior to the Design-Builder proceeding with the design, installation, or modification to any traffic control device. The Design-Builder shall not proceed with design, installation, or modification of any traffic control devices until the submitted Design Request Form has been approved by the Administration.

3.12.04.03 Approved Analysis Techniques and Software

3.12.04.03.01 Highway Capacity Manual and Software – Latest Version

All freeway mainlines, ramp junctions (merge and diverge locations), and weaving sections shall be analyzed using the Highway Capacity Manual and Software (latest version). The Design-Builder shall provide a summary of results on a line diagram of the proposed roadway configurations, including both the level of service and the volume-to-capacity (V/C) ratio as appropriate. The Design-Builder shall also provide all calculation files on a CD to support the summary of results.

3.12.04.03.02 Synchro, SimTraffic & CLV Analysis – Latest Version

For corridors with multiple intersections, or for individual signalized intersections, the Design-Builder shall use Synchro, SimTraffic and Critical Lane Volume (CLV) analysis to evaluate corridor and individual intersection operations. The Design-Builder's timing plans shall consider corridor-wide cycle lengths and appropriate offsets. The Design-Builder shall provide all calculation files on a CD to support the summary of results.

3.12.04.03.03 CORSIM/VISSIM – Latest Version

For freeway and arterial operations, the Design-Builder shall use CORSIM or VISSIM to analyze operations. This shall be in addition to the Highway Capacity Manual and Software and Synchro/SimTraffic requirements. CORSIM/VISSIM results will be considered by the Administration in conjunction with Highway Capacity Manual and Software and Synchro/SimTraffic analysis when assessing design alternatives proposed by the Design-Builder.

3.12.04.03.04 SIDRA – Latest Version

For all roundabouts proposed by the Design-Builder, operational analyses shall be completed with SIDRA, with the Environmental Factor set to 1.2. Roundabouts

shall also be coded and analyzed in VISSIM in order to capture and visualize the effects on the overall road network. The volumes should also be checked against the capacity thresholds outlined in FHWA NCHRP 672, Roundabouts: An Informational Guide, 2nd Edition, 2010. The results shall demonstrate that the roundabout operation will be no worse than the corresponding intersection operations proposed on the conceptual plans. An analysis that results in a degree of saturation of 0.85 or more on any movement shall be considered a Level of Service F condition.

3.12.04.03.05 Queuing Analysis

To determine the appropriate length of left and right turn bays, the Design-Builder shall calculate the queue length for both the through lane/s and the turn lane/s for the proposed design and each MOT phase of operation using the Administration's Queuing Analysis methodology.

The Design-Builder shall demonstrate that ramp queues will not extend from the ramp terminus to the mainline or that side road queues will not extend to adjacent intersections. The Design-Builder shall provide calculations demonstrating that the sight distance will be adequate for vehicles exiting and entering the mainline at highway speeds to see the back of the queue and decelerate to a stop condition. The queuing analysis shall be supplemented with simulation analysis for all cases.

3.12.04.03.06 Signal Warrant Analysis

If the Design-Builder proposes modifications to the general geometric layout included in the conceptual plans, the Design-Builder shall be responsible for performing an evaluation to determine if signalization is appropriate, based on the MD MUTCD. Study findings shall be submitted to the Administration for review and approval in a report which outlines the warrants evaluated, with consideration given to safety, operations, delay, and available gaps in traffic resulting from adjacent signalized intersection(s). Recommendations shall also be included in the report and the report shall be attached to the Administration's Office of Traffic and Safety's Traffic Control Device Request Design Request Form.

3.12.05 Signing

3.12.05.01 Signing Functional Operation Requirements

Permanent guide signing for this Project shall conform to requirements of the RFP including TC 3.08. Proposed signing on existing roadways shall not simply seek to replace existing signs impacted by construction, but should also seek to remedy any existing deficiencies. It is the intent of this Project to provide fully-compliant signing within the Project Limits that meets all applicable standards. Overhead and/or cantilever sign structures are required based on the conceptual design of this project.

3.12.05.02 Design and Construction Requirements

3.12.05.02.01 Signing Plan Sheets

The Design-Builder shall prepare a signing post-it note roll plan to be submitted to the Administration for review and comment prior to preparing the signing plan cut sheets. The post-it note plan shall show the proposed message, MD MUTCD or MUTCD sign designation (if applicable), and location of all guide, supplemental, route marker assemblies, regulatory, and warning signing. These plans shall also show the location, and messages of all existing signs to be removed and relocated. The plans shall also include the location and type of delineation devices (including pavement markings).

The Design-Builder shall prepare signing plans at a scale of 1"=50' or equal to the roadway plans. Plans shall show the proposed message, MD MUTCD or MUTCD sign designation (if applicable), size, and location of all guide, supplemental, route marker assemblies, regulatory, and warning signing. These plans shall also show the location, messages, and sizes of all existing signs to be removed. The plans shall also include the location and type of delineation devices (including pavement markings). The owner of each sign/structure shall be clearly noted on the plan sheets.

All proposed guide, supplemental, and non-standard signs shall be detailed on an SN-3 (Sign Fabrication) detail sheet. The plan set shall include SHA's latest SN-1 sheet (General Notes and Proposals). The Design-Builder shall be responsible for contacting SHA to obtain the latest SN-1 sheet. The SN-4 (Ground Mount Sign Support Details) sheet shall be used for all ground mounted guide or supplemental sign supports. All ground mounted sign supports (steel and wood) shall be detailed on this sheet. The tables on this sheet shall include the Sign Number, Plan Sheet number where the sign is located, the sign size, the post size to be used, if the supports are breakaway or non-breakaway, the support lengths, the lateral clearance code and offset, and the support spacing from left edge of sign. As necessary, the SN-8 (Overhead Structures) and the SN-9 (Cantilever Structures) sheets shall also be included in the plan set. The SN-11 (Signing and Marking Quantities) sheet shall be included which summarizes in table format the quantities and materials being used for this Project. Every sign location shall have a separate line.

3.12.05.02.02 Sign Location Design and Construction Requirements

The Design-Builder shall install all overhead and ground mounted signs within 25-feet of the location shown on the signing plan. An 800 foot spacing shall be maintained between overhead signs and traffic signals. For signing along MD 32, all guide signs, supplemental guide signs, and any overhead or cantilever

structures shall be installed such that 800 foot spacing is maintained, unless approved by the Administration. It is the Administration's intent to have the signs spaced at 800 foot intervals so that future signing can be accommodated and the 800 foot spacing is maintained.

Overhead and cantilever sign structures installed upstream of bridges crossing over the traveled roadway shall be constructed with at least 300 feet between the sign structure and the bridge, unless precluded by the MD MUTCD or Administration standards. Overhead and cantilever sign structures installed downstream of bridges crossing over the traveled roadway shall be constructed at least 800 feet from the bridge. All overhead and cantilever sign structures installed under this Project shall be located at a minimum of 50 feet from any roadway lighting.

To the extent possible, the Design-Builder shall provide minimum 200 foot spacing between ground-mounted signs. The Design-Builder shall coordinate the proposed sign locations with all proposed landscaping, utility, hydraulic, lighting, and all other roadside features to assure proper clearances, lighting levels, and adequate sight distance.

The Design-Builder shall also provide for the replacement or removal of any signing outside the limits of the Project that is no longer appropriate or pertinent as a result of changes associated with this Project. The signing shall be removed or replaced regardless of whether it falls within or outside the limits of construction along the mainline and cross-street approach roadways.

3.12.05.02.03 Sign Design and Construction Requirements

The Design-Builder shall design, fabricate, and install all guide, supplemental, route marker assemblies, regulatory, warning, and transit-related signing required for this Project, including signing on approaches outside the Project limits. Existing signing shall not be reused or relocated. The Design-Builder shall identify and install sign structure identification numbers for all overhead and cantilever sign structures. Structure numbers will be provided by the Administration.

The messages, fonts, font size, arrows shield, colors, borders, and type of support for the overhead and ground mounted signs shall be designed and constructed according to the MD MUTCD. The FHWA Standard Highway Alphabet shall be used for all sign legends. Legends for guide signs and non-standard sign shall be submitted to the Administration for review and approval.

All advisory, regulatory, and warning signs and route marker assemblies installed along MD 32 shall be expressway size. All advisory, regulatory, and warning signs and route marker assemblies installed along all other roadways shall be

standard size.

All proprietary logos (e.g. Police, etc.) will be provided and installed by the Administration onto signs and/or supports furnished and installed by the Design-Builder. The Design-Builder shall submit a letter to the Administration requesting the logos and the required size.

All signs greater than 4' x 8' shall be manufactured using extruded aluminum sign material. All new signs for this Project shall be constructed with non-reflective (black copy and background) or retroreflective (all other colors) sheeting background and copy.

Please note that on January 25th 2016, the Federal Highway Administration (FHWA) issued a notice in the federal register officially terminating Interim Approval IA-5 for Clearview font which was issued in 2004; all new signs shall use the FHWA approve Highway Gothic alphabet.

The Design-Builder may reuse or relocate existing signs within the Project limits, provided that the sign meets all applicable standards (including placement, application, size, color, reflectivity, condition, etc.). Existing signs that have been damaged in any way shall be removed and replaced, as necessary. The Design-Builder shall be prepared to submit photographs of any signs to remain or be relocated within the Project Limits at the request of the Administration to verify that the sign is suitable for reuse.

3.12.05.02.04 Sign Support Design and Construction Requirements

For each overhead or cantilever structure location, the Design-Builder shall draw the sign panel(s) and the sign structure on the corresponding completed cross-section. The proper vertical and horizontal clearances, sign sizes and sign structure offsets, number of lanes, and lane widths shall be labeled on the cross-sections. The Design-Builder shall check the cross-sections and profiles at all overhead sign locations and make adjustments as necessary to provide adequate sight distances and ground clearances to the bottom of the luminaire supports.

Any alternate to SHA standard sign structure design shall be submitted to the Administration for review and approval. The CSR for any structural support members shall be limited to 0.90. Alternate sign structure designs for Overhead structures shall be designed for a maximum sign area equal to the overall roadway width multiplied by the height of the tallest sign panel including exit panel(s); Cantilever sign structures shall be designed for a maximum sign area equal to the sign width multiplied by the sign height multiplied by a factor of 1.25. The wind speed to be used in design shall be 100 mph. The structure design life shall be a 10 year recurrence interval for ground mounted signs using breakaway steel

supports. For signs using breakaway steel supports, the Design-Builder shall utilize the design assistance software provided by the manufacturer of the breakaway system and follow the ground mounted steel post breakaway system selection process provided by the Administration. All posts except for W6X9 wide flange steel I-beams shall have at least 7 foot clear distance between adjacent posts. All wide flange steel I-beam sign supports shall utilize ASTM A709 Grade 36 steel. All square steel posts shall utilize ASTM A500 Grade B structural tubing.

Sheet aluminum signs on State-maintained roadways shall be mounted on wood supports. Sheet aluminum signs on all other roadways may be mounted on either wood supports or square tubular steel posts. Signs over 32 square feet shall be installed on steel posts. Additionally, if the signs are installed at a location where steel posts are required, then extruded aluminum sign material shall be used. All exit gore signs shall be placed on steel supports.

No signs or sign structures will be allowed on bridge overpass structures. No signs shall be banded to utility poles, street lighting poles, and overhead or cantilever sign structure uprights without Administration approval.

Traffic barriers shall be provided for protecting all non-breakaway supports within the clear zone and for new structures within as well as outside the limits of work. Signs shall be placed outside the clear zone wherever possible.

The Design-Builder will be responsible for locating and marking all underground and overhead utilities prior to any signing work beginning.

3.12.05.02.05 Sign Layout and Overhead Sign Requirements

Signing layout and sequencing shall be per the most recent Maryland MUTCD. The MD SHA adheres to all “shall” and “should” conditions in the MD MUTCD. Only “may” conditions are subject to discussion for non-adherence. MD 32 shall be treated as an expressway for signing design. Permanent guide signing for this Project shall have the following functional requirements:

- Exit directional guide signing along MD 32 shall all be overhead;
- Signing at the Interchange of MD 32 and Linden Church Road shall be based on the Intermediate Interchange Classification;
- Advance guide signing and exit direction guide signing on MD 32 approaching Linden Church Road shall be at ½ and 1 mile;
- Signing at the interchange of MD 32 and MD 108 shall be based on the Intermediate Interchange Classification;
- Advance and exit direction guide signing on MD 32 approaching MD 108 is to include ½ and 1 mile;

- Exit direction guide signs and exit gore signs shall be provided along both MD 32 approaches to MD 108 and Linden Church Road;
- The lane reduction along MD 32 northbound through the Linden Church Road interchange shall be signed and marked using the "Alternate Right of Way" and "Form Single Lane Ahead" scheme using the MD MUTCD and SHA "Form Single Lane Application Guidelines November 2016."

3.12.06 Pavement Markings

3.12.06.01 Design and Construction Requirements

3.12.06.01.01 Plan Sheets

The final design marking plans shall be indicated on the signing plan with the same scale as the signing plan. The plans are to show color, size, location, and material type for markings within the limits of work. The lanes shall be dimensioned based on the typical sections for the Project. Dimensions shall be included for each change in the roadway typical. Dimensions shall be included for placement of arrows, "ONLY" or other text messages, bicycle markings, stop lines, and length of longitudinal left turn lane lines. The plan shall also clearly define locations where pavement markings change color, width, or material. Existing pavement markings that are to remain shall be shown on the plans and locations where proposed pavement markings tie-in to existing pavement markings shall be denoted on the plans.

3.12.06.01.02 Pavement Marking Design and Construction Requirements

The Design-Build Team shall be responsible for the design and construction of all pavement markings. For all final pavement marking lane lines, including parallel, acceleration/deceleration lanes for ramps, intersection auxiliary lanes, and Snowplowable Raised Pavement Markers (SRPM), the Pavement Marking Materials shall adhere to the guidelines and references in TC 3.08, including the Pavement Marking Material Selection Policy and Guidelines Updated 1-29-2016, or current version if a newer document has been issued.

Durable Markings include thermoplastics, patterned preformed thermoplastics (wet tape), or epoxy. All durable markings shall demonstrate wet retro reflective properties when tested in accordance with ASTM #E 2177-01 (Test Method for Measuring the Coefficient of Retroreflected Luminance (RL) of Pavement

Markings in a Standard Condition of Wetness).

Whenever paint is listed as an application, the 50/50 blend of large and standard glass beads is required.

For pavement markings along ramps, the Design-Builder shall utilize the highest category markings of the intersecting roadways, with 1 being assigned the highest category marking and 3 assigned the lowest.

All transverse pavement markings (i.e. yield symbols (shark's teeth), crosswalks, stop lines), as well as all arrows, symbols, and letters shall be heat applied permanent preformed thermoplastic.

Crosswalks shall be provided at all signalized intersections as specified in in an approved DR.

All permanent pavement markings installed on the Project shall be listed on the Administration's List of Qualified Permanent Pavement Markings, unless submitted and approved through the Administration's Maryland Product Evaluation List (MPEL) program.

3.12.07 Traffic Signals

3.12.07.01 Traffic Signal Functional Operation Requirements

Temporary and permanent traffic signals shall be designed as per the requirements outlined in the Design Request Forms. Permanent traffic signals for this Project shall conform to requirements of the RFP including TC 3.08 and have the following functional requirements:

- There shall be no traffic signals along MD 32

3.12.07.02 Design and Construction Requirements

3.12.07.02.01 Traffic Signal and Interconnect Plan Sheets

The Design-Builder shall prepare traffic signal and interconnect plans to address any new traffic signals, temporary traffic signals, or modifications to existing traffic signals that are required.

3.12.07.02.02 Traffic Signal Design and Construction Requirements

Design and construction of all permanent traffic signal shall use mast arm signal poles. The use of diagonal single mast arms is not permitted. Any proposed alternatives to mast arm requirements shall be submitted by the Design-Builder to

the Administration for review and approval. Design and construction of temporary traffic signals may use strain poles or wood poles (if the estimated duration of signal operation is less than one year) with span wires.

LED lighting shall be provided on signal poles in accordance with SHA's current Lighting Guidelines, and shall be coordinated with adjacent existing and/or proposed roadway and/or sign lighting. Electrical cables for intersection lighting shall not pass through the signal cabinet.

The Design-Builder shall prepare and submit APS worksheets to the Administration for review and approval of APS messages.

All conduits crossing roadways shall be installed perpendicular to the roadway being crossed, unless there are constructability or utility conflicts, in which case the Administration must approve of the proposed conduit route. With the exception of conduit being used for non-invasive probes, all conduit crossing underneath a roadway shall be 4 inch Schedule 80 rigid PVC conduit. Conduit used for the installation of non-invasive probes shall be 3 inch Schedule 80 rigid PVC conduit. Three (3) inch Schedule 80 rigid PVC may be used between handholes and pedestal poles. Two (2) inch Schedule 80 rigid PVC conduit may only be used for power feeds.

Traffic signals shall be designed and constructed in accordance with the following:

A) Using base mounted (NEMA size S) Maryland State Econolite Traffic Signal Cabinets wired in accordance with Administration specifications for all permanent traffic signals. Pole mounted (NEMA size 5) cabinets may be permitted for use at temporary traffic signals only. All signal cabinets, controllers, and rack mounted modules will be supplied by the Administration. The Design-Builder shall be responsible for delivering the assembled cabinet from the Administration's Traffic Signal Shop to the site and installing. The Administration will provide final connection of all cables within the cabinet;
B) Using Light-Emitting Diode (LED) traffic signal heads and countdown pedestrian signal heads;
C) Using schedule 80 rigid PVC conduit for underground installations, and,
D) The addition of S cabinet uninterruptable power supply (UPS) battery backup

The Design-Builder shall ensure all traffic signal heads for existing, temporary, and permanent conditions can be seen by all approaching traffic at the required sight distance at all times during and after construction. The Design-Builder shall

prepare and submit to the Administration for review and comment sightline profiles for all overhead signs, bridges, and hazard identification beacons that are on traffic signal approaches, including calculations that the sight distance will be adequate for vehicles approaching signalized intersections to see the back of the queue and decelerate to a stop condition for all approaches to traffic signals under existing, temporary, and permanent conditions. If sight lines do not meet the MD MUTCD requirements, the Design-Builder shall provide a recommendation for meeting the requirements to the Administration for approval, such as red signal ahead warning signs or flashing beacon signs. UPS battery backup must be provided for interactive HIBs.

3.12.07.02.03 Interconnect Design and Construction Requirements

The Design–Builder shall obtain all existing interconnect information and all existing interconnected signals shall remain connected under the final design. All existing traffic signal interconnect shall be maintained throughout construction, which may require relocation or temporary interconnect. Along any run of existing interconnect there shall be no net increase in splice points. The Design-Builder shall utilize twelve-pair communication cable for all proposed interconnect. All impacted or damaged interconnect cables shall be replaced in-kind.

The Design-Builder shall be solely responsible for all work and costs associated with maintaining communication cable for all signals throughout construction. The Design-Builder shall be responsible for utility pole removals required when relocating existing interconnect. All interconnect shall be relocated prior to roadway construction in order to assure that interconnect can be maintained throughout construction. The Design-Builder shall be responsible for relocation of any existing interconnect or fiber optic cables impacted by construction. The Design-Builder shall coordinate with SHA/County to facilitate the relocation of existing interconnect and fiber optic cables and equipment. All proposed splices shall occur in signal or splice cabinets. If a section of interconnect run is not long enough to be relocated, the entire section of cable shall be replaced. The Design-Builder shall be responsible for obtaining all permits required for placing interconnect on utility poles and shall be responsible for all associated costs.

3.12.07.02.04 Utility Design and Construction Requirements

The Design-Builder shall be responsible for locating and marking all underground and overhead utilities prior to any signal installation work. The Design-Builder shall be responsible for all Work, materials, and costs associated with obtaining power (including coordination with the utility company). Electric costs for maintaining power throughout construction for all traffic signals and other electrical work required for this Project shall be the responsibility of the

Administration. The Design-Builder shall be responsible for completing all electrical service application materials necessary for obtaining and/or removing service from the appropriate power company. All materials shall be submitted to the power company through the Administration.

The Design-Builder shall use 200A Metered Service Pedestals at all traffic signal locations, unless otherwise noted by the Administration. The Design-Builder shall install conduit between the metered service pedestal and the nearest handhole (bypassing the signal cabinet) for intersection lighting. The Administration will be responsible for all on-going electric costs of proposed signal equipment after the signals have been accepted for Maintenance by the Administration. Metered Service Pedestals shall only be used to service traffic signal equipment and related intersection lighting, unless otherwise noted by the Administration. The current party responsible for any existing metered service that needs to be upgraded or replaced will continue to be responsible for all on-going electric costs after the Project is complete. For each location requested, it is the Design-Builder's responsibility to complete all paperwork, coordinate with the utility company, and schedule all utility connections so as to not adversely affect the project schedule.

The Design-Builder shall schedule meetings with the Administration to verify traffic control device work as follows:

A) At the completion of all cabling and wiring and prior to electrical utility service connection; and

B) Prior to traffic control device activation.

3.12.08 Lighting

3.12.08.01 Design and Construction Requirements

3.12.08.01.01 Lighting Plan Sheets

The Design-Builder shall complete a lighting analysis for all areas where new or modified lighting is proposed to be submitted to the Administration for review and comment prior to preparing the lighting plans. The submission shall include photometric calculations (illuminance and veiling luminance as appropriate) supporting the light locations and voltage drop calculations for all circuits.

The Design-Builder shall prepare and present lighting plans with a scale appropriate for the Project, generally 1"=50'. Plans shall include existing and proposed geometry, existing and proposed utilities, right-of-way, landscape features, applicable drainage features, ditch lines, applicable structural facilities, and other information required for coordination of utilities. Plans shall show location of new lighting, type and mounting height of poles, type and wattage of

luminaires, length of luminaire arms, removal and relocation of existing lighting, conduit, circuit routings, cable types and installation method, manholes/junction boxes, splice locations with appropriate connector kits, ground rod locations, signs to be lit, electrical service locations, and other details pertinent to the construction.

The lighting plans shall include standard Administration identifiers for light poles and manholes as well as standard designations for cable sizes. The plans shall include a panel schedule (including pole and base mounted lighting cabinets and metered service pedestals) showing the circuit breaker loads and equipment connected to each circuit breaker. The plan shall include a schedule of light poles, a sign lighting schedule, and a schedule of enclosures (manholes/vaults/junction boxes.) Voltage drop calculations shall be provided concurrently with the lighting plan sheets.

For each lighting submittal, the Design-Builder shall submit all available lighting sheets (updated and previously submitted) as one complete package. The submission shall include photometric calculations (illuminance and veiling luminance as appropriate) supporting the light locations and voltage drop calculations for all circuits.

The Design-Builder shall combine intersection lighting with the traffic signal plans whenever possible.

3.12.08.01.02 Lighting Design and Construction Requirements

For existing lighting, the maximum outage time for luminaires shall be 24 hours unless otherwise approved by the Administration. All proposed luminaires within the Project limits shall be working upon completion of the Project. All existing (to remain) luminaires within the Project limits that were working at the time of conducting the existing lighting inventory shall be working upon completion of the Project.

All roadway lighting installed under this Project shall be located a minimum of 50 feet from any overhead or cantilever structure.

All lighting cabinets shall be designed and constructed with at least 20 amps spare capacity for the Administration's future use.

All proposed lighting equipment shall be located such that it can be readily maintained by personnel of the maintaining agency. Where possible, the Design-Builder shall locate signal and lighting cabinets in the same quadrant of the intersection/interchange. Lighting placed on traffic signal equipment shall be serviced from a metered service pedestal. Each luminaire mounted on a signal structure shall be equipped with a photocell. Power supply for signal structure

mounted lighting and the traffic signal may be installed in the same conduit system.

The voltage drop for each branch circuit shall not exceed three percent for new circuits and five percent for existing circuits, assuming a cable temperature of 40 degrees Celsius. A minimum of two branch circuits shall be used for each continuous succession of lighting structures. All lighting circuits shall have balanced lighting loads. The voltage drop for each feeder circuit shall not exceed the maximum recommended by the National Electric Code (NEC).

Lighting circuits shall be direct-buried duct cable unless under roadway surfaces, in structures, or in locations where protection from surface loading is needed. Two conductor duct cables shall be used for all roadway lighting circuits. Four conductor duct cable is permitted for sign lighting circuits. Only the conductors that serve the lighting structures shall enter the foundation of the lighting structures. All other conductors shall remain un-spliced and bypass the foundation. The Design-Builder shall furnish and install single conductor cables in Schedule 80 rigid PVC conduit under all roadway surfaces. Single conductor cables shall be used any place cables are to be installed in conduit. For cable runs in bridges and/or parapets, cables sizes equal to or less than #6 AWG shall be used.

The Design-Builder shall provide electrical manholes (or vaults) and connector kits to splice the conductors. The Design-Builder shall provide no more than 30 connector kits in each manhole and no more than 50 connector kits in each electrical vault. No in-ground splices of electrical cables shall be permitted for any reason. The use of 'splitbolt' type connectors for splicing conductors shall not be permitted. The Design-Builder shall use waterproof electrical splice kits (sealed with silicone gel) or approved equal for splicing conductors in non-breakaway applications such as manholes and other similar underground locations.

No electrical handholes/handboxes/manholes shall be placed in drainage ditches. Electrical manholes shall be constructed of concrete. Manholes constructed of composite materials will not be permitted for use on the Project. The stone surrounding these structures shall not be considered a suitable outfall. Underdrain shall be connected to a suitable outlet such as a drainage pipe or structure. If a drainage structure is not available, the Design-Builder shall submit alternative designs to the Administration for review and approval. The Design-Builder shall abandon existing conductors between poles that are to be removed. Power supply for lighting (other than that mounted on signal structures) shall be installed in separate conduit (including cabinets, handboxes, handholes, and manholes/vaults) and on independently metered circuits for respective jurisdictional owners.

All underground lighting conduits shall be constructed of Schedule 80 rigid PVC

conduit. All exposed conduit shall be constructed of galvanized rigid steel. Conduit fill ratios shall not exceed 25% of conduit area.

All light poles that are not protected by traffic barrier and are in the clear zone as defined in the AASHTO Roadside Design Guide shall be installed on a breakaway transformer base complying with the Maryland Book of Standards. Light poles shall not be installed in front of traffic barrier.

The lighting system shall utilize cabinets, conduits, and handboxes/manholes/vaults/junction boxes separate from the traffic signal equipment.

The Design-Builder shall place luminaries approximately one foot over the pavement marking edge line. To avoid foundation conflicts, the luminaire location may be adjusted approximately 3 feet over the pavement marking edge line. Where such adjustments are made, the Design-Builder shall ensure that all other design requirements are being met.

Illuminance and veiling luminance calculations shall include uniformity ratios (average-to-min and max-to-min), point-by-point computations, and a summary of the minimum and average maintained lighting levels and the critical veiling luminance ratios. The Design-Builder shall apply a light loss factor of 0.64 when computing photometrics. For lamp types not listed in Section 950.12.02, the Design-Builder shall use the values provided by the manufacturer. The light loss factor and lamp lumens shall be provided with the illuminance and veiling luminance calculations.

The Design-Builder shall design, fabricate, and install all roadway lighting shown on the lighting plan within 5 feet of the location shown on the lighting plan.

3.12.08.01.03 Existing Lighting Design and Construction Requirements

All impacted existing roadway lighting shall be replaced by the Design-Builder unless otherwise directed by the Administration. Lighting shall incorporate the same luminaire and pole type as on the rest of the roadway in order to maintain consistency.

The Design-Builder shall design and construct the lighting system consistent with operational and engineering requirements of the utility company and owning/maintaining agencies. For locations where luminaires are attached to a utility pole, the Design-Builder (as a part of the utility relocation effort) shall contact the owner of the lighting to coordinate relocation of the light fixture. The Design-Builder is responsible for coordinating agreements between the owner and the utility company.

The Design-Builder shall remove existing light poles that are no longer required due to construction of the Project. The equipment shall be the property of the Design-Builder upon removal. The Design-Builder shall notify the owner of the lighting being removed at least two weeks in advance of scheduled equipment removal.

Any existing lighting structure that is impacted by construction of this Project shall be disconnected, reconnected, and made fully operational by the Design-Builder as part of this Project unless it is being removed. All abandoned cables shall be made safe.

The lighting limits for this project are along MD 32 and the MD 32 ramps, including the intersections of the off-ramps with the local roadway system, from the MD 108 bridge to the northern project limit. All existing lighting in this area shall be upgraded to LED. The Design-Builder shall complete a lighting analysis for all areas where new or modified lighting (upgrades LED) is proposed. These photometric analyses are to be submitted to the Administration for review and comment prior to preparing the lighting plans. The submission shall include photometric calculations (illuminance and veiling luminance as appropriate) supporting the light locations and voltage drop calculations for all circuits. Lighting plans will not be approved without approved photometric analysis. Any existing HPS lighting on SHA roadways within the project limits shall be upgraded to LED.

3.12.08.01.04 Intersection/ Interchange Lighting Design and Construction Requirements

All intersections/interchanges within the project limits shall have intersection/interchange lighting in accordance with the Administration's most recent Lighting Guidelines. All intersection/interchange lighting shall be prepared using the Administration's guidelines for partial intersection/entrance lighting. See ANSI - IESNA RP-8-00, Annex D for the design and photometric (and calculation zone) requirements of intersection lighting.

3.12.08.01.05 Sign Lighting Design and Construction Requirements

Lighting for new sign structures shall consist of individually mounted sign lighting fixtures. Signs shall be only lit from beneath the signs. Acceptable lighting shall consist of a long-life system, meeting the following requirements:

A) Using Light Emitting Diode (LED) luminaires approved by the Administration;
B) Having a functional life time of at least 100,000 hours, including lamp and ballast;
C) Having < 50% failure of any component at 60,000 hours, including lamps; and

D) Having a lamp lumen depreciation not worse than 70% at 60,000 hours.

All sign lighting shall be on dedicated circuits. For each sign structure a minimum of two circuits shall be used. The sign lighting design shall be shown on the roadway lighting plans. The design of luminaires for sign illumination using long-life lighting systems shall be in accordance with OOTS standard lighting charts, provided as Additional Information on ProjectWise.

All other sign lighting systems shall be designed to provide an average of 20 to 40 foot candles with 6:1 max to min uniformity. Photometric calculations shall be on a 1 foot grid over the entire surface of the sign. All existing sign lighting within Project limits that is impacted by construction activities shall be maintained throughout construction.

Sign lighting shall be installed using the following criteria:

1) All overhead "EXIT Direction" signs statewide will be lit if any of the following conditions are met:
   A) All overhead "LEFT EXIT" and "LANE DROP" signs will be lit (entire sequence).
   B) All overhead signs for multi-lane exits will be lit including but not limited to choice lanes and splits.
   C) All overhead signs with a "yellow" panel will be lit.
   D) All overhead signs that are not visible via passenger vehicle headlights with adequate sight distance (i.e. stopping sight distance per ASSHTO) to the sign due to geometric conditions (i.e. vertical/horizontal curve) will be lit.
   E) All overhead signs which are obscured due to adjacent visual clutter at the site (i.e. brightly lit parking lots, outdoor advertising signs, other lit signs, etc.) will be lit.
2) All signs on a structure with any one sign that requires lighting shall be lit.

Lighting for all new sign structures shall follow the above criteria. Individually mounted sign lighting fixtures with luminaires is the preferred method of illumination of signs; sign lighting maintenance systems should only be used at the discretion of the Office of Traffic Safety (OOTS). All existing sign lighting will be upgraded to LED lighting; all new lighting shall be LED. Where existing signs are replaced with new signs fabricated from Type XI sheeting, the need for sign lighting will be determined according to the above criteria. If any overhead sign does not require lighting it shall use Type XI sheeting which shall be specified on the sign detail sheets. At the current time, all signs requiring Type XI sheeting are to be supplied by SHA.

3.12.08.01.06 Leased Lighting Design and Construction Requirements

For locations where luminaires are attached to a utility pole, the Design-Builder (as part of the utility relocation effort) shall contact the appropriate agency to coordinate relocation of the light fixture or installation of new light fixtures provided photometric analysis supports the changes. In cases where the photometric analysis supports the change, the Design-Builder shall also develop lighting plans for submission to the Administration for review and approval. The Administration will be responsible for coordinating agreements with the utility company.

3.12.08.01.07 Temporary Lighting Design and Construction Requirements

All existing roadways which have roadway lighting shall remain illuminated at IES minimum levels for the duration of the Project unless approved otherwise by the Administration.

The Design-Builder shall maintain all existing lighting within the Limits of Work throughout construction. Where temporary lighting is needed to maintain the existing lighting levels in the Project area, the Design-Builder shall install and maintain temporary lighting (cobra heads attached to wood poles). Temporary overhead electrical service is acceptable for non-breakaway poles. The Design-Builder shall remove temporary lighting when no longer needed. The Design-Builder shall be responsible for the power costs of any and all temporary lighting that may be required and it is the Design-Builder's responsibility to schedule all utility connections.

3.12.08.01.08 Electrical Service for Lighting Design and Construction Requirements

The Design-Builder shall be responsible for locating and marking all underground and overhead utilities prior to any lighting work beginning. The Design-Builder shall be solely responsible for all Work, and materials, and costs associated with obtaining power (including coordination with the power company). Electric costs for maintaining power throughout construction for all lighting facilities and other electrical work required for this Project shall be the responsibility of the Administration. The Design-Builder shall be responsible for completing all electrical service application materials necessary for obtaining service from the appropriate power companies. All materials shall be submitted to the power company through the Administration. The Design-Builder shall contact all utility companies to fulfill requirements to determine the location of all existing and proposed utilities, obtain power company requirements for service and obtain power company approval for service location(s). For each location requested, it is the Design-Builder's responsibility to complete all paperwork, coordinate with the

utility company, and schedule all utility connections so to not adversely affect the Project schedule.

Lighting systems owned by different jurisdictions shall have separate power sources derived from the utility company. Exceptions shall require written approval and agreement of all jurisdictions involved and will require separate circuits for each jurisdiction's electrical elements fed from the electrical service equipment.

3.12.08.01.09 Light Pollution

For all proposed roadway lighting, the maximum allowable vertical and horizontal illuminance at residential property lines shall not exceed 0.05 foot-candles (fc). House side shielding shall be provided where necessary to achieve the 0.05 fc horizontal or vertical illuminance requirement. House side shielding shall also be provided with all roadway lighting within 75 feet of a residential structure. Photometric analyses for light trespass at residential property lines is required and the analysis shall utilize a light loss factor of 1.00.

3.12.09 Bicycles

Bicycles are not permitted on MD 32 and the MD 32 ramps in the project limits. No bicycle lane markings or signing shall be installed on MD 32, and any existing bicycle lane signs and pavement markings on MD 32 and the MD 32 ramps within the project limits shall be removed.

Bicyclists shall be directed to exit MD 32 southbound at the off-ramp to Burntwoods Rd. The SHA approved non-standard "BICYCLES MUST EXIT" sign (see below Figure 1) shall be posted on MD 32 at the beginning of the taper for this off-ramp. Additionally, SHA standard sign R5-10b "PEDESTRIANS AND BICYCLES PROHIBITIED" shall be posted in the gore area for this ramp.

SHA standard sign R5-10b "PEDESTRIANS AND BICYCLES PROHIBITIED" shall be posted at the beginning of the MD 32 on-ramps at both access ramps at Linden Church Rd, both access ramps at MD 108, and the access ramp to eastbound MD 32 at Burntwoods Road. Any bike lanes that approach the MD 32 ramp entrances shall be terminated with "Bicycle Lane Ends" sign assemblies as per the MD SHA Bicycle Policy and Design Guidelines revised January 2015.

Figure 1: Non-standard “Bicycles Must Exit” sign approved for use by SHA.

TC 3.13 LANDSCAPE AND REFORESTATION DESIGN PERFORMANCE SPECIFICATIONS

3.13.01 Preservation of Trees and Woodlands

The Design-Build Team shall design and construct the project to minimize the amount of healthy, native, trees removed. Where feasible, design improvements to avoid or minimize impacts to existing tree stands and specimen trees. The Design-Builder shall design and implement sound tree protection measures during construction in accordance with the requirements of the Administration's 2008 *Standard Specifications for Construction and Materials* (*SSCM*) Section 120-Tree Preservation Area. Impacts to specimen trees, defined as trees having a 30 inch or greater diameter at breast height (DBH) or trees having a DBH of 75% or greater of the State or County Champion of the species, shall be avoided where feasible.

a. All impacts to individual trees, woods, and forest areas occurring as part of this project, including, but not limited to: crown and branch pruning, tree clearing, and root pruning shall be in accordance with the MD Reforestation Law and/or Roadside Tree Law as applicable and Section 120-Tree Preservation Area. The Design-Builder shall clearly indicate tree removals and tree protection measures on the erosion and sediment control plans.

b. The area covered by the Maryland Department of Agriculture (MDA) Quarantine has expanded since the discovery of Emerald Ash Borer in Howard and Anne Arundel Counties in 2011. Per Plant Protection Order #11-02, effective July 11, 2011, regulated materials are not to be moved out of quarantine areas. Regulated areas include all 14 Maryland Counties west of the Chesapeake Bay and Baltimore City. Regulated materials for the Emerald Ash Borer Quarantine include the following:

c.

1. Emerald Ash Borer
2. Hardwood firewood
3. Any piece of Fraxinus spp. (Ash), including cut or fallen, living or dead.
4. Any uncomposted Ash chips or uncomposted Ash bark, larger than 1 inch in any two dimensions.

d. The Design-Build Team shall employ the services of an individual who is an ISA Certified Arborist, MD Licensed Tree Expert, MD Registered Forester, or Maryland Licensed Landscape Architect, who shall conduct an on-site inspection to locate and identify any specimen or significant trees within the limits of disturbance plus 30 feet beyond the limits of disturbance.

1. Specimen trees are defined as trees with a Diameter at Breast Height

(DBH) of 30" or greater or at least 75% of the DBH of the MD State or Champion of the species, whichever DBH measurement is smaller.

2. For the purpose of this contract significant trees are defined as trees a DBH of 24 inches or larger.

e. The Design-Build Team shall employ the services of a MD Licensed Tree Expert who will be responsible for:

1. Preparing a Tree Impact Avoidance and Minimization Report as described under Landscape Submittals and consistent with the *SSCM* Section 120-Tree Preservation. Submit the Report to the Office of Environmental Design, Landscape Operations Division (OED-LOD) for approval, prior to installation of erosion and sediment controls.

2. Coordinating tree protection measures with erosion and sediment control measures and providing constructability review of tree protection measures on erosion and sediment control plans.

3. Directing oversight of tree work during construction as required by State Law and/or as described in Sections 712 through 716 in the *SSCM*.

4. Maintaining project compliance with the MDA Quarantine on the Fraxinus (Ash) species; to include providing a plan for disposal of Ash trees impacted by the project, subject to the approval of MDA.

f. The Administration has obtained a Reforestation Site Review Approval for impacts to trees and forest areas within the proposed limits of disturbance shown on the Concept Plans. Prepare the documentation and submit required information to OED-LOD for review of conformance with the current MD Department of Natural Resources Forest Service (DNR-FS) Reforestation Site Review Approval. Tree and forest mitigation plantings shall be coordinated with and approved by the Administration.

1. The Forest Impacts shown on the Concept Plates for the Project show 33.2 acres of forest removal. Preserved forest stands composed primarily of Callery Pear, Tree of Heaven, or other invasive tree species will not be eligible for the incentive bonus.

2. The Design-Builder shall provide necessary documentation for required modifications to the approved Reforestation Site Review to OED-LOD for submittal to DNR-FS in the event that work will impact trees beyond the permitted limits. The Design Build Team will be required to attend site review meetings with SHA/DNR-FS if so requested by the Administration. Compliance with additional DNR-FS requirements or conditions associated with the modification of the Reforestation Site Review Approval shall be the

responsibility of the Design Build Team, in coordination with the Administration.

3. Upon substantial completion of construction, the Design Build Landscape Architect shall conduct a project audit to confirm the actual project impacts to forest areas. Provide an as-built forest impact plan to OED-LOD showing the forest and tree impacts.

g. Maximize on-site individual tree and/or reforestation mitigation for impacts to trees and/or forest areas per the Roadside Tree Law or MD Reforestation Law as applicable. On-site reforestation of 19.3 acres as shown in the Reforestation Law Approval shall be part of this contract. Coordinate proposed changes requiring revisions to the Reforestation Site Review Approval with the Landscape Architecture Division (OED-LAD), OED-LOD, and DNR-FS. The Design Build team will maintain compliance with DNR-FS requirements or conditions associated with modifications to the Reforestation Site Review Approval.

The order of preference for the location of reforestation is as follows:

1. Cleared SHA land within the project limits adjacent to existing, preserved forest areas and not in locations reserved for future roadway widening or other improvements.

2. Cleared SHA land within the project limits that is not reserved for future roadway widening or other improvements.

3. Offsite areas on SHA land in coordination with, and pending the approval of SHA and DNR-FS.

4. Offsite area adjacent to SHA lands in coordination with, and pending the approval of the SHA and DNR-FS.

h. Revegetate land disturbed by construction activities as soon as practical after construction is completed in accordance with the Drainage, Stormwater Management, and Erosion & Sediment Control and Planting & Landscape Architectural Performance Specifications. Mitigation for additional impacts proposed beyond those originally approved by DNR-FS for the Project shall be the responsibility of the Design-Builder, and may include a site search, agency reviews and approvals, design, invasive species management, obtaining right of way, and construction.

3.13.02 Guidelines and References

Design and construction of landscape and reforestation plantings shall be in accordance with this Landscape and Reforestation Design Performance Specification and the relevant requirements of the Guidelines and References in TC 3.08.

3.13.03 General

Design and construct tree and forest protection measures, landscaping, and mitigation plantings associated with the Project in accordance with these specifications.

This project requires the Design-Builder to have a Professional Landscape Architect (PLA), licensed to practice in the State of Maryland, with more than 10 years of landscape architectural design experience related to highway corridor design and construction. The PLA will address, in a collaborative, multi-disciplinary approach, the functional and aesthetic needs of the project, which includes the preparation and implementation of successful design responses to the commitments established for the project. The lead landscape architect shall have an understanding of the process of context sensitive design solutions; be knowledgeable of native vegetation of the Piedmont Region of Maryland; be experienced in the requirements of the Maryland Reforestation Law; be experienced in MDE and SHA requirements for Stormwater management and associated plantings, and be knowledgeable about SHA's Landscape Design Guide (LDG).

a. The Design-Builder shall include tree preservation, tree protection and impact minimization measures, and tree removals on erosion and sediment control plans and ensure tree protection measures are coordinated with the sequence of construction.

b. The Design-Build Landscape Architect shall prepare a set of Landscape Plans for Landscaping, Reforestation, and other Plantings, based on the supplemental Conceptual Landscape Plans and Request for Proposal. Plans shall be at a scale appropriate for the project, but not less than 1"=50'. Plans shall include schedules of all materials proposed for use, and shall be submitted to the Landscape Architecture Division (LAD) and Landscape Operations Division (LOD), for review and approval. Landscape and Reforestation Plans will include the following information:

    1. Vicinity Map of site location(s) for both on-site and off-site reforestation areas

    2. Critical Root Zones for individual significant or specimen trees, as defined by the Maryland Department of Natural Resources: Measured from the center of the tree's trunk; 1 foot of radius per inch of DBH (Diameter at Breast Height) for trees 30" DBH or less; and 1.5 feet of radius per inch of DBH for trees greater than 30" DBH.

    3. Tree preservation measures and details including, but not limited to fencing, fertilizing, root aeration, signage, root pruning, and sequencing of construction indicating any additional requirements for tree preservation not identified in the specifications.

4. Environmental/surface features, extending at least 100' beyond Property Line or Right-of-Way of adjacent parcels. Include ownership and parcel numbers for each adjacent parcel.

5. Existing roadway and incidental structures, including utilities.

6. Proposed improvements, including traffic control devices, highway and incidental structures, drainage features, storm drain, SWM facilities, utilities, etc.

7. Limits of Disturbance

8. Areas of subsoil and topsoil placement, including type (salvaged or furnished) and depth.

9. Areas of soil stabilization matting (SSM) placement, including type of SSM as per Section 709.

10. Type of permanent vegetation, including but not limited to: Bioswale Meadow Establishment, Turfgrass Establishment, Meadow Establishment, Shrub Seeding, and Turfgrass Sod Establishment.

11. Density and quantity of plantings

12. A schedule of materials, indicating plant quantities for each type and size of plant material, proper nomenclature for plant species, size, form, and root specifications as per ANSI standards, and proposed spacing.

13. Limits to mulch areas and landscape planting beds.

14. Additional information as required by the Administration.

c. The Design-Build Team shall coordinate the Landscape Plans with all other elements of work to be performed under the Contract including, but not limited to: grading, stormwater management facilities and ancillary structures, drainage swales, storm drain, stormwater management BMP outfalls and cross culvert outfalls, utilities, paved areas, maintenance access ways, traffic control devices, and lighting.

d. Landscape plantings required as part of the stormwater management plans shall be coordinated with the landscape and reforestation plans to ensure a unified planting theme is created for the project.

e. Landscaping shall conform to the Administration's *Landscape Design Guide* and supplemental documents, including the *SHA Preferred Plants List* and Category 700 Landscaping of the *SHA Highway Construction Cost Estimating Manual.*

3.13.03.01 Landscape and Reforestation Preliminary Design Meeting.

The Design-Build Team shall conduct an on-site meeting and design charrette with representatives of the Landscape Architecture Division (OED-LAD) and Landscape Operation Division (OED-LOD) to discuss and review the Preliminary Landscape Plans. The Design-Build Team shall schedule this meeting early in the design process to ensure adequate opportunity for coordination and integration with other engineering and design disciplines.

a. Preliminary Landscape Plans shall be prepared by the Design-Build Team based on the Conceptual Landscape Plans.

    1. The development of the Preliminary Landscape Plans shall be done in close coordination with the development of the various engineering plans to identify and reduce any potential conflicts.

    2. The preliminary plans shall be at a scale appropriate for the project but no less than 1''= 50' and may include graphics, sketches and illustrations to convey the Landscape Architect's design intent in complying with the requirements of RFP.

    3. Information shown on the Preliminary Landscape Plans shall include, but not be limited to: existing conditions, wetland and waterway buffers, proposed and existing utilities, proposed roadway and paved areas, tree preservation areas, reforestation areas, general plant types, locations and potential species selections, stormwater management facilities and landscaping concepts, cut and fill lines, areas of pavement removal, compacted soils or shallow bedrock, limit of disturbance lines, right-of-way lines, and other information deemed necessary for adequately evaluating the proposed planting locations.

b. The Design-Build Team shall prepare meeting minutes and distribute them to attendees for review and comments. After approval of the Preliminary Landscape Plans by OED-LAD, the Design-Build Team may then begin to develop Semi-final and Final Landscape Plans.

c. In the event that unexpected site conditions are encountered or revisions to other design elements occur during the design process that affect the design integrity of the approved preliminary plan, it is the responsibility of the design-build team Landscape Architect to inform OED-LAD immediately of the situation and recommend remedies that may be considered by the Administration.

3.13.03.02 General Landscape Design and Construction Requirements

In addition to other requirements provided in the Contract Documents, the Design-Builder shall design, construct, and establish, landscape and mitigation plantings according to the following criteria:

a. Design and construct the appropriate soil profile, including subsoil and topsoil, where necessary for proposed vegetative treatment and/or landscaping as per the Concept Plans or as specified in the Contract Documents to comply with the following:

1. Areas where the existing roadway has been demolished are designated as Soil Enhancement Areas, where the base and sub base are to be excavated and loosened, and any debris is to be removed. These areas are to be delineated on the civil plans, within the appropriate phase of work. Remove unsuitable subgrade, loosen highly compacted subgrade, and furnish additional subsoil and topsoil as necessary to provide successful plant establishment.

2. A minimum of 12 inch depth existing or placed subsoil is required in all areas to be landscaped, except where approved by the Administration. This requirement may be reduced or waived on steep slopes and engineered reinforced slope systems at the discretion of the Administration.

3. In locations where individual landscape trees and shrubs in planting pits or planting beds are to be installed, a minimum of 18 inch depth subsoil is required.

4. Install a minimum of 4 inch depth topsoil in Turfgrass Establishment and Turfgrass Sod Establishment areas. This requirement may be reduced on steep slopes at the discretion of the Administration.

5. Install a minimum of 6 inch depth topsoil in planting bed locations and in curbed medians that are to receive Turfgrass Establishment, Turfgrass Sod Establishment, or landscape planting.

b. The Design-Builder shall determine salvageable quantities of subsoil and topsoil available within the Limits of Disturbance.

1. The Design-Builder shall provide tests results for all areas proposed for salvaging of subsoil and/or topsoil to the Office of Materials Technology Soils and Aggregate Technology Division (OMT-SATD).

2. If OMT-SATD determines that salvageable subsoil and/or topsoil meets SHA Specifications, the Design-Builder shall develop a Nutrient Management Plan in compliance with MD Nutrient Management Lawand submit to OED-LOD for review and approval.

3. The Design-Builder shall provide the appropriate soil profile, including subsoil and topsoil, where necessary for proposed vegetative treatment and/or landscaping as per the Concept Plans or as specified in the Contract

Documents. The Design-Builder shall calculate quantities of salvaged and furnished subsoil and/or topsoil to comply with the following and ensure successful establishment of vegetation and landscaping:

A minimum of 12 inch depth subsoil is required in all areas to be landscaped, except where approved by the Administration. This requirement may be reduced or waived on steep slopes and engineered reinforced slope systems at the discretion of the Administration.

In locations where individual landscape trees and shrubs in planting pits or planting beds are to be installed, a minimum of 18 inch depth subsoil is required.

Install a minimum of 4 inch depth topsoil in Turfgrass Establishment and Turfgrass Sod Establishment areas. This requirement may be reduced or waived on steep slopes and reinforced slope systems at the discretion of the Administration.

Install a minimum of 6 inch depth topsoil in planting bed locations and in curbed medians that are to receive Turfgrass Establishment, Turfgrass Sod Establishment, or planting.

4. The Design-Builder shall be responsible for removing unsuitable subgrade, loosening highly compacted subgrade, and furnishing additional subsoil and topsoil as necessary to provide successful plant establishment.

5. The Design-Builder shall ensure that soil which is to be planted, seeded, or sodded is properly prepared and/or amended in accordance with an approved Nutrient Management Plan (701.03.01 (b) *SSCM*) to provide successful plant establishment.

c. If the Design-Builder or SHA identifies a conflict between the Landscape Plans and other plan sheets or as-built conditions during design or in construction, the Design-Builder shall be responsible for modifying the plans to the satisfaction of OED-LAD.

d. Furnish seed and seed mixes according to the *SSCM* and in accordance with applicable State and Federal Law. Submit requests to modify SHA seed mixes or develop custom seed mixes to OED-LAD for approval.

e. Plant selections shall be appropriate for the field environmental conditions of the planting site, including microclimate, air and water-borne salt, drainage, soil chemistry and pH. Recommended plant species, sizes, forms, and spacing or density requirements are listed in each of the Landscape Zones. Written requests for substitution of other species, selections, and cultivars, sizes, forms,

or root conditions will be reviewed by OED-LAD and approved where appropriate.

f. **Utility and Safety Setbacks**. The Design-Builder shall avoid conflicts between trees and shrubs and existing and proposed/relocated utilities and maintain safety setbacks from roadsides for vehicle recovery zones and sight distance per *AASHTO's Roadside Design Guide* and the *SHA Landscape Design Guide*. The Design-Build Landscape Architect shall be responsible for resolving conflicts identified by the Design-Builder, SHA, or utility owners during design and construction. The Design-Builder must obtain concurrence from OED-LAD prior to constructing modifications to approved plans.

1. Offset trees and shrubs from underground and overhead utilities, power cabinets, electrical transformers, lighting, and traffic control devices in accordance with the *SHA Landscape Design Guide (LDG).* Additional setbacks may be required at the discretion of the utility owner or the District Utility Engineer. The Design-Build Landscape Architect shall confirm appropriate setbacks for trees and/or shrubs from overhead and underground utilities and associated structures with the District 7 Utility Engineer in consultation with OED-LAD prior to commencing design of landscape plans.

2. Adjust tree and shrub plantings prior to planting where necessary to maintain offsets from new or relocated utilities in accordance with the *LDG.* Trees and shrubs installed without necessary utility offsets as per the *LDG* will be relocated at no cost to the Administration.

3. The mulch edge of planting pits for individual trees and shrubs, and the edge of mulched landscape beds shall be planted a minimum of 7 ft. from the centerline of swales and ditches. Larger setbacks may be required for lined and/or rip-rapped swales or swales with higher volume or velocity of flow.

4. Trees shall be offset from the edge of travel lanes and bridges as required according to the roadway section and design speed in conformance to the *AASHTO Roadside Design Guide* and the *LDG.*

5. Additional setbacks may be required by the Administration for safety clear zones/recovery areas, to maintain sight distance, and/or for maintenance needs.

3.13. 03.03 Low Maintenance Landscape Design.

Roadside plantings, including but not limited to: landscaping and screening, reforestation, revegetation, and stormwater management facility landscaping shall

be designed following an approach that balances safety, environmental stewardship, maintenance requirements, and aesthetic appeal. The Design-builder shall develop designs that minimize landscape maintenance requirements as follows:

a. Arrange individual tree plantings, landscape beds, and plant massings to accommodate mowing and other maintenance operations in locations within or abutting areas of regularly mowed turfgrass and where otherwise requested by the Administration.

b. The Design-Builder shall use Turfgrass Establishment (*SSCM* 705) or Turfgrass Sod Establishment (*SSCM* 708) in all locations requiring regular mowing maintenance as per the latest edited *SHA Integrated Vegetation Management Manual for Maryland Highways and the supplemental SHA Turfgrass Management Policy Guidelines* , in areas were vegetation height must be controlled to maintain sight distance such as merge areas and roadside shoulder areas, where required in SWM management facilities, and elsewhere as specified in the Contract Documents.

c. In locations where regular mowing is infeasible or unnecessary for maintenance or safety considerations, (i.e. on areas of future roadway expansion, slopes steeper than 4:1 or in reforestation, revegetation, or other naturalized areas) the Design-Builder shall specify meadow establishment, shrub seeding, and/or other native seeding approved by OED-LAD in lieu of turfgrass establishment or turfgrass sod establishment.

d. Minimize the use of shrub and perennial beds primarily to high-visibility locations and tighten plant spacing to minimize weed growth. Where space is available, use masses of evergreens, flowering, and deciduous trees to provide aesthetic benefit while requiring less annual maintenance than shrub or perennial beds. Shrub masses in areas that will be allowed to naturalize rather than receive frequent maintenance may be installed in planting beds to discourage weed growth and aid plant establishment.

3.13.03.04 Invasive Species Management.

Successful landscape and mitigation plantings cannot be successfully established without management of invasive species and woody and herbaceous weeds.

a. Invasive species and prohibited weeds list below shall be treated and removed within the limits of disturbance in coordination with the OED-LOD.

Invasive species and prohibited weeds.

Invasive Species Management **Invasive Species To Be Controlled And Removed**		
Acer platanoides	Heracleum mantegazzianum	Polygonum perfoliatum

Norway Maple	Giant Hogweed	Mile-a-minute [2]
Ailanthus altissima Tree of Heaven	Humulus japonicas Japanese Hops	Pueraria montana var. lobata Kudzu
Albizia julibrissin Mimosa	Ligustrum obtusifolium Border Privet	Pyrus calleryana 'Bradford' Callery/Bradford Pear
Alliaria petiolata Garlic Mustard	Hedera helix English Ivy	Perilla frutescens Perilla
Allium vineale Wild Garlic	Hemerocallis fulva Daylily	Phalaris arundinacea Canary Reed Grass[2]
Akebia quanata Chocolate Vine	Ligustrum sinense Chinese Privet	Phragmites australis Phragmites
Ampelopsis brevipedunculata Porcelain Berry	Ligustrum japonicum Japanese Privet	Polygonum cuspidatum Japanese Knotweed
Artemisia vulgaris Mugwort	Ligustrum vulgare European Privet	Ranunculus ficaria Lesser Celandine
Bambusa vulgaris, Phyllostachys aurea, Pseudosasa japonica and others Bamboo	Lonicera japonica Japanese Honeysuckle[2]	Rosa multiflora Multiflora Rose
Berberis thunbergii Japanese Barberry	Lonicera maackii Amur Honeysuckle	Sorghum biclor Shattercane
Carduus sp. & Cirsium sp. Thistles (Canada, Plumeless, Bull and Musk)	Lonicera morrowi Morrow's Honeysuckle	Sorghum halepense Johnsongrass
Celastrus orbiculatus Oriental Bittersweet	Lonicera tatarica Tartarian Honeysuckle	Toxicodendron radicans Poison Ivy [2]
Centaurea maculosa Spotted Knapweed	Lythrum salicaria Purple Loosestrife	Ulmus parvifolia Chinese Elm or (Lacebark Elm)
Dipsacus fullonum Common Teasel[2]	Microstegium vimineum Japanese Stiltgrass	Ulmus pumila Siberian Elm
Elaeagnus umbellate Autumn Olive	Miscanthus sinensis Eulalia	Vitus sp. Grape Vine
Euonymus alatus Burning bush	Oplismenus hirtellus ssp. Undulatifolius Wavyleaf Basketgrass	Wisteria floribunda Japanese Wisteria
		Wisteria sinensis – Chinese Wisteria
Note: Do not treat and control these species in wetlands, 25' nontidal wetland buffers, and waters of the US without appropriate state/federal authorization.		

b. The Design-Builder shall develop a treatment program and schedule detailing proposed methods for control and removal of invasive species/prohibited weeds for review and approval by the OED-LOD, to include the following:
    1. Schedule of invasive vegetation management operations, including mechanical and chemical methods of control, initial, intermediate, and follow-up treatments for re-growth.
    2. List of tools and pesticides to be used
    3. Required licenses for work as required by applicable State and Federal Law
    4. Maps in CADD or GIS, providing areas of treatment based on prevailing invasive species present.

c. The Design-Builder shall conduct invasive species management operations as appropriate for proposed final landscape treatments. For example, operations using herbicides will be scheduled with sufficient lead time prior to plant installation or seeding. Herbicides shall be applied according to MDA requirements and applicable State and Federal Laws. Appropriate licenses will be required.

d. The Design-Builder shall continue to treat and remove invasive species listed above until Final Acceptance of Trees, Shrubs, and Perennials for the Project.

e. Remove and replace trees and landscape plantings damaged by invasive species management operations at no cost to the Administration.

3.13.03.05 Deliverables

a. Preliminary Landscape Plans
b. Pre-final Landscape Plans
c. Final Landscape Plans
d. Tree removals and tree protection measures (included on the landscape and Erosion and Sediment Control Plans
e. Invasive Species Control Program and Schedule
f. Soil Test Reports
g. Nutrient Management Plan/Report
h. Refer to Section 3.13.05 for additional information

3.13.04 PLANTING ZONES

Design and install landscape and mitigation plantings that are appropriate to site conditions and constraints. The Design-Build Team shall be responsible for ensuring that all requirements for planting densities, plant species, species mix, and spacing meet those that are provided in this document. The General Landscape Design and Construction requirements and the *SHA Landscape Design Guide* apply to all plantings within the project limits.

Submit a site analysis plan indicating the planting opportunities for each planting zone prior to commencing with detail design. The following Planting Zones are proposed within the limits of this Contract:

3.13.04.01 ZONE 1 REFORESTATION PLANTINGS

The intent for areas labeled as Zone 1 is to reforest and/or to re-vegetate areas that are suitable for tree plantings within the project right-of-way. The Design-Build

Team is to maximize reforestation whenever possible and employ this planting association where indicated on the Conceptual Landscape Plans and in all locations where establishment of forest is not precluded by site constraints such as proposed improvements or utility offsets.

a. **Reforestation Plantings** shall be designed as required by the Maryland Reforestation Law and according to the following:

1. Plantings shall consist of random arrangements of native trees and shrubs, under planted with native low-maintenance groundcover such as meadow or shrub seeding. A mix of native evergreen and deciduous tree species and shrubs of the Piedmont region of Maryland shall be specified as appropriate to site conditions. Use of cultivars of native species may be approved at the discretion of OED-LAD. The Administration will reject unacceptable species.

2. In highly visible areas (such as roadside edges or cut or fill slopes facing the highway, exit ramps, or secondary roads), the Design-Builder shall use single-species groupings of trees and shrubs or masses of single-species groupings rather than random plantings of to increase aesthetic interest. Masses of trees selected to provide added seasonal aesthetic interest with flowers, fruit, foliage color, or bark texture or color are recommended in highly visible areas.

3. Turfgrass Establishment of Turfgrass Sod Establishment shall not be used within Reforestation or Revegetation Planting areas without approval of OED-LAD. Reforestation areas shall receive Shrub Seeding, *SSCM* Section 706, Meadow Establishment, *SSCM* Section 707, or other native seeding as approved by OED-LAD.

4. Reforestation areas must meet the following size requirements for credit under the Maryland Reforestation Law:

Reforestation areas adjacent to existing forest to remain must be at least ¼ acre in size. Combined forest area width (existing and reforestation) must be at least 50’ wide.

Reforestation areas not adjacent to existing forest must be at least one half (1/2) acre in size and at least 50’ wide.

b. Reforestation plantings shall be provided at a mitigation ratio of 1:1. In other words, one (1) acre of reforestation plantings is required for one (1) acre of impacts. Reforestation areas species diversity and planting density shall be as follows:

1. Project Reforestation stock shall be composed of a mix of at least 11 species of deciduous and evergreens trees and shrubs, with

no more than 30% from the same taxonomic family. Individual reforestation areas smaller than 1 (one) acre in size may be composed of a mix of at least 7 (seven) species provided no more than 30% are from the same taxonomic family.

2. A ratio of 70% overstory to 30% understory plants is recommended.

3. Reforestation Plantings shall be composed of planting stock in various sizes installed at the following rates to provide 250 stems per acre:

Small: 100 trees per acre composed of:

- 66 Single leader deciduous trees 5' ht. #5 CG
- 34 Evergreens 3' height B&B, #5 CG

Medium: 75 trees per acre composed of:

- 50 Single leader major deciduous trees 1¼" cal. B&B/#10 CG
- 25 Multi-stemmed minor deciduous trees, 5' ht. B&B, Single leader minor deciduous tree 1¼" cal. B&B or evergreen trees 5' ht. B&B/#10 CG

Large: 32 trees per acre composed of:

- 16 Single leader major deciduous trees 1 ¾" cal. B&B
- 8 Multi-stemmed minor deciduous trees, 7' ht., B&B or single leader 1 ¾ " cal. B&B
- 8 Evergreens 7' ht. B&B

Shrubs: 43 shrubs per acre (entire reforestation acreage)

- 22 30" height B&B/#3 min CG
- 21 24" height CG #3 min CG
- Minimum 4 species

(Specify classes of container-grown stock according to ANSI Z60.1-.2014 or the latest edition.

Zone 1 –Reforestation Plantings*

BOTANICAL NAME	COMMON NAME	SIZE*	COMMENTS
Major Deciduous Trees (Overstory) (Single Leader unless noted otherwise)			
Acer rubrum	Red Maple	S, M, L	
Acer saccharum	Sugar Maple	S, M, L	
Betula nigra	River Birch	S, M, L	Multistem
Celtis occidentalis	Hackberry	S, M, L	
Fagus grandiflora	American Beech	S	
Carya alba	Mockernut Hickory	S	
Carya cordiformis	Bitternut Hickory	S	
Carya glabra	Pignut Hickory	S	
Carya ovata	Shagbark Hickory	S	

Fagus grandiflora	American Beech	S, M	
Liquidambar styraciflua	Sweet Gum	S, M, L	
Liriodendron tulipifera	Tulip Poplar	S, M, L	Install 50' min. from road shoulder.
Nyssa sylvatica	Black Gum	S, M, L	L size also may be CG
Platanus occidentalis	American Sycamore	S, M, L	
Quercus alba	White Oak	S, M, L	
Quercus bicolor	Swamp White Oak	S, M, L	
Quercus coccinea	Scarlet Oak	S, M, L	
Quercus marilandica	Blackjack Oak	S, M, L	
Quercus palustris	Pin Oak	S, M, L	
Quercus phellos	Willow Oak	S, M, L	
Quercus prinus	Chestnut Oak	S, M, L	
Quercus rubra	Red Oak	S, M, L	L size also may be CG
Quercus stellata	Post Oak	S, M, L	
Quercus velutina	Black Oak	S, M, L	
Tilia Americana	Basswood	S, M, L	
BOTANICAL NAME	**COMMON NAME**	**SIZE***	**COMMENTS**
Minor Deciduous/ Flowering Trees (Understory) (single leader unless noted otherwise)			
Amelanchier canadensis	Eastern Serviceberry	S, M, L	single leader or multistem
Amelanchier laevis	Allegheny Serviceberry	S, M, L	single leader or multistem
Carpinus caroliniana	American Hornbeam	S, M	
Castanea pumila	Chinquapin	S	
Cercis canadensis	Eastern Redbud	S, M, L	single leader or multistem
Chionanthus virginicus	White Fringetree	S, M, L	multistem
Crataegus viridis 'Winter King'	Winter King Hawthorn	M, L	
Diospyros virginica	Persimmon	S, M	
Hamamelis virginiana	Witch Hazel	S	multistem
Ostrya virginica	American Hophornbeam	S, M, L	
Sassafras albidum	Sassafras	S, M	
Evergreen Trees			
Ilex opaca	American Holly	S, M, L	SHA Approved Varieties
Magnolia virginiana	Sweetbay Magnolia	S, M, L	multistem, semi-evergreen
Pinus echinata	Shortleaf Pine	S	
Pinus rigida	Pitch Pine	S, M	
Pinus strobus	White Pine	S, M, L	
Pinus virginiana	Virginia Pine	S, M, L	
BOTANICAL NAME	**COMMON NAME**	**SIZE***	**COMMENTS**
Shrubs			
Ceanothus americanus	New Jersey Tea	24" ht.	
Cornus amomum	Silky Dogwood	24" ht.	
Cornus sericea	Redosier Dogwood	30" ht.	
Cornus racemosa	Gray Dogwood	24" ht.	
Corylus americana	Filbert	24" ht.	
Hamamelis virginiana	Witch hazel	24" ht.	

Ilex decidua	Possumhaw	30” ht.	
Ilex verticillata	Winterberry	30” ht.	
Lindera benzoin	Spicebush	30” ht.	
Photinia melanocarpa	Black Chokeberry	30” ht.	*(Aronia melanocarpa)*
Photinia pyrifolia	Red Chokeberry	30” ht.	*(Aronia arbutifolia)*
Physocarpus opuliflius	Ninebark	30” ht.	
Rhus aromatica	Fragrant Sumac	24” ht.	
Rhus copallina	Shining Sumac	24” ht.	
Rhus glabra	Smooth Sumac	24” ht.	
Rhus hirta (R. typhina)	Staghorn Sumac	24” ht.	
Sambucus nigra L. ssp. canadensis	Elderberry	30” ht.	
Vaccinium corymbosum	Highbush Blueberry	30” ht.	
Viburnum acerifolium	Mapleleaf Viburnum	24” ht.	
Viburnum dentatum	Southern Arrowwood	30” ht.	
Viburnum lentago	Nannyberry Viburnum	30” ht.	
Viburnum nudum	Possumhaw Viburnum	30” ht.	
V. nudum var. cassinoides	Witherod	30” ht.	
Viburnum prunifolium	Blackhaw Viburnum	30” ht.	
Note: * Refer to tree and shrub size, form, and root specifications as listed in B3 of Zone 1.			

3.13.04.02 ZONE 2 – REVEGETATION PLANTINGS

The intent for areas labeled as Zone 2 is to revegetate areas that are suitable for tree plantings within the project right-of-way but will not be credited towards reforestation requirements under the MD Reforestation Law. The Design-Build Team shall employ this planting association in the areas as indicated on the Conceptual Landscape Plans. The Design-Build Team shall submit a site analysis plan indicating the planting opportunities for this category. The Design-Build Team is to maximize planting whenever possible.

a. Revegetation Areas shall be designed and constructed according to the design criteria for Zone 1 Reforestation Plantings with the exception of the minimum area requirements.

   1. The minimum width and area for Revegetation Plantings shall be 15 feet and 1,500 square feet, respectively, except where smaller areas are shown on the Concept Plans and/or approved by OED-LAD.

   2. Refer to the Plant Material list for species and sizes for use in Zone 2

b. Do not substitute Revegetation Plantings for Reforestation Plantings required under the MD Reforestation Law. Revegetation Plantings do not qualify for reforestation credit under the law.

c. Clearly label and differentiate Revegetation and Reforestation Areas on the Landscape Plans.

d. Adjustments to the species composition or increase in planting density within Revegetation Areas may be required in areas where they overlap with Zone 3 Screen Plantings.

3.13. 04.03 ZONE 3 – SCREEN PLANTINGS

The intent for areas labeled as Zone 3 plantings are to screen adjacent residences which will have insufficient buffer from MD 32 following construction of roadway improvements. Insufficient buffer is defined as less than 100 feet of forest when measured perpendicular from the roadway alignment. Screen Plantings are to meet the following requirements:

a. Screen plantings are to consist of a mix of deciduous and evergreen trees, arranged to provide a year-round screen. The percentage of evergreen trees will increase as the width of roadside area available for screening decreases.

b. Screen plantings may be necessary to augment existing plantings or forest areas to remain or to augment the visual screen provided by proposed reforestation areas.

c. Plant selections shall be appropriate for the field environmental conditions of the planting site, including microclimate, air and water-borne salt, drainage, soil chemistry and pH.

d. Recommended plant species, minimum acceptable sizes, and maximum spacing are listed below. Written substitution requests for use of other species, selections, cultivars, or sizes will be reviewed by OED-LAD and approved where appropriate.

e. For Narrow Screen Planting Areas, consisting of areas 50 ft. wide or narrower, measured perpendicular from the roadside, provided evergreen trees of at least 6 ft. height, B&B as per the following:

    1. Install pyramidal and broad-spreading evergreens, 15 ft. on center when installed in multiple staggered rows and install at 12’ on center when only single row of planting is feasible. Tighter spacing may be required for narrow columnar evergreens, such as Thuja ‘Green Giant.’

    2. For screen plantings exceeding 120 ft. long and shorter than 240 ft, long, planting is to consist of at least two evergreen species.

    3. For screen plantings 240 ft. or longer, planting is to consist of at least 3 evergreen species.

    4. Large deciduous and evergreen shrubs may be used to augment screen plantings in locations where utility conflicts or other site constraints preclude installation of evergreen trees.

f. For Wide Screen Planting Areas, consisting of areas greater than 50'-100' wide when measured perpendicular from the roadside:

1. Provide screen plantings composed of rows or massings of major deciduous trees, minor deciduous trees, evergreen trees, and large shrubs. Spacing is to be as per the Zone 3 Screen Plantings Plant List or as approved by OED-LAD.

2. Wide Screen Planting areas of at least 0.5 acre of planting not contiguous with proposed reforestation or preserved forest areas or plantings of at least 0.25 acres adjacent to proposed reforestation or preserved forest areas will be credited toward reforestation mitigation requirements for the Contract.

Zone 3 – Screen Plantings

BOTANICAL NAME	COMMON NAME	COMMENTS
Evergreen Trees (6 ft. ht. B&B, single leader, unless noted otherwise)		
Ilex opaca	American Holly	SHA approved cultivars, 10 ft. o.c.
Ilex x Nellie R. Stevens	Nellie R. Stevens Holly	10 ft. o.c.
Juniperus virginiana	Eastern Redcedar	SHA approved cultivars, 10 ft. o.c.
Magnolia grandifolia	Southern Magnolia	approved hardy cultivars, 15 ft. o.c.
Picea abies	Norway Spruce	15 ft. o.c.
Picea omorika	Serbian Spruce	15 ft. o.c.
Picea orientalis	Oriental Spruce	15 ft. o.c.
Picea pungens	White Spruce	15 ft. o.c.
Pinus taeda	Loblolly Pine	15 ft. o.c.
Pinus virginiana	Virginia Pine	15 ft. o.c.
Thuja 'Green Giant'	Green Giant Arborvitae	8 ft, B&B or #25 CG, 8' o. c. max. spacing.
Thuja 'Steeplechase'	Steeplechase Arborvitae	8 ft, B&B or #25 CG, 8' o. c. max. spacing.
Major Deciduous Trees (2.5 inch cal. B&B, single leader, unless noted otherwise)		
Acer rubrum 'Autumn Flame'	Autumn Flame Maple	seedless, 25 ft. o.c.
Acer rubrum 'Brandywine'	Brandywine Maple	Seedless, 25 ft. o.c.
Acer rubrum 'Burgundy Belle'	Burgundy Belle Maple	25 ft. o.c.
Acer rubrum 'Franskred'	Red Sunset Maple	25 ft. o.c.
Acer rubrum 'October Glory'	October Glory Maple	25 ft. o.c.
Acer rubrum 'Sun Valley'	Sun Valley Maple	Seedless, 25 ft. o.c.
Celtis occidentalis	Hackberry	25 ft. o.c.
Carpinus betulus 'Fastigiata'	Pyramidal European Hornbeam	15 ft. o.c.
Liquidambar styraciflua'Happdell'	'Happidaze' Sweetgum	few seeds, 25 ft. o.c.
Liquidambar styraciflua 'Rotundiloba''	Rotundiloba Sweetgum	Seedless, 25 ft. o.c.

Nyssa sylvatica	Blackgum	May be #25 CG, 25 ft. o.c.
Platanus x acerifolia 'Bloodgood'	Bloodgood Planetree	30 ft. o.c.
Platanus x acerifolia 'Columbia'	Columbia Planetree	30 ft. o.c.
Quercus coccinea	Scarlet Oak	30 ft. o.c.
Quercus phellos	Willow Oak	30 ft. o.c.
Quercus rubra	Red Oak	May be #25 CG, 30 ft. o.c.
Quercus shumardii	Shumard Oak	30 ft. o.c.
Tilia Americana 'Redmond'	Redmond Linden	30 ft. o.c.
Tilia cordata 'Greenspire'	Greenspire Linden	30 ft. o.c.
Ulmus parvifolia 'Allee'	Allee Elm	30 ft. o.c.
Major Columnar Deciduous Trees (2.5 inch cal. B&B, single leader, unless noted otherwise)		
Carpinus betulus 'Frans Fontaine'	Frans Fontaine Hornbeam	15 ft. o.c.
Quercus x 'Crimschmidt'	Crimson Spire Oak	15 ft. o.c.
Quercus x 'Long'`	'Regal Prince' Oak	15 ft. o.c.
Quercus palustris 'Pringreen'	Green Pillar Pin Oak	15 ft. o.c.
Quercus robur 'fastigiata'	Skyrocket Oak	15 ft. o.c.
Single Stem Minor Deciduous Trees (2.5 inch cal. B&B, unless otherwise noted)		
Acer compestre	Hedge Maple	15 ft. o.c.
Acer ginnala 'Flame'	Flame Amur Maple	15 ft. o.c.
Amelanchier laevis 'Autumn Brilliance'	Autumn Brilliance Serviceberry	15 ft. o.c.
Amelanchier laevis 'JFS-Arb'	Spring Flurry Serviceberry	15 ft. o.c.
Amelanchier laevis 'Robin Hill'	Robin Hill Serviceberry	15 ft. o.c.
Amelanchier laevis 'Snowcloud	Snowcloud Serviceberry	15 ft. o.c.
Cercis canadensis	Eastern Redbud	15 ft. o.c.
Crataegus viridis 'Winter King'	Winter King Hawthorn	15 ft. o.c.
Prunus serrulata 'Kanzan'	Kansan Cherry	(commonly known as Kwanzan cherry), 15 ft. o.c.
Prunus serrulata 'Snowgoose'	Snowgoose Cherry	15 ft. o.c.
Prunus virginiana var. virginiana 'Schubert Select'	Canada Red Chokecherry	15 ft. o.c.
Prunus x incamp 'Okame'	Okame Cherry	15 ft. o.c.
Prunus x yedoensis	Yoshino Cherry	15 ft. o.c.

Multistemmed Minor Deciduous Trees (8 ft. ht. B&B, at least 3 stems, unless noted otherwise)		
Acer ginnala 'Flame'	Flame Amur Maple	15 ft. o.c.
Amelanchier canadensis	Canadian Serviceberry	15 ft. o.c.
Amelanchier laevis 'Autumn Brilliance'	Autumn Brilliance Serviceberry	12 ft. o.c.
Cornus kousa	Kousa Dogwood	12 ft. o.c.
Cornus mas	Cornelian Cherry	12 ft. o.c.
Lagerstroemia x 'Biloxi'	Biloxi Crapemyrtle	15 ft. o.c.
Lagerstroemia x 'Choctaw'	Choctaw Crapemyrtle	15 ft. o.c.
Lagerstroemia x'Comanche'	Comanche Crapemyrtle	15 ft. o.c.
Lagerstroemia x 'Lipan'	Lipan Crapemyrtle	15 ft. o.c.
Lagerstroemia x'Muskogee'	Muskogee Crapemyrtle	15 ft. o.c.

Lagerstroemia x 'Natchez'	Natchez Crapemyrtle	15 ft. o.c.
Lagerstroemia x 'Sioux'	Sioux Crapemyrtle	15 ft. o.c.
Magnolia virginiana	Sweetbay Magnolia	12 ft. o.c.

Large Shrubs (3 ft. height, B&B or #5 CG Min.)		
Cornus sericea f. baileyi	Bailey's Red-twig Dogwood	3' OC
Cornus sericea 'Cardinal'	Cardinal Red-twig Dogwood	3' OC
Juniper chinensis 'Sea Green'	Sea Green Chinese Juniper	3' OC, B&B/#7 CG
Myrica pensylvanica	Northern Bayberry	4' OC
Viburnum dentatum	Southern Arrowwood	4' OC
Viburnum dentatum 'Blue Muffin'	Blue Muffin Viburnum	4' OC
Viburnum dentatum 'Chicago Lustre'	Chicago Lustre Viburnum	4' OC
Viburnum prunifolium	Blackhaw Viburnum	4' OC
Viburnum rhytidiphylloides 'Alleghany'	Alleghany Viburnum	4' OC
Viburnum x pragense	Prague Viburnum	4' OC

Note: B&B indicates balled and burlapped. Cal. indicates caliper in inches. O. C indicates On Center Spacing.

3.13.04.04 ZONE 4 NATURALIZED ROADSIDE AREAS

The intent for areas labeled as Zone 4 is to provide Naturalized Roadside Areas in locations where regular mowing maintenance is not required per SHA Mowing Policy, per the *SHA Integrated Vegetation Management Manual for Maryland Highways* or is not feasible due to steep slopes or lack of access

The Design-Builder shall perform Meadow Establishment (*SSCM 707*), Shrub Seeding (*SSCM 706*), and/or specify a seed mix of native herbaceous species as approved by OED-LAD in lieu of turfgrass establishment. Use of Type D Soil Stabilization Matting (Type D SSM) is recommended and may be required by OED-LAD in locations where necessary to stabilize slopes and other areas of potential erosion prior to establishment of vegetation.

a. The Design-Builder shall specify Meadow Establishment as per *SSCM* Section 707 or use a customized seed mix as approved by OED-LAD, in locations where mowing frequency is limited to once or twice annually as necessary to control the growth of woody vegetation.

b. Where mowing will not be required and/or will be infeasible, Shrub Seeding per *SSCM* Section 706 and installation of B&B or container-grown stock will be provided as per the following:

3.13.04.05 ZONE 5 TURFGRASS

The intent for areas labeled as Zone 5 is to provide Turfgrass Establishment (*SSCM* 705) or Turfgrass Sod Establishment (*SSCM* 708) in areas indicated on the

Conceptual Landscape Plans or in the Contract Specifications. In addition to areas graphically indicated on the Conceptual Landscape Plans, Zone 5 will include all locations within the project limits, including within other Zones, where regular mowing is required per the latest SHA Turfgrass Management Guidelines (dated 5/13/11 or later), disturbed turf areas of on private properties, grass swales, and ditches.

Turfgrass Establishment and Turfgrass Sod Establishment may both be used to establish turfgrass. Use of Turfgrass Sod Establishment is recommended in locations where rapid stabilization is desired, including but not limited to: areas of concentrated flow, areas adjacent to pedestrian walkways, and areas of well-maintained turf on commercial or residential properties.

3.13.04.06.01 ZONE 6 SWM FACILITY PLANTINGS

Zone 6 will consist of temporary and permanent vegetation for stormwater management facilities and adjacent areas. Design, construct, and establish SWM Facility Plantings to provide permanent stabilization and landscaping as required by the SHA Plan Review Division (OHD-PRD) and as per the following. Landscaping in Zone 6 shall meet the requirements as set forth in "*SHA Stormwater Site Development Criteria*", latest edition with the following modifications:

3.13.04.06.01 Establishment of Vegetative Stabilization in all SWM facilities

a. The Design-Builder shall design, construct, and establish 95% vegetation coverage in areas draining into SWM Facilities prior to construction of facilities as required by OHD-PRD. Permanent vegetation such as Turfgrass, Meadow, or other Native herbaceous species may be specified to stabilize areas surrounding SWM Facility prior to facility construction. Temporary seeding may be approved by OED-LAD, in conformance with SPI 704 provided 95% coverage is maintained throughout the duration of SWM construction. Tilling in areas where runoff into SWM facilities under construction is not treated by an approved erosion and sediment control will not be permitted for establishment of permanent vegetation in areas of temporary seed draining into constructed SWM facilities.

b. The Design-Builder shall establish and maintain 95% permanent vegetation coverage in all areas of topsoil or bioretention soil mix within SWM facilities, except in areas stabilized with wood mulch, stone mulch, or riprap. Vegetative coverage requirements may be reduced in areas that remain permanently inundated.

c. With the exception of grass swales, the Design-Builder shall minimize the use of Turfgrass Establishment or Turfgrass Sod Establishment Stormwater Management Facilities to locations where regular mowing

will occur, on stabilized maintenance access roads, and where required by OHD-PRD.

d. In locations where turfgrass or shredded hardwood bark mulch is not required, the Design-Build Landscape Architect shall specify appropriate native seed mixes such as SHA Meadow Establishment. Native seed mixes are also to be used in areas planted with plugs, container grown herbaceous plants, and other landscaping. Mixes of other native species appropriate to soil and hydrologic conditions may be specified pending approval of OED-LAD.

e. Specify Type A Soil Stabilization Matting (SSM) with Turfgrass Establishment or Type D SSM with Meadow Establishment in SWM Facilities where other types of mulch (straw, wood cellulose, hardwood bark mulch) are not permitted per the *SHA Stormwater Site Development Criteria* or where mulch will not remain in place due to temporary and permanent water elevations in Stormwater Management Facilities. Use of other types of SSM may be required by the Highway Hydraulics Division.

3.13.04.06.02 Zone 6 Planting Requirements by SWM Facility Types

The Design-Builder shall design, build, and maintain stormwater management facilities as required by MDE and the Office of Highway Development. Design and criteria for different facility types will vary as per the following and is supplemental to the General SWM criteria provided in 3.13.04.06.01.

a. Grass Swale: The permanent vegetative treatment for grass swales is Turfgrass Sod Establishment or Turfgrass Establishment with Soil Stabilization Matting (SSM). The Design-Builder must establish vegetation as necessary to establish and sustain 95% vegetation coverage until approval of as-built plans for SWM.

b. Bioswale: The permanent vegetative treatment for grass swales is native meadow, which may be Upland or Lowland Meadow Establishment, Bioswale Meadow Establishment, or another custom native seed mix approved for the project.

    1. The Design-Builder shall establish 95% native vegetation coverage throughout the limits of the swale. Use of Type D Soil Stabilization Matting (SSM) is required to minimize erosion prior to vegetative stabilization. Additional plantings of container-grown, deep-rooted perennials, typically plugs, may be used to expedite establishment of native vegetation but are only required in bioswales on check dams.

    2. Turfgrass Establishment and SSM or Turfgrass Sod Establishment may be approved for bioswales in locations where tall vegetation

would block necessary sight lines. Where approved turfgrass will require 95% coverage throughout the swale limits.

3. Container-grown plantings of deep-rooted perennials are to be used on check dams to provide additional reinforcement. Minimum spacing of plantings on check dams will vary depending on container class as follows:

   Plug: 12 in. on center spacing
   #SP4: 18 in. on center spacing
   #1: 24 in. on center spacing

4. The Design-Builder must establish and sustain 95% vegetation coverage until approval of as-built plans for SWM.

c. Dry Pond: The permanent vegetative treatment for dry ponds is to be Turfgrass or native meadow.

   1. Native meadows may be SHA Upland, Lowland, or Wet Meadow Establishment or another custom native seed mix approved for the project. Where SSM is recommended in the Landscape section of the *SHA Highway Construction Cost Estimating Manual,* provide SSM suited for the specified permanent vegetation.

   2. Areas of dry ponds located within wetlands or waters of the US buffers are to be permanently vegetated with native meadow with Type D SSM. Locations with base flow or standing water may require plantings of containerized stock to provide vegetative stabilization if required by the Highway Hydraulics Division, Environmental Programs Division, or the State or Federal permitting agencies.

   3. Side slopes and base of dry pond are to be used as reforestation and/or screen plantings, except where woody plants are restricted as per MD Pond Code 378, where plantings are prohibited by the Highway Hydraulics Division, or where otherwise prohibited by the *SHA Landscape Design Guide.*

3.13.04.06.03 Zone 6 Planting Requirements for Microbioretention

The Design-Builder shall design Microbioretention facilities as required by the Highway Hydraulics Division. Unlike the other types of facilities listed, areas of Bioretention Soil Mix (BSM) in microbioretention facilities are stabilized with 3 inch depth shredded hardwood bark mulch and then planted with native plants. As such, the vegetative stabilization and planting requirements vary from other types of SWM facilities in this project as follows:

a. Microbioretention Perimeter Plantings (Tree and shrub plantings). Provide perimeter tree and shrub plantings to shade, screen, and improve the aesthetics of microbioretention facilities. Use the following table to calculate required minimum perimeter plantings for each facility:

Plant Type	**Size/Root**	**Max. Spacing**	**Quant. per 100 LF of Perimeter***
Major Deciduous Tree	2 in. cal. /B&B	N/A	1
Minor Deciduous Tree (single leader)	1.75 in. cal/B&B	N/A	Provide any 2
Minor Deciduous Tree (multistemmed)	6 ft. ht./B&B or #7 CG	N/A	
Evergreen Tree	6 ft. ht./B&B	N/A	
Shrub	30 in. ht. #5 CG	5 ft. OC	10
Perennial	#1 CG	30 in OC	??
*Note: Where site constraints do not permit use of major deciduous trees, substitute 2 minor deciduous trees or 5 shrubs.			

b. Microbioretion Facility Side Slopes. Establish permanent vegetation on side slopes to obtain 95% coverage. Turfgrass Establishment with Type A SSM or Turfgrass Sod Establishment may be used on side slopes above the level of water volume retained during rain events. Native meadow establishment, using SHA Upland Meadow seed, Lowland Meadow seed, or other approved native seed, with Type D SSM may also be used on side slopes, provided 95% coverage is obtained. Perimeter plantings may be installed on side slopes where feasible.

c. BSM Areas: Where bioretention soil mix is present, the design-builder will be required to design and establish native herbaceous and woody plants in 3 inch depth shredded hardwood bark mulch. The density of plantings will vary based on the size and type of stock at installation. Provide plants from at least 3 different genera.

Plant Type	**Size/Root**	**Max. Spacing**	**Quant. per 100 SF of BSM**
Shrub	30 in. ht. #5 CG	5 ft. OC	2
Perennial	#1 CG	30 in OC	16
Perennial	#SP4 CG	24 in OC	25
Perennial	Plug (2 in. diam. by 5 in. depth	18 in. OC	50

Zone 6 - SWM Facility Plantings

BOTANICAL NAME	**COMMON NAME**	**TYPICAL**	**MINIMUM SIZE**

		SPACING	
Major Deciduous Trees			
Acer rubrum 'Autumn Flame'	Autumn Flame Maple	30' OC	2'' Cal. B&B
Acer rubrum 'Brandywine'	Brandywine Maple	30' OC	2'' Cal. B&B
Betula nigra	River Birch	20' OC	8' Ht. Multi-stem, 3-5 stems
Celtis occidentalis	Hackberry	30' OC	2'' Cal. B&B
Liquidambar styraciflua'Happdell'	'Happidaze' Sweetgum	25' OC	2'' Cal. B&B
Liquidambar styraciflua 'Rotundiloba''	Rotundiloba Sweetgum		2'' Cal. B&B
Nyssa sylvatica	Black Gum	30' OC	2'' Cal. B&B
Quercus bicolor	Swamp White Oak	30' OC	2'' Cal. B&B
Quercus coccinea	Scarlet Oak	30' OC	2'' Cal. B&B
Quercus marilandica	Blackjack Oak	30' OC	2'' Cal. B&B
Quercus palustris	Pin Oak	30' OC	2''Cal. B&B
Quercus phellos	Willow Oak	30' OC	2''Cal. B&B
Quercus stellata	Post Oak	30' OC	2''Cal. B&B
Tilia Americana	Basswood	30' OC	2''Cal. B&B
Minor Deciduous Trees			
Select species from the Zone 1 Plant Material List and/or native species and cultivars of native species from the Zone 7 Plant Material List. Specify 1.75" Caliper B&B for Single stem or 5' Height B&B for Multistem.			
Evergreen Trees			
Ilex opaca	American Holly	15' OC	6' Ht. B&B SHA approved varieties
Juniperus virginia	Eastern Red Cedar	15' OC	6' Ht. B&B/#25 CG
Magnolia virginiana	Sweetbay Magnolia	15' OC	6' Ht. B&B
Pinus rigida	Pitch Pine	20' OC	6' Ht. B&B
Pinus virginiana	Virginia Pine	20' OC	6' Ht. B&B
Shrubs			
Select shrubs native to the Maryland Piedmont Region from the Zone 1 Plant Material List or specify other natives and/or cultivars of natives as approved by OED-LAD. Specify size at 30" height minimum, #5 CG stock. Space as necessary for shrubs to grow together and minimize weed growth.			
Container Grown Herbaceous Species			
'Cape' Ammophila breviligulata Fernald	'Cape'American beachgrass	18" OC	Plug
Amsonia tabernaemontana	Eastern Bluestar	18'' OC	Plug
Andropogon virginicus	Broomsedge	18'' OC	Plug
Asclepias incarnata	Swamp Milkweed	18'' OC	Plug
Asclepias tuberosa	Butterfly Weed	18'' OC	Plug
Aster novae-angliae	New England Aster	18'' OC	Plug
Aster novi-belgii	New York Aster	18'' OC	Plug
Carex retrorsa	Retrose Sedge	18'' OC	Plug, 32 per tray

Eragrostis spectabilis	Purple Lovegrass	18'' OC	Plug
Eupatorium dubium	Joe-pye Weed	18'' OC	Plug
Helianthus angustifolius	Swamp Sunflower	18'' OC	Plug
Heliopsis helianthoides	False Sunflower	18'' OC	Plug
Hibiscus moscheutos	Swamp Rose Mallow	24'' OC	Plug
Iris versicolor	Blue Flag	18'' OC	Plug
Iris virginica	Virginia Blue Flag	18'' OC	Plug
Juncus effusus	Soft Rush	12'' OC	Plug
Leymus arenarius 'Blue Dune'	Blue Lyme Grass	18" OC	Plug
Liatris spicata	Blazing Star	12'' OC	Plug
Lupinus perennis	Sundial lupine	18" OC	Plug
Oenothera fruticosa	Sundrops	18'' OC	Plug
Panicum amarum Elliott	Bitter panicgrass	18" OC	Plug
Panicum virgatum (species and approved cultivars)	Switchgrass (species and approved cvs)	18" OC	Plug
Rudbeckia Triloba	Black-eyed Susan	18'' OC	Plug
Schoenoplectus pungens var. *pungens (Scirpus pungens)*	Common Three-Square	24'' OC	Plug
Scirpus cyperinus	Woolgrass	18'' OC	#SP4
Schoenoplectus validus (*Scirpus validus)*	Soft-Stemmed Bulrush	18'' OC	Plug
Solidago sempervirens	Seaside goldenrod	18" OC	Plug
Sparganium americanum	Bur-reed	18'' OC	Plug
Spartina pectinata	Freshwater Cordgrass	18'' OC	Plug
Symphyotrichum laeve var. laeve	Smooth Blue Aster	18'' OC	Plug
Thalictrum pubescens	King of the Meadow	18'' OC	Plug

Notes:
1. All plugs to be 38 per tray, 2" diameter, and 5" depth unless otherwise noted.
2. B&B indicates Balled and Burlapped. CG indicates Container Grown. OC indicates On Center Spacing.
3. Herbaceous plants included on the Zone 6 Plant List may have specific cultural requirements and may not be suitable for certain locations or some types of SWM facilities. Additional native species and cultivars of native species may be submitted for review and approval of OED-LAD.

3.13.04.07 ZONE 7 INTERCHANGE PLANTING

The intent for areas labeled as Zone 7 is to provide plantings in interchange areas, especially near bridge abutments and high visibility steep slopes for added aesthetic interest and erosion control. Naturalized massings of trees and shrubs are to be included for added aesthetic interest, soil stabilization, and environmental enhancement. The Design-Build Team shall employ this plant association in accordance with the following criteria:

a. Providing large naturalized masses composed of multiple single-species groupings of trees and shrubs are to be used in high visibility naturalized or steep slope areas.

b. Providing masses composed primarily of evergreens and more closely-spaced deciduous trees and shrubs where necessary to screen views or headlight glare from roadways into adjacent properties.

c. Using tree and shrub species that provide added aesthetic interest with flowers, fruit, fall color, bark texture or color.

d. Installation of container grown or B&B trees and shrubs or Shrub Seeding shall occur outside of highway clear zones or locations where woody plants are removed during vegetation management operations as per the *SHA Integrated Vegetation Management Manual for Maryland Highways*. Meadow Establishment will be used in locations where woody plants are not permitted and regular mowing will not be required or feasible.

e. Container grown and B&B plants will cover 40 percent of the total area in Zone 7. Areas graded for future roadway expansion and locations where woody plants are prohibited are excluded from this calculation as are bridge abutment plantings, which are calculated separately.
   a) Calculate coverage using the following values:
      - 200 SF Major Deciduous Tree 2" cal. B&B
      - 200 SF Evergreen Tree 7' ht. B&B
      - 150 SF Minor Deciduous Tree 1.75" cal. B&B/#10 CG
      - 150 SF Minor Multistem Deciduous Tree 7' height B&B/#10 CG
      - 100 SF Major Deciduous Tree 1.25" cal. B&B/# 10 CG
      - 100 SF Minor Deciduous Tree 1.25" cal. B&B/#10 CG
      - 100 SF Minor Multistem Deciduous Tree 5' height B&B/#10 CG
      - 50 SF Evergreen Tree 3' ht. B&B/#5 CG
      - 30 SF Large Shrub 30" height/spread (Min #3 CG)
      - 20 SF Small Shrub 24" height/spread (#3 CG)
      - 5 SF Ornamental Grasses #1 CG

   b) At least 50% of the total credit provided is to be from tree planting.

f. Select tree and shrub species from the plant lists for Zones 1 and 6. Use of native plants and cultivars of natives is preferred, however, the use of non-native species in lists 1 and 6 may be approved at the discretion of OED-LAD.

g. Masses of shrubs and ornamental grasses are to be installed in mulched landscape beds, with spacing reduced to minimize weed growth. Beds shall be designed to infill to outcompete weeds and minimize future maintenance. Trees within 6' of mulched beds are to be included in beds.

h. Woody Plant Setbacks:
   i. Trees are to be kept at least 30 ft. away from bridge abutments or parapets.

ii. Shrubs are to be kept at least 10 ft. away from bridge abutments.

i. Planting Density: Container grown and B&B plants will be installed throughout the total area of bridge abutment planting areas at the following densities:

a) Provide credit equivalent of 10,000 SF of trees, calculated using the following values:

- 200 SF Major Deciduous Tree 2" cal. B&B
- 200 SF Evergreen Tree 7' ht. B&B
- 150 SF Minor Deciduous Tree 1.50" cal. B&B/#10 CG
- 150 SF Minor Multistem Deciduous Tree 7' height B&B /#10 CG
- 100 SF Major Deciduous Tree 1.25" cal. B&B/# 10 CG
- 100 SF Minor Multistem Deciduous Tree 5' height B&B/#10 CG
- 50 SF Evergreen Tree 3' ht. B&B/#5 CG

b) Provide the credit equivalent of 20,000 SF of shrubs and Ornamental Grasses, calculated using the following values:

- 30 SF Large Shrub 3' height B&B
- 25 SF Large Shrub 30" height/spread, Min #3 CG
- 20 SF Small Shrub 24" height/spread, #3 CG
- 10 SF Small Shrub 18" spread, #2 CG (Rhus aromatica 'Gro-Low' only)
- 5 SF Ornamental Grasses #1 CG

j. Select tree and shrub species for Interchange Plantings from the plant lists below. Additional species and cultivars may be used at the approval of OED-LAD.

ZONE 7 Interchange Plantings

BOTANICAL NAME	COMMON NAME	COMMENTS
Major Deciduous Trees (25' o.c. spacing unless otherwise noted)		
Acer rubrum 'Autumn Flame'	Autumn Flame Maple	seedless
Acer rubrum 'Brandywine'	Brandywine Maple	seedless
Acer rubrum 'Burgundy Belle'	Burgundy Belle Maple	
Acer rubrum 'Franskred'	Red Sunset Maple	
Acer rubrum 'October Glory'	October Glory Maple	
Acer rubrum 'Sun Valley'	Sun Valley Maple	seedless
Betula nigra 'BNTF'	Dura Heat River Birch	9' Ht. B&B, 3-5 stems, 15' OC spacing
Betula nigra 'Cully'	Heritage River Birch	9' Ht. B&B, 3-5 stems, 15' OC spacing
Liquidambar styraciflua'Happdell'	'Happidaze' Sweetgum	few seeds
Liquidambar styraciflua	Rotundiloba Sweetgum	seedless

'Rotundiloba''		
Nyssa sylvatica	Blackgum	30' OC spacing, May be #25 CG
Quercus coccinea	Scarlet Oak	
Single Stem Minor Deciduous Trees (15' o.c. spacing unless otherwise noted)		
Acer ginnala 'Flame'	Flame Amur Maple	
Amelanchier arborea var. arborea	Common Serviceberry	
Amelanchier laevis 'Autumn Brilliance'	Autumn Brilliance Serviceberry	
Amelanchier laevis 'JFS-Arb'	Spring Flurry Serviceberry	
Amelanchier laevis 'Robin Hill'	Robin Hill Serviceberry	
Amelanchier laevis 'Snowcloud	Snowcloud Serviceberry	
Cercis canadensis	Redbud	
Crataegus viridis 'Winter King'	Winter King Hawthorn	
Prunus serrulata 'Kanzan'	Kansan Cherry	(commonly known as Kwanzan cherry)
Prunus serrulata 'Snowgoose'	Snowgoose Cherry	
Prunus virginiana var. virginiana 'Schubert Select'	Canada Red Chokecherry	
Prunus x incamp 'Okame'	Okame Cherry	
Prunus x yedoensis	Yoshino Cherry	20' OC spacing
Prunus x yedoensis 'Akebono'	Akebono Yoshino Cherry	20' OC spacing

Multistemmed Minor Deciduous Trees (15' o. c. spacing unless otherwise noted)		
Amelanchier canadensis	Canadian Serviceberry	
Amelanchier laevis 'Autumn Brilliance'	Autumn Brilliance Serviceberry	
Cornus mas 'Golden Glory'	Golden Glory Cornelian Cherry	
Cotinus x 'Grace'	Grace Smoketree	
Lagerstroemia x 'Biloxi'	Biloxi Crapemyrtle	
Lagerstroemia x 'Choctaw'	Choctaw Crapemyrtle	
Lagerstroemia x'Comanche'	Comanche Crapemyrtle	
Lagerstroemia x 'Lipan'	Lipan Crapemyrtle	
Lagerstroemia x'Muskogee'	Muskogee Crapemyrtle	
Lagerstroemia x 'Natchez'	Natchez Crapemyrtle	May specify single leader
Lagerstroemia x 'Sioux'	Sioux Crapemyrtle	

Evergreen Trees (spacing as noted)		
Ilex opaca	American Holly	SHA-approved varieties, 15' OC
Ilex x Nellie R. Stevens	Nellie Stevens Holly	10-15' OC
Magnolia virginiana	Sweetbay Magnolia	multistem, semi-evergreen, 15' OC
Picea abies	Norway Spruce	20' OC
Picea glauca	White Sprue	20' OC

Picea omorika	Serbian Spruce	20’ OC
Pinus strobus	White Pine	25’ OC
Shrubs (max. spacing as noted)		
Cornus sericea f. baileyi	Bailey’s Red-twig Dogwood	3’ OC
Cornus sericea ‘Cardinal’	Cardinal Red-twig Dogwood	3’ OC
Ilex verticillata ‘Jim Dandy’	Jim Dandy (male) Winterberry	3’ OC, pollinator for Red Sprite. 1 per 20 females
Ilex verticillata ‘Maryland Beauty’	Maryland Beauty Winterberry	4’OC (provide appropriate male pollinator)
Ilex verticillata ‘Red Sprite’	Red Sprite Winterberry	3’ OC
Ilex verticillata ‘Southern Gentleman’	Southern Gentleman Winterberry (male)	4’ OC Pollinator for Winter Red.
Ilex verticillata ‘Winter Red’	Winter Red Winterberry	4’ OC (provide appropriate male pollinator)
Myrica pensylvanica	Northern Bayberry	4’ OC
Photinia melanocarpa’Elata’	Elata Black Chokeberry	(Aronia m. ‘Elata’) 3’ OC
Photinia pyrifolia ‘Brilliantissima’	Brilliant Red Chokeberry	(Aronia arbutifolia ‘Brilliantissima’) 30” OC
Rhus aromatica ‘Gro-low’	Fragrant Sumac	18” spd, #2 CG 3’ OC
Rhus copallina	Shining Sumac	4’ OC
Rhus glabra	Smooth Sumac	4’ OC
Viburnum dentatum	Southern Arrowwood	3’ OC
Viburnum dentatum ‘Blue Muffin’	Blue Muffin Viburnum	3’ OC
Viburnum dentatum ‘Chicago Lustre’	Chicago Lustre Viburnum	4’ OC
Viburnum nudum ‘Winterthur’	Winterthur Possumhaw Viburnum	3’ OC
Viburnum prunifolium	Blackhaw Viburnum	4’ OC
Viburnum rhytidiphylloides ‘Alleghany’	Alleghany Viburnum	4’ OC
Viburnum x pragense	Prague Viburnum	4’ OC

Ornamental Grasses			
Panicum virgatum ‘Cloud Nine’	Cloud Nine Switch Grass	3’ OC	#1 CG
Panicum virgatum ‘Dallas Blues’	Dallas Blues Switch Grass	3’ OC	#1 CG
Panicum virgatum ‘Heiliger Hain’	Heiliger Hain Switch Grass	30” OC	#1 CG
Panicum virgatum ‘Northwind’	Northwind Switch Grass	30” OC	#1 CG
Panicum virgatum ‘Prairie Fire’	Prairie Fire Red Switchgrass	30” OC	#1 CG
Panicum virgatum ‘Rotstrahlbusch’ (P. v. Hanse Herms)	Rotstrahlbusch Switch Grass	30” OC	#1 CG
Panicum virgatum ‘Shenandoah’	Shenandoah Switch Grass	30” OC	#1 CG
Panicum virgatum ‘Squaw’	Squaw Switch Grass	30” OC	#1 CG
Panicum virgatum ‘Warrior’	Warrior Switch Grass	3’ OC	#1 CG

Note: CG indicates Container Grown. OC indicates On Center Spacing.

3.13.05 Landscape Submittals and Other Requirements

3.13.05.01 Forest Impact Plans

The Forest Impact plans shall be prepared and formatted at a minimum scale of 1" = 50', and shall indicate forest impacts based on the most current limits of disturbance. Forest Impact Plans shall indicate the quantities of impacts on each plan sheet for each individual area identified, and shall include a summary of quantity totals for the entire package of drawings. Forested wetlands shall not be included in the Forest Impact as wetland impacts are quantified and mitigated separately. The Design-Builder will update the Forest Impact Plans throughout construction and provide a completed set to SHA following completion of construction activities impacting tree and forest areas.

3.13.05.02 Tree Impact and Minimization Report

The Design-Build Licensed Tree Expert shall prepare a Tree Impact Avoidance and Minimization Report consistent with the *SSCM* Section 120-Tree Preservation. Submit the Report to the Office of Environmental Design, Landscape Operations Division (OED-LOD) for approval, prior to installation of erosion and sediment controls.

The report shall detail all impacts to trees and forest areas as well as impact reduction and tree preservation measures. In addition, the report will include the Design-Builder's plan to maintain compliance with the MDA Quarantine on Fraxinus (Ash) species, including disposal of Ash trees impacted by the project.

3.13.05.03 Preliminary Landscape Plans

The Design-Builder shall prepare Preliminary Landscape Plans based on the Landscape Concept Plans. The Design-Builder shall be responsible for coordinating the plans for the Landscaping with all other elements of work to be performed under the Contract including, but not limited to: Final grading; storm drain and stormwater management BMP locations and outfalls; cross culvert outfalls; utilities; signage; and lighting. The Design-Builder shall demonstrate that areas were maximized for plantings and that the Design-Builder worked cooperatively toward this goal. Landscaping required as part of the stormwater management plans shall be included on the Landscape plans to ensure a unified planting theme is created for the project.

In the event that conditions change during the design process so as to affect the design integrity of the approved Preliminary Landscape Plan, it is the responsibility of the Design-Builder Landscape Architect to immediately inform

the SHA, OED, and LAD of the situation and recommend remedies that may be considered by the SHA and LAD.

The Preliminary Landscape Plan shall be formatted as a roll plan at a minimum scale of 1" = 50' and may include: graphics, sketches and illustrations to convey the Landscape Architect's design intent in complying with the requirements of the RFP. The Landscape Concept Plans, which are included in this Request for Proposals (RFP) document, are indicative in nature, and provided as a guideline; these plans designate planting zones by type, location and square foot or square yard area

The preliminary plans shall include, but are not limited to: Existing conditions, including adjacent natural and manmade features; concept design elements; limits of construction phasing; location and extent of planting zone types; anticipated types of plantings, such as overstory and understory; and clear labels or a legend to identify these elements. proposed roadway; tree preservation areas; reforestation areas; plant types, locations and potential species selections; stormwater and ESD plantings; cut and fill lines; limit of disturbance lines; Right of Way lines, and other information deemed necessary for adequately evaluating the proposed planting locations.

Preliminary Landscape Review Meeting. The Design-Builder shall conduct a review meeting with OED-LAD and OED-LOD to discuss and review the Preliminary Landscape Plans. This meeting should be scheduled early in the design process to ensure adequate opportunity for coordination and integration with other engineering and design disciplines. The Design-Builder shall prepare meeting minutes and distribute them to attendees for review and comments. After approval by OED-LAD and the OED-LOD of the Preliminary Landscape Plans, the Design-Builder may then begin to develop and advance the Landscape Plans to a Pre-final level of completion while continuing close coordination and communication with other engineering and design disciplines.

3.13.05.03 Pre-Final Landscape Plans

The Pre-final Landscape Plans shall serve for use in a multi-disciplinary review to identify and resolve any conflicts. Plans shall be prepared at a scale no smaller than 1" = 50', and shall include, but are not limited to: Existing and proposed roadway and site conditions; limits of disturbance; Right of Way lines; existing grades; proposed grades; stormwater management BMP locations; SHA-required setbacks from travel lanes; all existing and proposed utilities and their SHA-required setbacks; all barriers, fences, signage, lighting, and other fixtures that may pose a potential conflict within the project site; location and extent of planting zone types; plant species and locations; and clear labels and legends to indicate all elements of the drawings. If the Design-Builder or SHA determines a conflict from one or more of these elements, the Design-Builder shall be

responsible for modifying the Landscape Plans, while still retaining the intent of the design.

3.13.05.04 Pre-final Landscape Review Meeting.

The Design-Builder shall conduct a review meeting with all engineering and design disciplines, OED-LAD, and OED-LOD to discuss and review the Pre-final Landscape Plans. This meeting should be scheduled well in advance of the submittal of the Final Landscape Plans to ensure adequate opportunity for coordination and all required revisions. The Design-Builder shall prepare meeting minutes, which will include a list of compiled comments to be addressed prior to the submission of Final Landscape Plans, and distribute them to attendees for review and comments.

3.13.05.05 Final Landscape Plans

Final Landscape Plans shall include all plant species, cultivars, sizes and locations for the project. The plans shall include all proposed roadside, stormwater management, wetland, and stream restoration plantings and shall be submitted at a scale no smaller than 1" = 50'. The plans shall include the sizes of planting zones in acres, and quantities of plants anticipated, noting any differences in quantities from previous phases in the form of a chart/table. The stormwater plantings shall include the surface area of treatments, in addition to quantities of plantings. Plans shall include signs, utilities, roadside barriers and other elements that impact planting areas to demonstrate that the greatest amount of planting area was utilized.

3.13.05.06 Plant Material Sources

The Design-Builder shall obtain all plants from nurseries that employ best IPM practices and shall conform to SPI Section 920 of the Standard Specifications..

3.13.05.07 Invasive Species Control Plan

The Design-Builder shall prepare and submit a detailed Invasive Species Control Plan to the SHA as part of the definitive design submittal for consultation and written comment. Refer to 3.13.03.04 Invasive Species Management for requirement, treatment, and removal of Invasive species and prohibited weeds.

3.13.05.08 Contour Grading

The Design-Builder shall perform contour grading throughout the limits of the project Right of Way. Contour grading for both cut and fill conditions shall be performed so that the resultant landforms are natural in appearance, blend well with the surrounding landscape and built features, facilitate positive drainage, and minimize opportunities for erosion. Grading shall be performed to maintain desirable existing vegetation and accommodate project landscape plantings.

Changes in slopes shall be rounded to appear smooth and natural. Slopes to be routinely mowed shall be no steeper than 4:1.

3.13.05.09 SWM Fence

SWM fencing shall be constructed at SWM facilities accessible by adjacent properties as required by SHA's Storm Water Management Safety Policy. SWM fencing shall be constructed and consist of black vinyl coated chain link fencing. Chain link fencing shall be provided according to the SHA's Pond Fencing Guidelines with a height of 3.5 feet and be placed so as to be visually unobtrusive. Chain link fencing used at stormwater management facilities shall have a top rail run continuously between terminal posts at the top of the chain link. Chain link shall be tied to the top rail at two-foot maximum spacing. The top rails shall conform to the brace rail and brace rail attachment specifications. No brace rail is required when top rails are used. A tension wire shall be run continuously between terminal posts near the bottom of the fabric and be attached to the fabric with hog ring fasteners at eighteen-inch intervals. A twelve-foot wide double gate shall be constructed at each SWM facility requiring fencing.

3.13.05.10 Soil Test Reports

The Design-Builder shall comply with the SHA Environmental Guidelines for Construction Activities.

The Design-Builder shall obtain and submit subsoil and topsoil test results, along with the proposed method to comply with subsoil and topsoil requirements, to the SHA for consultation and written comments.

3.13.05.11 Nutrient Management Plan/Report

The Design-Builder shall comply with the SHA Environmental Guidelines for Construction Activities.

3.13.05.12 Final Acceptance

3.13.05.12.01 Landscape Warranties

Installation Phase Acceptance for Trees, Shrubs and Ornamental Grasses/Perennials shall conform to Section 710 of the Standard Specifications. The Design-Builder shall provide a warranty and maintain all landscape plantings for one year after Acceptance for Maintenance of plantings and landscape work. Acceptance for Maintenance for plantings and landscape work shall be implemented after all plant materials in the project have been planted, are true to species and minimum size, and are in a healthy and thriving condition. In addition, each plant pit or bed shall be properly filled, mulched, pruned and staked. During this one-year warranty period, the Design-Builder shall provide all required plant care and maintenance. This work shall include, but is not

limited to: watering, weeding, fertilizing, pest control, invasive plant control, mulching, pruning, and replacement of any plant materials that are not in a healthy and thriving condition reflective of the species and in accordance with the SHA's Standard Specifications for Construction and Materials, SPI Sections 705, 706, 707, and 710.

This one-year plant material warranty shall commence with installation acceptance and apply to all landscaping, wetland, and stormwater management plantings required in the project.

3.13.05.12.02 Stormwater Facility Landscape Final Acceptance

Landscaping in Stormwater management facilities will be maintained by the Design-Builder until approval of the SWM as-built drawings. Maintenance will include mowing of turf areas, control of invasive species as per the approved invasive species management program, repair of eroded areas, re-seeding bare areas, repairing and replacing soil stabilization matting, and replacing plantings in Bioretention Soil Mix (BSM) to maintain required minimum planting density.

a. The following shrub and perennial survival rates will be required within BSM in the event that SWM as-built approval occurs after the completion of the Plant Establishment Phase in Section 710:

Plant Type	**Size**	**Survival %**
Shrub	30 in. ht, #5 CG	90%
Perennial	#1 CG	90%
Perennial (#SP4)	#SP4 CG	80%
Perennial (Plug)	Plug 2 in. diam. By 5 in. depth.	70%

3.13.05.12.03 Turfgrass Final Acceptance

Turfgrass Final Acceptance shall conform to Section 705 of the Standard Specifications. The Design-Builder shall submit a turfgrass establishment certification package that consists of field photographs and completed turfgrass inspection checklists. All acceptable turfgrass areas shall have a uniform dark green color and have achieved the minimum density per Standard Specification SPI 705.03.10.

3.13.05.12.04 Meadow Final Acceptance

Meadow Final Acceptance shall conform to Section 707 of the Standard Specifications. The Design-Builder shall submit a meadow establishment

certification package that consists of field photographs and completed meadow inspection checklists. All acceptable meadow areas shall be as specified in SPI 707.03.11.

TC 3.14 GEOTECHNICAL PERFORMANCE SPECIFICATION

3.14.01. GENERAL

The Administration has completed a preliminary geotechnical subsurface investigation for this project. The results of the preliminary geotechnical subsurface investigation are included in the RFP. The preliminary geotechnical subsurface investigation data were obtained with reasonable care and recorded in good faith. Its presentation on the plans or elsewhere is for the purpose of providing intended users with access to the same information available to the Administration. The Administration neither assumes nor implies any warranty regarding the data provided, other than that the information was obtained at the locations and depths indicated and to the accuracy of the data at the time of drilling and/or testing.

The preliminary subsurface data presented is not intended as a substitute for a subsurface investigation by the Design-Builder. The Design-Builder shall form its own interpretation and assessment of the subsurface investigation data provided to satisfy itself as to the nature of the subsurface conditions, the form and nature of the site and nature of the Work that may affect the detailed design, construction methods, and tools.

It is the Design-Build Team's responsibility to perform a complete geotechnical program including, but not limited to supplemental subsurface investigation, analyses, and design, as necessary to complete the design and construction of this project. The supplemental subsurface investigation, analyses, design and construction shall be performed in accordance with this Geotechnical Performance Specification and all applicable reference and guidelines listed in TC 3.08. It is the Design-Builder's responsibility to obtain written clarification for any unresolved ambiguity prior to proceeding with any subsurface investigation, analyses, design and construction.

3.14.02. REQUIREMENTS

3.14.03.01 Geotechnical Subsurface Investigation

a. Geotechnical Planning Report

The Design-Builder shall prepare a Geotechnical Planning Report and submit to Office of Materials Technology's Engineering Geology Division for review and approval. The subsurface investigation shall not start until the Geotechnical Planning Report is approved.

The Geotechnical Planning Report shall include the understanding of the project, the discussion of potential geotechnical challenges of the project, Design-Builder's assessment and interpretation of the preliminary geotechnical investigation data included in the RFP, the detailed supplemental geotechnical investigation plan, the rationale of the supplemental geotechnical investigation plan, and the proposed schedule. The Geotechnical Planning Report shall also include a Quality Assurance/Quality Control (QA/QC) plan for its supplemental subsurface

investigation, analyses, design, and construction. See Section 3.14.05.01 "Geotechnical Planning Reports" for detailed submittal requirements of the Geotechnical Planning Report.

The Geotechnical Planning Report shall identify all personnel that will be involved during the supplemental geotechnical investigation and those personnel shall meet the requirements specified in GS 2.1 of Maryland State Highway Administration Standard Specifications for Subsurface Explorations. In addition, all field investigations and laboratory testing shall be performed under the direct supervision of a Maryland-registered professional engineer with a minimum of five (5) years experiences in the performance and supervision of geotechnical engineering projects.

The Geotechnical Planning Report shall identify all laboratories to perform the laboratory testing and include the list of testing for which each laboratory is certified by AASHTO Materials Reference Laboratory (AMRL). All laboratories conducting geotechnical testing shall be AASHTO Materials Reference Laboratory (AMRL) certified. The laboratories shall only conduct those tests for which the laboratory is certified.

The Geotechnical Planning Report shall include the energy efficiency of each SPT drill rig to be used for the project. The amount of driving energy shall be measured using ASTM D4633 - Standard Test Method for Energy Measurement for Dynamic Penetrometers. If energy efficiency of SPT drill rig is not available at the time of developing the Geotechnical Planning Report, the Design-Builder shall include a schedule to conduct the energy measurement for drill rigs. The energy efficiency information of each drill rig shall be also included on each boring logs. Boring logs without energy efficiency information of the drill rig being used will not be acceptable.

b. Field Investigation

The supplemental subsurface investigation shall be performed in accordance with the Technical Specification of Maryland State Highway Administration Standard Specifications for Subsurface Explorations. It is Design-Builder's responsibility to obtain, prior to the start of the subsurface investigation work, all permits, utility clearances and licenses required by any of all Federal, State, County, or local laws or regulatory agency requirements in accordance with GS 2.15 of Maryland State Highway Administration Standard Specifications for Subsurface Explorations.

The soil and rock samples obtained by the Design-Builder for the supplemental subsurface investigation are the property of the Administration. The Design-Builder shall deliver all samples to Field Exploration Division, Office of Materials Technology upon completion. The Design-Builder shall submit two copies of Compact Disks Field Exploration Division, Office of Materials Technology with all original driller's logs, final boring logs in PDF format, and final boring logs in gINT file format. Field Exploration Division, Office of Materials Technology is located at 7450 Traffic Drive, Hanover, MD 21076, Phone: 1-866.926.8501 (Toll free).

The Standard Penetration Test shall be performed every 2 feet in the upper 10 feet and every 5 feet thereafter. All roadway embankments shall have one Standard Penetration Test location performed at least every 500 feet along the roadway embankment. All testing locations shall be performed to a depth of at least twice the height of the embankment beneath the anticipated bearing elevation (i.e. to a depth sufficient to characterize settlement and stability issues) or to

auger refusal, whichever is shallower. All cut excavations shall have one Standard Penetration Test location performed at least every 300 feet along the cut area. All testing locations shall be performed to a depth of at least 25 feet below the anticipated bottom depth of the cut or to auger refusal, whichever is shallower.

c. Laboratory Testing

Undrained shear strength, Su, shall be determined using Consolidated undrained (CU), unconsolidated undrained (UU) testing or in situ testing such as CPT, Flat Plate Dilatometer Test (DMT), or VST. Strength measurements from hand torvanes, pocket penetrometers, or unconfined compression tests, or correlated from SPT shall not be used to determine undrained shear strength. If in situ testing is used to determine the undrained shear strength, the undrained shear strength shall be calibrated with the appropriate level of triaxial testing. CPT testing results shall be correlated with soil borings and laboratory triaxial testing to back-calculate the cone factor for the specific soil types under evaluation. The DMT results should be corrected and correlated to undrained shear based on the FHWA Publication FHWA-SA-91-044.

The drained shear strength of cohesive soils, c' and φ', shall be evaluated by consolidated drained (CD) triaxial tests, or consolidated undrained (CU) triaxial tests with pore pressure measurements. The drained shear strength of cohesive soils, c' and φ', shall not be evaluated by direct shear tests. The drained shear strength of soils that have both φ' and c′ shall be treated as if the soil were either cohesive soils or cohesionless soils. The drained friction angle of granular deposits shall be evaluated by correlation to the results of SPT testing, CPT testing, or other relevant in-situ tests.

In laboratory tests, the rate of shearing load application shall be sufficiently slow to ensure substantially complete dissipation of excess pore pressure in the drained tests, or, in undrained tests, complete equalization of pore pressure throughout the specimen.

Parameters obtained from in-situ testing, without correlation with soil index and validation by a qualified engineer shall not be allowed for design purposes. Laboratory testing conducted on undisturbed samples shall be performed no more than 7 calendar days after sample retrieval.

The Administration has established maximum allowable Total Soil Shear Strength and Maximum Allowable Effective Soil Shear Strength design parameters shown in Table 1.1 and 1.2 for use in design. These soil shear strength design parameters may not be exceeded without laboratory testing and the express written permission of the Administration.

Table 1.1 Maximum Allowable Total Soil Shear Strength

Soil Type	Peak		Residual	
	c	ϕ	c_r	$ϕ_r$

USCS	Description	(psf)	(degrees)	(psf)	(degrees)
GW, GP, GM, GC	Stone and Gravel	0	34	0	18
SW	Coarse Grained Sand	0	17	0	7
SM, SP	Fine Grained Sand	0	17	0	7
SP	Uniform Rounded Sand	0	15	0	6
ML, MH, SC	Silt, Clayey Sand, Clayey Silt	1,500	15	1,200	6
SM-ML	Residual Soils	900	14	700	6
CL-ML	NC Clay (Low Plasticity)	1,500	0	900	0
CL, CH	NC Clay (Med-High Plasticity)	2,500	0	1,250	0
CL-ML	OC Clay (Low Plasticity)	2,500	0	1,400	0
CL, CH	OC Clay (Med-High Plasticity)	4,000	0	2,000	0

Table 1.2 Maximum Allowable Effective Soil Shear Strength

Soil Type		Peak(1)		Residual	
USCS	Description	c' (psf)	ϕ' (degrees)	c_r' (psf)	ϕ_r' (degrees)
GW, GP, GM, GC	Stone and Gravel	0	40	0	34
SW	Coarse Grained Sand	0	38	0	32
SM, SP	Fine Grained Sand	0	36	0	30
SP	Uniform Rounded Sand	0	32	0	32
ML, MH, SC	Silt, Clayey Sand, Clayey Silt	0	30	0	27
SM-ML	Residual Soils	0	27	0	22
CL-ML	NC Clay (Low Plasticity)	0	35	0	31
CL, CH	NC Clay (Med-High Plasticity)	0	26	0	16
CL-ML	OC Clay (Low Plasticity)	0	34	0	31
CL, CH	OC Clay (Med-High Plasticity)	0	28	0	16

(1) The same maximum peak effective shear strength parameters shall be used for peak effective internal friction angle of normally consolidated cohesive soils and to the fully-softened internal friction angle of overconsolidated soils.

The selection of soil shear strength design parameters for borrow materials requires that the Design-Builder obtain soil shear strength parameters from all potential borrow pit sources. Evaluation of the soil shear strength design parameters requires that a composite bulk sample be obtained from the borrow source and have the following laboratory tests performed:

- Moisture Density Relationship (Modified Proctor)
- Grain Size Distribution with wash #200 Sieve
- Moisture-Plasticity Relationship Determination (Atterberg Limits)
- Natural Moisture Content
- Consolidated Undrained (CU) Triaxial Shear Test with pore pressure measurements (sample remolded to 97% of Modified Proctor with moisture -1 percent to +2 percent of optimum moisture content) to obtain drained and undrained shear strength parameters

3.14.03.02 Geotechnical Analyses and Design

a. Software and Spreadsheets

Software and spreadsheets used for geotechnical analysis and design shall be consistent with AASHTO, FHWA and MDSHA guidelines and specifications. The Design-Build team shall provide background information about the software or spreadsheet, assumption made and their limitations, calculation procedure, references, definition of parameters, units, equations used, input values and output values. The Administration reserves the right to accept or reject the use of a particular software or spreadsheet. The calculation results of software or spreadsheet shall also be checked with hand-calculations.

b. Roadway Slopes (Fill Embankment and Cut Slopes)

The need for geotechnical analyses (settlement, bearing, slope stability) for roadway depends on the height of the slope, slope ratio, subsurface conditions, ground water table, adjacent structures, the type of materials being used for fill embankment or materials encountered for cut slope, etc. The Design-Builder shall review and assess the subsurface exploration data provided in the RFP and evaluate the need for additional subsurface exploration and the need for the slope stability, settlement, bearing capacity.

Geotechnical analyses shall be performed for the critical sections. The Administration requires geotechnical analyses (settlement, bearing, slope stability, etc.) being performed for slopes meeting any one of the following scenarios:

1) Slopes steeper than 2H:1V;
2) Slope higher than 5 feet;
3) Slope in soft soil (e.g. wetland);
4) Ground water table near or above the toe of the slope;
5) Slopes supporting structures, e.g. building retaining wall, bridge, etc.;
6) Rock slopes or excavation into rock;

Roadway slope in excess of 20 feet in height shall include a bench at least 10-feet in width at the mid height of the slope. For fill embankment higher than 10 ft, geotextile inclusion shall be

placed every three feet (vertical spacing) along the edge of fill embankments per SP 200 Geotextile Inclusion.

All slopes shall be designed to minimize erosion by rainfall and runoff. Adequate drainage and erosion control provisions shall be incorporated in the design and construction of embankments. Drainage and erosion control provisions and means to control seepage shall be incorporated in the design and construction of the cut slopes. The Design-Builder shall have a record of water levels and the slope stability calculation shall model the effect of seepage in the slope stability calculations. The seepage line shall be intercepted with the use of slope drains or horizontal drains or any other techniques to enhance the stability of cut slopes. If the toe of the slope is adjacent to pond or water, the toe of the slope shall be protected by riprap.

Permanent roadway soil slopes (fill embankment or cut slopes) shall not be steeper than 2H: 1V without reinforcement. Reinforced soil slopes shall be designed and constructed per SP 200 Reinforced Soil Slope, SP 900 Geosynthetic Reinforcement Reinforced Soil Slope, and SP 200 Soil Nail Slope.

c. Slope Stability

Slope stability analyses shall be conducted using limit equilibrium methodologies using a computer program such as PCSTABL, ReSSA, or StedWIN/GSTABL. The use of slope stability design charts shall not be acceptable. The Simplified (Modified) Bishop, simplified Janbu, Spencer, or Morgenstern and Price may be used for rotational and irregular surface failure mechanisms. Simplified (Modified) Bishop Method is required.

Circular, sliding, compound and wedge type failures shall be analyzed for potential occurrence for each critical location. For all slope stability analyses, linear Mohr-Coulomb model shall be used for soil strength model unless it is approved by the Administration. The evaluation of global slope stability shall accommodate potential seepage forces, water infiltration, surficial water runoff and any weak deposits and seams that are adversely impacted by water flow.

Below are the requirements of the minimum safety factor:

1) A minimum safety factor of safety of 1.3 is required for fill embankment slopes not steeper than 2H:1V for both global stability and surficial stability analyses.
2) A minimum factor of safety of 1.5 is required for cut soil slopes not steeper than 2H:1V for global stability and surficial stability.
3) A minimum factor of safety of 1.5 is required for soil slopes supporting structures.
4) Reinforced soil slopes shall be designed and constructed per SP 200 Reinforced Soil Slope, SP 900 Geosynthetic for Reinforced Soil Slope and SP 200 Soil Nail Slope.

d. Settlement

The settlement analyses shall include immediate settlement, consolidation settlement, secondary

settlement, and time for settlement. Fill embankments shall be designed to keep estimated total long-term settlements limited to one (1) inches during a period of 50 years after construction. Differential settlements within fill sections and across fill/structure interfaces shall be limited to 1/300.

e. Ground Improvement

The use of soil improvement techniques to increase soil shear strength or to reduce compressibility in order to increase the safety factors for external and internal stability and to reduce settlements to the allowable range will be allowed in the design. Techniques such as soil-cement, vertical drains, surcharge, stone columns, vibro compaction, dynamic compaction, lime columns, cement columns, deep mix methods, rammed aggregate pier, and grouting may be considered.

All soil improvement systems shall be designed using current practice and procedures. The performance of all ground improvement techniques shall be verified with a pre-production, post-production field testing program (e.g SPT, CPT, DMT, load testing, etc.), and instrumentation developed to demonstrate that the proposed methods and design will provide the ground improvement level required to satisfy the performance requirements specified herein.

f. Alternative Materials

Alternative embankment materials for reducing load and settlement such as foamed concrete, expanded polystyrene and fired/expanded clay shale may be considered for use on the project upon approval by the Administration. Recycle materials such as wood chips/products and by-products from steel and coal production, such as slags and fly ashes, will not be allowed for the project. The Contractor shall submit the following for alternative materials proposed for use and approval on the project:

1) The purpose of materials;
2) Design calculations;
3) Material design specification,
4) Material strength and engineering properties,
5) Construction and placement specification,
6) Material quality control plan specification,
7) Long-term performance history,
8) Certification and test data demonstrating compliance with all MDE and EPA requirements for use of recycled materials, and
9) Material Safety Data Sheets from the material supplier.

3.14.03.03 Construction

The Design-Builder is responsible for any and all damage (including, but not limited to settlement and vibrations) to property, structures, or utilities, both inside and outside of the State Right-of-Way, caused by the Work on the Project, and shall appropriately mitigate for these damages.

The Design-Builder is responsible for the temporary support of excavation and it shall be designed in accordance with all applicable OSHA standards and AASHTO requirements including, but not limited to, the appropriate lateral earth pressures, hydrostatic pressure, surcharges and construction loading. Detailed design of all components shall be completed by the Design-Builder, including but not limited to, temporary decking, sheeting, bracing and tie-backs.

The Design-Builder shall prepare instrumentation plans, where appropriate, to monitor existing facilities, temporary construction support structures and in-progress construction of permanent facilities for effects of construction activities such as excavation by blasting, pile driving and nearby construction equipment traffic. Monitoring may include vibrations, ground accelerations, tilt or rotation, and vertical and lateral movement during and after construction.

The Design-Builder shall prepare a report detailing the proposed program of instrumentation and monitoring, establishing threshold values of monitored parameters, and describing the response plans that will be implemented when threshold parameters are exceeded. After the Administration's review and comment on the instrumentation plan, threshold values and response plan, the Design-Builder shall provide, install and monitor the instrumentation during and after construction and interpret the data. Construction instrumentation monitoring reports shall be submitted to the Administration prior to opening the instrumented work for subsequent construction. Corrective actions shall be taken where the instrumentation data so warrant.

The instrumentation plan shall provide that potentially affected facilities are protected against damage due to the construction of the Work. Limiting values of movement (horizontal and vertical), vibration and acceleration for each facility within the zone of influence of the Work shall be established by the Design-Builder. To establish these limiting values, the designer shall consider the nature of buildings and facilities within the sphere of influence of the construction activities, including their use, foundation systems, structural design and current condition. Records of facilities, where available, shall be examined during the design stage and, where no record exists, assessments shall be made and clearly stated. These assessments shall be subject to verification at the commencement of the construction phase prior to the adjacent construction activity.

In addition to the instrumentation plan, the Design-Builder shall conduct preconstruction and post-construction surveys for nearby structures and facilities that may be affected by construction activities. The minimum distance for preconstruction and post-construction surveys is 500 feet from existing facilities, temporary construction support structures and construction of permanent facilities to construction activities such as excavation by blasting, pile driving, and nearby construction equipment traffic.

The Design-Builder shall prepare and submit instrumentation monitoring plans to either monitor facilities that may be affected by construction activities or to monitor field performance of specific construction elements in accordance with the following criteria and requirements. The Design-Builder's Instrumentation Engineer shall have a minimum of 5 years of experience in planning instrumentation programs, monitoring, analyzing instrumentation data and providing control and threshold values.

1) The extent of the monitoring program will depend on the size and type of the facilities. The instrumentation program shall be implemented to monitor potential settlement, stability of fill or cut slopes and stability of surrounding structures;
2) The type and distribution of instrumentation shall demonstrate an understanding of the need, purpose and advantages of using each proposed instrument;
3) The plan shall include consideration of environmental effects such as temperature, rain, sun, wind, corrodibility, and electromagnetic wave interference;
4) Responsibilities for the instrumentation plan, procurement, installation, recording, maintenance and protection shall be the Design-Builders;
5) The instrumentation plan will provide construction-related control information and accommodate the collection of long-term performance data;
6) Test installations may be performed to demonstrate the compliance and acceptability of instrumentation in relation to the Contract requirements;
7) If instruments fail or are damaged they shall be replaced at no cost to the Administration and the Design-Builders Geotechnical Engineer may require that all work cease in the area to be monitored by the instruments, with the concurrence of the Administration;
8) Monitoring shall be initiated a minimum of 15 days prior to construction of the features being monitored to establish baseline readings; and,
9) The results of the vibration measurements shall be used to develop attenuation curves for predicting vibrations at varying distances from the source.

3.14.03. SUBMITTALS

All submittals will be subject to review and approval as per TC Section 3.06.20.1. All submittals shall be prepared, signed and sealed by a Professional Engineer licensed in the State of Maryland. All submittals shall be submitted to the Administration at least 30 days prior related activities (e.g. mobilization, construction, procurement of materials supply, etc.). Copies of these submittals shall also be sent to the Project Engineer and the Engineering Geology Division, Office of Materials Technology (OMT) located at 7450 Traffic Drive, Hanover, MD 21076, Phone: 1-866.926.8501 (Toll free).

3.14.03.01 Geotechnical Planning Reports

The Design-Builder shall prepare Geotechnical Planning Reports for the project per 3.14.03.01. The Geotechnical Planning Reports shall include a detailed method statement describing the general philosophy and methods of investigation, preliminary design and analysis and selection of the anticipated means of construction for the included Project elements. The method statement shall indicate how material and design details are chosen to match selected construction methods and construction details and the soil, rock, and groundwater environment for the site.

For each Geotechnical Planning Report, the Design-Builder shall include the information required per 3.14.03.01 and the following technical information, as a minimum:

a) Description of geology and various ground types to be encountered along the alignment;
b) A description of the geotechnical information that was collected and analyzed in developing the Design-Builder's Geotechnical Planning Report;
c) Assessment of the engineering properties of all soil types, including the expected average and range of soil strengths and deformation properties and the preliminary design parameters for all soil and rock types;
d) A narrative describing the interpretation of the pertinent geotechnical data used as a basis for preliminary selection, design, and installation of the proposed foundation elements;
e) A description of the planned supplemental subsurface investigation (See "Design-Builders Subsurface Exploration").
f) The Geotechnical Planning Reports shall define the investigation, engineering and design approach that will be followed in order to develop the most technically, and environmentally acceptable and durable foundations, cut and fill slopes, retaining structures, pavements, storm water management, and geotechnical designs for the elements included in the Geotechnical Planning Report.
g) The Geotechnical Planning Report should also include a set of full size or half size plans and cross sections of the areas covered by the report, and a copy of any reports or references referred in the report.
h) The Geotechnical Planning Report should include calibration information and the efficiency of all hammers and sampling assembly to be used for the project.

3.14.03.02 Geotechnical Subsurface Investigation Summary Report

The Design-Builder shall prepare Geotechnical Subsurface Exploration Summary Report after the completion of subsurface investigation including field testing and laboratory testing. The Geotechnical Subsurface Investigation Summary Report shall include the following, at a minimum:

a) Scope work of the project and the report;
b) Location plan showing borings, geophysical testing and other in-situ testing;
c) Field testing procedures;
d) Final typed boring logs updated with laboratory testing results;
e) Electronic copy of the gINT data of subsurface investigation data;
f) Results of any in-situ testing and geophysical testing;
g) Description of subsurface conditions, including groundwater, and subsurface profiles;
h) Results of laboratory tests;
i) Values assigned to soil parameters for design;
j) Descriptions of geotechnical risks and approach to respond to risk (e.g. settlement problems, stability, etc.);
k) Discussion of geotechnical analyses and designs to be performed;
l) Discussion of construction considerations and needs such as blasting, instrumentation, pre/post construction survey;

m) Calibration information and the efficiency of all hammers and sampling assembly used for the project.

n) A set of full size plans and cross sections of the area covered by the report,

o) Copies of any reports or references referred in the report.

3.14.03.03 Final Geotechnical Reports

The Design-Builder shall prepare Final Geotechnical Reports prior to releasing constructed elements for subsequent work. The Final Geotechnical Reports shall include the following, at a minimum:

a) The corresponding Geotechnical Planning Report;

b) The corresponding Geotechnical Subsurface Investigation Report;

c) Location map and results of borings, rock coring, geophysical testing and other in-situ testing;

d) A detailed description of geological and subsurface conditions for each Project element (including a description of site stratigraphy);

e) Field investigation procedures;

f) Discussion of groundwater conditions;

g) Results of laboratory tests;

h) Values assigned to all applicable soil parameters for design;

i) All pertinent data and complete discussions of all geotechnical analyses and design;

j) All relevant design calculations and computer program output/inputs checked and initialed by a Professional Engineer licensed in the State of Maryland;

k) Conclusions and recommendations for structure foundations, embankments, cut slopes, retaining walls, ground improvement, requirements for backfill materials, etc.;

l) Groundwater problems encountered, means of dewatering and/or other solutions;

m) Designs for support of excavation;

n) Discussion of pre-construction survey;

o) Recommendations of instrumentation monitoring and post-construction survey;

p) Special provisions developed;

q) A set of full size plans and cross sections of the area covered by the report,

r) Copies of any reports or references referred in the report.

3.14.03.04 Geotechnical Instrumentation Reports

The Design-Builder shall prepare Geotechnical Instrumentation Reports during the construction per Geotechnical Final Report. The Geotechnical Instrumentation Reports shall include the following, at a minimum:

a) Qualifications of instrumentation personnel;

a) Instrumentation location plans;

b) Instrumentation installation records and calibration data for acquisition equipment used to collect the required instrumentation data.

c) Instrumentation data and post-construction survey;

d) Recommendations;

e) A set of full size plans and cross sections of the area covered by the report;

f) Copies of any reports or references referred in the report.

TC SECTION 3.15 UTILITY PERFORMANCE SPECIFICATION

3.15.01 Utility Statement

3.15.01.01 General.

The Design-Build Team's attention is called to the requirements of Section GP-5.05, GP-7.13 and GP-7.17.

3.15.01.01.01 Buy America Steel/Iron Materials.

This section applies to projects partially or totally funded with Federal Funds. The prime contractor or its subcontractors shall comply with Section 165 of the Surface Transportation Assistance Act of 1982 as amended by Section 1041(a) and 1048(a) of the Intermodal Surface Transportation Efficiency Act of 1991 with regard to the furnishing and coating of iron and steel products.

The prime contractor or its subcontractors shall supply certifications to the Project Engineer from the manufacturer of all coating, iron or steel products which document that the steel and iron have been manufactured and the coatings for iron or steel have been applied by the manufacturer in the United States. The Project Engineer shall forward copies of the certifications to the Office of Materials Technology for review and approval prior to such items being incorporated into the permanent work. Certifications shall extend to materials utilized in manufactured and fabricated products purchased by the Contractor.

Products manufactured of foreign steel or iron materials may be used, provided the cost of such products as they delivered to the project does not exceed 0.1% of the total contract amount, or $2500, whichever is greater. If a supplier or fabricator wishes to use a partial fabrication process where domestic and foreign source components are assembled at a domestic location, the "as delivered cost" of the foreign components should include any transportation, assembly and testing costs required to install them in the final product.

This applies to all iron, steel and coating materials used for utility work incorporated into the project including materials/items supplied by the Utility Company.

3.15.01.02 Utilities within Project Limits

The Design-Build Team (DBT) is alerted to the presence of overhead and underground utilities including, but not limited to, water, sanitary sewer, gas, transmission pipelines, electric, communication, fiber optic, utility conduit, well, septic tanks, poles and house service

connections that are located within the limits of the State Highway Administration (SHA) right of way and within the limits of the construction project. It is the responsibility of the DBT to avoid, protect, coordinate, and relocate these utilities as necessary to maintain service, safety, and project schedule with minimal disruption to the traveling public or utility customers.

The DBT is responsible to coordinate with these Utility Companies on the overall project design, schedule, and construction. The DBT is also responsible to coordinate any and all Utility Owner design, schedule and relocations by working directly with the Utility Owners. As the DBT has the flexibility to determine how to perform certain operations and how much space will be needed to perform those operations, the relocations will be based on the Utility companies' safety and clearance requirements. It may be necessary for the DBT to utilize non-typical methods in some cases to avoid impacting utility facilities. Associated costs will be incidental to the overall contract lump sum.

Utility Owner Contact Information:

Ms. Lynn Grossman BGE (electric) 2nd Floor 2900 Lord Baltimore Drive Baltimore, MD 21244 Phone: 410-470-7868 Lynn.m.grossman@constellation.com	Level 3 Communications 1025 Eldorado Boulevard Broomfield, CO 80021 Phone: 720-888-0336 relo@level3.com & matt.crome@level3.com
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Mr. Jerry Fisher Columbia Gas Transmission, LLC 34646 Old Valley Pike Strasburg, VA 22657 Phone: 540-465-6441 jfishel@cpg.com	Ms. Andrea Abend SHA District Utility Engineer (DUE) 5111 Buckeystown Pike Frederick, MD 21776 Phone: 301-624-8116 aabend@sha.state.md.us

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Mr. Steve Drake Lightower Fiber Networks 11 New Plant Court Owings Mills, MD 21117 Phone: 585-743-1736 sdrake@lightower.com	Mr. Tim Schneid, Sr. BGE Gas Transmission Mains Real Estate Representative (Room 302) 1068 N. Front Street Baltimore, MD 21202 Phone: 410-470-6707 Timothy.Schneid@bge.com

3.15.01.03 Utilities Coordinator.

The DBT shall provide a Utility Coordinator with experience in coordinating the relocation of utilities on major roadway projects. Responsibilities for this position include, but are not limited to, continuous coordination with all Utility Companies, establishment and continual updates of schedules for the relocation of utilities, creation and maintenance of the utility conflict matrix, tracking progress of Utility Owner design and utility construction, coordination with DBT design and construction personnel to ensure they are minimizing impacts to and protecting existing utility facilities, facilitation of issues and conflicts pertaining to utilities as they arise, organize and facilitate at least monthly Utility Coordination Meetings, including preparation of the agenda and distribution of meeting minutes.

3.15.01.04 Utility Coordination Meetings.

The DBT shall conduct and facilitate a utility coordination meeting as soon as possible after notification as the successful proposer and prior to issuance of the Notice to Proceed. Attendees shall include:

- DBT Design-Build Manager and/or Construction Manager
- DBT Utility Coordinator
- The SHA Design Project Engineer
- The SHA Construction Project Engineer
- The SHA District 7 Utility Engineer
- The SHA Area Engineer
- A responsible officer of any necessitated subcontractors
- Utility Owners and/or their representatives

At a minimum the following shall be discussed at this meeting:

- Status of DBT design and construction
- Potential utility impacts and avoidance and minimization efforts
- DBT planned design and construction schedule and coordination between utility relocation design and construction schedule
- Schedule for utility relocations including how they will be facilitated within the DBT's design and construction
- Issue resolution
- Schedule for future utility coordination meetings

The DBT Utility Coordinator shall prepare all meeting minutes and distribute them to the team for review, comments, and follow up within five (5) calendar days from the meeting date.

3.15.01.05 Utility Coordination.

The DBT shall incorporate and make provisions in the design for all utility relocations. The DBT shall establish and maintain ongoing coordination with Utility Owners to fulfill the following requirements:

a) Obtain plans from the Utility Companies.

b) Ensure adequate protection of their utilities.

c) Maintain utility service at all times during construction of the project.

d) Identify all potential conflict areas both overhead and underground and perform test holes to verify conflicts.

e) Incorporate and accommodate utility relocations in the schedule and sequence of construction.

f) Conduct alternative studies to avoid utility relocation

g) Incorporate utility relocations in the schedule and sequence of construction.

h) Provide the design and construction associated with any utility service connections to existing and proposed Traffic Control Devices. The DBT shall be responsible for all conduits, manholes, cabling, meter cans, and disconnect switches as required by the utility to obtain the electrical utility connection. Monthly energy use charges and the final connection fees will be the responsibility of SHA.

i) Provide construction stakeout and clearing and grubbing for any required utility relocations.

3.15.01.06 Utility Relocations by Others.

Any utility relocations determined to be unavoidable shall be performed by the respective third party utility owners. Immediate notification shall be made by the DBT to the utility owner and SHA if a conflict is identified.

3.15.01.06.01 Howard County DPW.

This project is beyond the metropolitan district. Howard County has no sewer or fiber optic facilities on this project. A water line may be present near the MD 108 crossing of MD 32.

3.15.01.06.02 BGE Electric.

BGE maintains aerial and underground facilities within the project limits. Any necessary utility relocation design and construction shall be concurrent to this project. BGE will design and relocate their facilities for impacts which are unavoidable.

It is the responsibility of the DBT to coordinate BGE design and relocations with the DBT's design, schedule and sequence of construction so that there are no delays to the utility relocations or the DBT's schedule. A minimum of 3 feet of cover shall be maintained on underground facilities and all work shall adhere to BGE Standards including Design Manuals, General Provisions, Specifications, and Standard Details.

3.15.01.06.03 Williams Gas Pipeline.

Williams maintains transmission gas pipelines within the project limits. The DBT shall maintain a minimum of 3 feet of cover over Williams Gas mains and encasements at all times. All work within the Williams Gas transmission easement shall adhere to Williams Gas requirements. Vibratory rollers shall not be used within the transmission easement. Plans, including specifications for any equipment to be utilized in the transmission easement, shall be submitted for a 30 day review to Williams Gas to confirm all requirements are met. A Williams Gas representative shall be on site for any and all work within the transmission easement. A minimum of 72 hours notice shall be provided to Williams Gas before any work begins within the transmission easement.

3.15.01.06.04 BGE Gas.

BGE owns and maintains transmission and distribution pipelines within the project limits. BGE will design and relocate their facilities for impacts which are unavoidable.

The DBT shall maintain a minimum of 3 feet of cover over BGE transmission mains and encasements at all times. Minimum gas distribution line horizontal clearance is 4-5' and vertical clearance is 12". All work within the BGE transmission easement shall adhere to BGE Standards including Design Manuals, General Provisions, Specifications, and Standard Details. Plans, including specifications for any equipment to be utilized in the transmission easement, shall be submitted for a 30 day review to BGE to confirm all requirements are met. A BGE representative may be required on site for any and all work within 10 feet of the of the transmission easements. A minimum of 72 hours notice shall be provided to BGE before any work begins within the transmission easement.

If there is an existing abandoned gas main in the project, the DBT shall contact the BGE Call Center at 1 800 685 0123 to request the gas main tested to verify it is abandoned. A site contact name and number must be provided and the pipe shall be exposed for access with a minimum 3'x4' hole. In order for BGE to test the pipe, they will need to access the hole to weld or fuse fittings on the main for safety reasons. Trench boxes or other safety precautions may be required.

3.15.01.06.05 Level 3 Communications.

Level 3 owns and maintains fiber optic lines within the project limits. Level 3 will design and relocate their facilities for impacts which are unavoidable. For all inquiries concerning this project, reference the file number 61946 MD.

3.15.01.06.06 Columbia Gas Transmission, LLC.

Columbia Gas maintains transmission gas pipelines within the project limits. The DBT shall maintain a minimum of 3 feet of cover over Columbian Gas mains and encasements at all times. All work within the Columbia Gas transmission easement shall adhere to Columbia Gas requirements including Appendix B for Columbia Pipeline Group Right-of-Way Use Procedure number 220.003.009

Vibratory rollers shall not be used within the transmission easement. Plans, including specifications for any equipment to be utilized in the transmission easement, shall be submitted for a 30 day review to Columbia Gas to confirm all requirements are met. A Columbia Gas representative shall be on site for any and all work within the transmission easement. A minimum of 72 hours notice shall be provided to Columbia Gas before any work begins within the transmission easement.

3.15.01.06.07 Lightower Fiber Networks.

Lightower owns and maintains a fiber optic line within the project limits. Lightower will design and relocate their facilities for impacts which are unavoidable.

3.15.01.06.07 Comcast Cable.

Comcast owns and maintains facilities within the project limits. Comcast will design and relocate their facilities for impacts which are unavoidable.

3.15.01.06.08 Verizon of Maryland.

Verizon has aerial and underground facilities within the limits of this project. Verizon will design and relocate their facilities for impacts which are unavoidable. Verizon has both active and abandoned facilities within the limits. The Design-Builder shall coordinate with Verizon and have these facilities field verified.

3.15.01.07 Utility Relocations by DBT

3.15.01.07.01 SHA Traffic Control Devices.

The DBT shall coordinate the design and construction of any and all utility service connections to existing and proposed Traffic Control Devices with the Utility Company. The DBT shall be responsible for all conduits, manholes, cabling, meter cans and disconnect switches as required by the utility to obtain the electric utility connection. The DBT shall review all existing and proposed traffic signal structures and related equipment to ensure clearance from all existing and proposed utility lines are in compliance with OSHA, MOSH and the High Voltage Line Act. Relocations and/or adjustments may be necessary to obtain the clearance that is required by the SHA Office of Traffic and Safety to ensure the signals can be maintained in compliance with the High Voltage Line Act. NO EXCEPTIONS will be made.

3.15.01.07.02 Permitting.

The Utility Owner is to obtain the required utility permits from the Administration. The DBT shall obtain any other approvals with regard to utility work that is performed by the DBT including service connections. If the DBT has reasonable cause to believe that a Utility Owner performing construction work on the site does not have necessary approvals, or is in violation of the approvals, the DBT shall notify the Administration immediately after discovery.

3.15.01.07.03 Existing Utility Services.

The plans show some existing utility service connections, however, this does not relieve the DBT from identifying all impacted service connections within the limits of the project. No guarantees are made regarding the completeness or accuracy of said connections. The DBT must communicate with the Utility Companies and use all means necessary to locate existing services and protect as necessary. Should a service require relocation, the DBT is responsible for the coordination and work required to relocate, reconnect and remove the existing service. Utility services must be maintained at all times during construction, unless written permission is obtained from the Utility Owner.

3.15.01.07.04 Existing Utility Locations.

The DBT must notify Public Service Companies of work intentions 48 hours before work is to begin, by calling MISS UTILITY at 1-800-257-7777 or by applying for utility locates online at: http://www.missutility.net/. All notifications to the above Utility Companies and "MISS UTILITY", at 1-800-257-7777, shall be given 48 hours (two full working days) in advance of working in the area of each specifically affected utility. The notification to "MISS UTILITY" is required whenever any excavating or similar work is performed. The DBT is responsible for following the MISS UTILITY process prior to any excavation or work associated with this project. Utility locations shown on the plans are for the convenience of the DBT and shall not be considered accurate or complete unless it has been located and verified by a test hole. The cost for this coordination shall be included in the overall contract lump sum and the time needed should be considered in the project schedule.

3.15.01.07.04.01 Utility facilities owned by the SHA.

Regarding stake out of State Highway Administration owned facilities, please make note of our new notification procedures. SHA is now part of MISS UTILITY, and we also charge fees for our locates. The DBT **must** provide the contract number (HO1415170) when contacting MISS UTILITY for locates. This provision is required whether the DBT contacts MISS UTILITY via the internet or by phone. Failure of the DBT to comply with this requirement may result in a locate fee by SHA for which the DBT **will not** be allowed to recover. When processing online, you shall complete the LOCATE REQUEST FORM. On this form, toward the bottom is the Section – EXCAVATION INFORMATION. Under this section, in the blank space to the right of "Work Being Done For" type – HO1415170. This will allow MISS UTILITY to know what District number and highway agency that you are working for.

Regarding the marking of SHA owned facilities, the DBT shall contact the following (a minimum 72-hour advance notice is required):

Intelligent Transportation System (ITS) devices: SHA OOM Communications 410-747-8590 **AND** ITS Operations 410-787-7662.

SHA Owned Street Lighting: District 7 Maintenance Section, Dan Houck (301) 624-8108.

SHA owned traffic signal facilities: Hanover Complex Signal Shop 410-787-7652.

3.15.01.07.05 Protection of Existing Utilities during Construction.

The DBT shall maintain a minimum of three (3) feet of cover over all existing utilities that will be left in service during construction. SHA utility clearances are listed in the MD Department of Transportation SHA Utility Policy. Some Utility Owners have provided their minimum clearances which are listed under 3.15.01.06. SHA and Utility Owner clearances must be

adhered to. If there is a discrepancy, it is DBT's responsibility to work out a resolution with SHA and the Utility Owner. In the event that this requirement cannot be met, the DBT shall immediately contact the impacted Utility Owner to determine alternative means of protection.

3.15.01.07.05.01 Utility Damage.

The DBT shall locate all existing utilities, including Administration owned utilities, and be responsible for their safety. Should any existing utilities or Administration owned facilities be damaged or destroyed due to the operations of the DBT, the Utility Owner must be immediately notified and the damaged or destroyed components shall be immediately replaced or repaired as necessary to restore the facilities to a satisfactory operating condition as directed by the Utility Owner. The DBT shall be responsible for completing a Utility Damage Report form to use in the event a utility or Administration owned facility is damaged. The DBT shall complete and submit a Utility Damage Report within 24 hours of the damage. Refer to Appendix "A" for a copy of the report.

3.15.01.07.06 Surface Utility Frames.

The DBT shall make all adjustments to surface utility frame and covers located in pavement and concrete, not limited to manholes, water valves, water meters, gas valves and gas meters. The DBT must coordinate with the Utility Owner on the specifications and schedule. This work is to be included in the overall contract lump sum.

3.15.01.07.07 Utilities: Guidelines and Technical Requirements.

All utilities within the Project area, designed and/or constructed by the DBT, shall be placed in accordance with applicable OSHA, MOSH, Utility Owner Regulations, Governmental Rules, including the Administration's utility regulations and policies, MD Department of Transportation SHA Utility Policy Manual and Utility Procedure Manual, the applicable Utility Standards, Maryland Tariff, and other requirements specified in the Contract Documents. The DBT is to ensure the technical requirements are maintained while designing proposed improvements around and/or near utility facilities.

3.15.01.07.07.01 Gas Transmission Facilities.

BGE, Williams Gas, and Columbia Gas own and maintain transmission facilities within the project limits. They shall review and approve any proposed excavation and heavy equipment crossing their facilities and or working within their transmission easements. BGE, Williams Gas and Columbia Gas require 72 hours notice prior to the DBT working (including test holes and excavation) near their facilities and/or within their transmission easements so they can schedule a representative to be on site while the work is taking place. Vibratory rollers shall not be used within the transmission easements.

3.15.01.07.09.16 Measurement and Payment.

All work performed coordinating with utilities and their contractors, working around and protecting existing aerial and underground utilities shall not be measured for payment. It may be necessary for the DBT to utilize non-typical methods in some cases to avoid impacting utility facilities. Associated costs will not be measured for payment, but are to be included in the overall contract lump sum.

Appendix
"A"

UTILITY DAMAGE Report
REPORT

UTILITY DAMAGE INFORMATION

Exact Location: _____

Date & Time of Incident: _____

Reported By: _____

Repaired By: _____

UTILITY OWNER INFORMATION

Utility Owner: _____

Utility Owner Contact: _____

Time Utility Owner Contacted: _____

LOCATOR INFORMATION

Locator Service: _____

Date of Locate Request: _____

Locate Expiration Date: _____

Locate Log Number: _____
Was Line Marked: _____
Distance from Damage to Mark:
_

CONTRACTOR INFORMATION
Name of Supervisor: _____
Name of Foreman: _____
Name of Witness: _____

SIGNATURES
Contractor's Supervisor: _____
Utility Owner: _____
Locator Service: _____

DESCRIPTION OF DAMAGE:

_____
_____
_____
_____

TC 3.16 MAINTENANCE OF TRAFFIC (MOT), HAUL ROUTES AND ACCESS DURNING CONSTRUCTION PERFORMANCE SPECIFICATION

3.16.01 General

The Design-Builder shall develop and implement a Transportation Management Plan (TMP) in accordance with the requirements of this specification including performance requirements, standards and references, design and construction criteria, maintenance during construction, and required reviews.

This performance specification provides the flexibility to establish a TMP and to adopt Maintenance of Traffic (MOT) operational changes throughout the Project life to produce benefits or savings to the Administration or the Design-Builder without impairing the essential functions and characteristics of the Project, such as safety, mobility, traffic operations, durability, desired appearance, maintainability, environmental protection, drainage, and other permitted constraints.

Work zone impacts, including impacts on the environment and surrounding communities, shall be kept to a minimum, and shall be considered when developing and implementing the Transportation Management Plan. To that end, a Transportation Management Plan Report shall be developed by the Design-Builder. The TMP Report will lay out transportation management strategies and how these strategies will be implemented to manage work zone impacts.

3.16.02 Guidelines

Maintenance of Traffic shall be in accordance with this Maintenance of Traffic (MOT) Performance Specification and the relevant requirements of the Guidelines and References in TC 3.08.

3.16.03 Performance Requirements

Administration responsibilities

The Administration's responsibilities include the following activities:

A) Maintaining Quality Assurance (QA) of any MOT analysis, work zone impact management strategies and temporary traffic control plans from the Design-Builder;
B) Liaising with and monitoring the Design-Builder's performance for compliance with this Contract's requirements;
C) Maintaining documentation for the TMP as developed by the Design-Builder;
D) Providing a trained individual to implement and monitor the TMP during construction;
E) Monitoring implementation of the TMP to verify that strategies are being implemented on schedule and in the manner planned, and that they are effectively managing the work zone impacts.

Design-builder personnel requirements

This project requires the Design-Builder to have a team experienced in Maintenance of Traffic, including work zone design, work zone traffic analysis, and traffic control devices and setups.

Traffic Manager:

The Design-Builder shall provide a Traffic Manager (TM) on-site whose sole responsibility is to supervise and continuously monitor the installation and maintenance of all traffic control devices. The TM shall be equivalent to, meet the requirements of, and perform all duties of Section 104.18 of the Administration's Standard Specifications for Construction and Materials. The Design-Builder shall authorize the TM to direct traffic changes to ensure safe and continuous traffic flow and to direct traffic operations after a traffic incident has occurred. A TM shall be available at all times and be on-site within a ½ hour throughout the duration of the Project. The TM shall document all daily maintenance of the traffic control setups, including but not limited to maximum queue lengths/delays, work zone modifications, incidents, and suggested improvements. Minimum qualifications of the TM include successful completion of Administration's Temporary Traffic Control Traffic Managers Training Course and five years' experience in work zone traffic control.

Flaggers:

The Design-Builder shall provide flaggers with a current American Traffic Safety Services Association (ATSSA) flagger certification. The flaggers provided shall maintain their flagger certification throughout the life of the Project.

3.16.03.01 Maintenance of Traffic – General Requirements

All maintenance of traffic design and implementation shall be performed in accordance with the following performance requirements:

A) Provide for the safe and efficient passage of pedestrians (including those with disabilities), bicycles, and vehicular traffic through and around construction zones;
B) Prohibit use of new permanent pavement construction as haul route(s);
C) Minimize negative impacts on residents, commuters, and businesses;
D) Provide convenient and logical rerouting of traffic (by using advance warning systems and directional and informational signing, lighting, and striping) to provide "driver friendly" detours and to maximize the safety of the traveling public;
E) Maintain and provide access at all times to properties for owners, customers, visitors, and emergency vehicles;
F) Provide a safe travel corridor while minimizing any unnecessary investment in the existing infrastructure that is being replaced;
G) Develop and coordinate MOT activities with the Maryland State Police, local law enforcement, and other emergency service agencies to ensure public safety and emergency response times are not compromised;
H) Coordinate MOT activities and Traffic Control Plans with other construction projects;
I) Provide Traffic Control Plans (TCPs) for each major phase of construction (see Section 3.16.06 of this performance specification);
J) Provide for a Public Outreach campaign to be implemented in cooperation with the Administration; and
K) Develop an incident management plan for accidents occurring within the Project limits, including accident prevention strategies, emergency procedures, reporting requirements, and mitigation strategies.

3.16.04 Design And Construction Criteria

3.16.04.01 Traffic Through Construction Zones

The Design-Builder shall perform the following:

A) Implement Traffic Control Plans for all roadways within the Project limits in a manner that safely and efficiently accommodates traffic at all times.
B) Design temporary traffic control plans and implement maintenance of traffic setups using prevailing travel speeds (not posted or design speeds) to determine buffer and taper lengths, clear zone distances, attenuator arrangements, acceleration and deceleration length, and other temporary traffic control elements.
C) Provide all material, labor, equipment, and personnel to effectively carry out the TMP. All equipment and tools shall be in good operating condition and shall be

kept in proper adjustment throughout the duration of the project. All materials and supplies shall be of good quality and suitable for the assigned work.

D) Provide and use all safety equipment including (but not limited to) hard hats, safety vests and clothing required by State and Federal regulations and Administration policies and procedures.

E) Begin maintenance of traffic activities at the start of construction work (including preparatory MOT work), or when first hauling construction materials and/or equipment, whichever is earliest and continue MOT activities until Completion of the Project.

F) Arrange and host a pre-traffic switch meeting with the Administration and all affected agencies at least two weeks prior to switching traffic.

G) Identify desired full roadway or ramp closures (for any period of time) and submit a request in writing to the Administration for review and concurrence during the design review process.

H) Correct all traffic control deficiencies immediately upon notification or observance of the deficiency.

I) Design temporary traffic control plans using temporary raised pavement markers liberally such that all temporary markings are supplemented with temporary raised pavement markers for positive guidance during darkness.

J) Design temporary traffic control plans in a manner that reduces conflict areas. Introducing new intersections, either signal or STOP controlled, along MD 32 shall not be permitted.

K) Design all geometric aspects of temporary roadways for the assigned prevailing speed, and appropriate design vehicle (school bus, pickup truck with livestock trailer, and WB-67)

L) Design all active roadways to accommodate drainage such that there are no puddles or icing on the traveled roadway or shoulders.

M) Ensure appropriate MOT and flagging procedures are employed during all phases of construction, including mobilization activities.

3.16.04.02 Public Information and Outreach

Actively assist the Administration in providing advance information to the public regarding construction phasing, detour routes, and expected travel impacts, and coordinate these activities through frequent meetings with the Community Outreach Manager SHA's Office of Communications and District – 7 Community Liaison. Coordinate with the Administration regarding special events that may affect traffic patterns through and around the Project limits and adjust the TMP and TCPs as needed.

3.16.04.03 Public Access

Maintain access to all businesses, residences, local streets and private driveways at all times, including all temporary approaches to, crossings of, and intersections with roads and streets. Consider any special access needs of property owners and tenants, such as business hours, delivery schedules and circulation patterns.

3.16.04.04 Pedestrian and Bicycle Traffic

The Design – Builder shall maintain all existing pedestrian and bicycle access along existing facilities at all times during construction. The pedestrian access way shall be fully compliant with all applicable regulations for accessibility, as defined by the Americans with Disabilities Act (ADA). Whenever an existing pedestrian access route in the public right of way is blocked by a construction, alteration, or maintenance activity, an alternate accessible pedestrian route must be provided.

Recreational trails, including bicycle paths, shall also be maintained and kept in good condition. Access to all recreational facilities shall be provided and coordinated with the appropriate governing agency.

3.16.04.05 Schools and Public Transportation Agencies

The Design-Builder shall coordinate with the local schools, appropriate Board of Education, and public transportation agencies for both city and local counties to maintain bus, private vehicle, and pedestrian access to education facilities and public transportation services in the area. Access to bus stops shall also be maintained. Construction impacts on school bus and public transportation routes shall be coordinated with the local agencies. Construction staging shall be developed with the goal to minimize impacts to existing school bus routes.

3.16.04.06 Detour Routes

Design, place, and maintain all traffic detours required during construction. Wherever possible, use State routes of a similar roadway caliber (i.e. similar number of travel lanes and similar roadway classification as the road being closed) for detour routes. The Design – Builder is also responsible for obtaining all necessary permits from the respective agencies for temporary roadways, including construction and/or haul routes.

Detour routes shall be required when complete road or ramp closures or elimination of a particular movement or movements at an intersection approach are necessary. Proposed detour routes shall be included in the Traffic Control Plans and reviewed through the design review process (see Section 3.16.06 of this performance specification). Complete closures of roadways will not be permitted without the express written approval of the Administration (or Howard County for county roadways) as part of the design review process prior to the closure. Specific identification and written documentation of the proposed closure, including traffic and operational impacts, shall be provided to the Administration during the design review process for each request.

3.16.04.07 Motorist Guidance

The Design – Builder shall provide guidance and signage to and along the entire length of

every detour route to motorists who are diverted around or traveling through the construction areas. Signing that is not in compliance with the MD MUTCD or Category 1 of the Administration's Book of Standards shall be corrected within 24 hours, unless the sign is a critical regulatory or warning sign, in which case the sign shall be corrected within 6 hours of notice. If the deficiency is caused by an accident, the 6 hours begins when access to the area is available.

For closures of surface streets or changes in roadway configurations, the Design-Builder shall provide guide signs in accordance with the TCP for that particular phase, MD MUTCD and Category 1 of the Administration's Book of Standards. At least seven (7) calendar days before a road closure or major change in the roadway configuration or travel pattern, the Design-Builder shall utilize portable variable message signs warning motorists of the pending changes. Messages to be displayed shall be submitted to the Administration for review and comment. The Design-Builder shall coordinate motorist guidance activities with the Community Outreach Manager.

3.16.04.08 Work Zone Intelligent Transportation Systems (ITS)

Utilize existing and future CHART and Administration variable message signs as part of the TMP. It is the responsibility of the Design – Builder to coordinate the operation of these signs and the implementation of the appropriate messages with the Administration.

3.16.04.09 Construction Access and Haul Routes

Provide all construction roads required for delivery of fill, asphalt, concrete, bridge girders, and all other materials required for the Project. It is the responsibility of the Design – Builder to obtain all necessary permits from all applicable agencies for construction, maintenance, and removal of temporary roadways, including construction and/or haul roads.

3.16.04.10 Local Roadway Crossings

The Administration will allow construction traffic to cross roadways that intersect with the Project as long as the crossing is maintained within the Project right-of-way. Proper flagging procedures and/or temporary traffic signals are required to facilitate construction traffic crossing local roadways. The Design – Builder shall ensure that delays incurred to local roadways as a result of at-grade crossing operations do not exceed the mobility thresholds established by the Administration's "Work Zone Lane Closure Analysis Guidelines".

3.16.04.11 Emergency Response

The Design – Builder shall cooperate with the Maryland State Police, local law enforcement, and other emergency service providers in their response to accidents, fires, spills, or other emergencies in any area affected by the Project, including those on the

construction site and on traffic lanes open to the public. The Design – Builder shall cooperate in all Administration investigations of accidents and other incidents along the Project.

The Design – Builder shall work with emergency service providers and address their concerns about emergency access to and in the corridor, which may include installing gates to allow emergency personnel to access the Project area. The Design-Builder shall coordinate emergency services efforts as follows:

Assistant Chief Daniel G. Merson
Office of the Fire Marshal
Howard County Department of Fire and Rescue Services
6751 Columbia Gateway Drive, Suite 400
Columbia, MD 21046
O: 410-313-6006
F: 410-313-6066
dmerson@howardcountymd.gov

3.16.04.12 Field Verification of Traffic Operations

The Design – Builder shall be responsible for monitoring queues and delays during Maintenance of Traffic operations. If the thresholds established in the Administration's "Work Zone Lane Closure Analysis Guidelines" are exceeded, the Design-Builder shall modify the Maintenance of Traffic plans or incorporate other mitigation strategies to reduce the queues and delays below the threshold levels. All proposed changes shall be submitted to Administration for review.

3.16.04.13 MOT Restrictions

Refer to Special Provision – Section 104.01 – Traffic Control Plan, for work restrictions and temporary lane closure and/or shoulder closure requirements.

3.16.04.14 Advance Notification Requirements

The Design-Builder shall submit to the Administration a lane closure permit request form for approval of each lane closure. Lane closures will not be allowed without an approved written closure request.

Type of Lane Closure	**Minimum Advanced Notice**	**Maximum Advanced Notice**
1	30 Days	45 Days
2	10 Days	21 Days
3	7 Days	14 Days
4	3 Days	14 Days

Type 1 – Planned and acceptable closures of an arterial or local street, traffic switches, new road openings, or changed traffic patterns.

Type 2 – A lane closure that would have significant impact on traffic, such as temporarily stopping traffic completely (traffic drags), closing two (2) or more lanes, or flagging operations.

Type 3 – A lane closure that would have minor or no impact on the flow of traffic, such as closing one lane on a three-lane roadway during off-peak hours.

Type 4 - A lane closure that would close a shoulder (right or left).

For Type 1 closures, the Design – Builder shall make provisions in the MOT Phase Plan for local traffic to access properties and businesses at all times on the closed arterial or local street.

Type 1 and 2 closures will require extensive media and stakeholder notification effort and coordination among various local and State agencies. The Design – Builder shall assist with all notification and coordination efforts.

All notice periods exclude weekends and holidays.

The lane/shoulder closure request shall be submitted on a Lane/Shoulder Closure Request Form provided by the Administration and shall be submitted electronically. The information provided on the form shall include, but not limited to, the following:

1) Location: Roadway name or State route number;
2) Project Number;
3) Direction: West/East/North/South;
4) Lane Closure Type: 1, 2, 3 or 4;
5) Duration: Date and times;
6) Limits: Beginning or work zone to end or work zone;
7) Nature of work and justification of lane/shoulder closure;
8) Number of remaining lanes on roadway;
9) Lane(s)/Shoulder(s) to be closed-specifically left, right, middle, left middle, right middle, shoulder, etc.;
10) Ramp location to be closed;
11) Traffic Control Plan sheet number;
12) Appropriate Administration typical application;
13) Point of Contact: Field Inspector;
14) Contact Information;
15) Any detours required;
16) Notes: Any other pertinent information that may be needed to facilitate in clarifying closures; and
17) State Police request and required number of troopers.

The Design-Builder shall contact and notify the Administration 30 minutes prior to initiating all lane closures and after removing all lane closures.

3.16.04.15 Approval of Temporary Traffic Control Devices

All items for the maintenance of traffic shall be crashworthy in conformance with NCHRP Report 350. When conformance with NCHRP Report 350 is required, the manufacturers' certifications that the devices comply with the specified criteria shall be reviewed by the Design – Builder and approved in writing, and copies of the certifications and approvals shall be provided to Administration for consultation and written comment.

All maintenance of traffic products, including temporary pavement markings, used on the Project shall be listed on the Administration's Office of Traffic and Safety's Approved Product List for Temporary Traffic Control Devices and Miscellaneous Items, unless submitted and approved through the Administration's Maryland Product Evaluation List (MPEL) Program.

3.16.04.16 Use of 'Point of Presence' (POP) Sign and 'Completed As Promised' (CAP) Pennant Requirements

The Design-Builder shall install 'Point of Presence' (POP) Sign and 'Completed As Promised' (CAP) pennant per SP CATEGORY 800 - CONSTRUCTION NOTICE SIGNS of this RFP and the POP Details provided in the Additional Information on ProjectWise. Replacement of the POP sign due to a change in date shall be at no additional cost to the Administration.

The 'Point of Presence' (POP) Sign provides the motorist with information about existing or upcoming roadway construction. The POP sign can describe the type of construction and the anticipated completion date.

The POP sign is to be used in conjunction with Limit of Work Identification Sign (LOWI) on this project and is to be paid for using only State funding. The POP sign should be installed in advance of the LOWI sign, in each direction of travel along impacted highways. The signs are not to be installed along roadways that are closed to traffic or along directions of travel which are not impacted by the construction.

All signs are to be installed in accordance with Maryland Book of Standards and the most current edition of the Maryland Standard Specifications for Construction and Materials.

The sheet aluminum POP sign shall display one of two messages based on improvements – 'Roadway Improvements' or 'Roadway Resurfacing'. It is available in two sizes depending upon roadway conditions as dictated in Standards MD 104.01-04 and MD 104.01-05.

The Project shall be considered 'Completed as Promised' when impacts to traffic operations no longer exist. Upon Final Inspection of the project and prior to the acceptance for maintenance by the Administration, the contractor shall affix a 'Completed As Promised (CAP) Pennant' overlay. The sign will remain in place for a period of 30 days, at which time the contractor shall remove the entire sign and wood supports. The material shall become the property of the contractor.

3.16.05 Development And Review Of The Transportation Management Plan

The Transportation Management Plan (TMP) shall include Traffic Control Plans (TCP), as well as Transportation Operations (TO) and Public Information and Outreach (PI&O) strategies. The TMP shall:

A. Evaluate work zone impacts and develop strategies to mitigate those impacts through the use of improved transportation operations and management of the transportation system (refer to Section 3.16.05.01 of this Performance Specification). Impacts and strategies shall be documented in a TMP Report.

B. Include traffic control plans that accommodate project and site specific considerations (refer to Section 3.16.06 of this Performance Specification).

C. Include strategies to communicate with the public and concerned stakeholders, before and during the project, through the development of a public outreach plan.

3.16.05.01 Transportation Management Plan Report

The Design – Builder is responsible for developing a temporary traffic control system that best meets the performance requirements and construction activities. Therefore, maintenance of traffic design shall be done concurrently with a work zone impacts assessment and traffic analysis. This effort shall be documented in a Transportation Management Plan (TMP) report.

The report shall include discussion of the following and all supporting documentation:

(A) Work zone impacts assessment for the proposed MOT;
(B) Traffic analyses for each phase of MOT;
(C) Work zone impact management strategies.

3.16.05.02 TMP Report Format

(A) All the pages within the report shall be numbered and dated.
(B) The report shall be placed in an 8½ by 11 inch, 3-hole binder that allows for insertion of revisions and removal of old data.

(C) The Design-Builder shall make revisions to the report as required to keep reports current with design and construction activities. The date of the revision shall be placed on all pages. Pages to be added, replaced or removed shall be designated. Revisions shall be 3-hole punched for easy placement in the reports.

(D) The final approved report shall be converted to a Portable Document Format (pdf) file, including all maps and exhibits. The electronic file shall be delivered to the Administration for their records.

(E) Sections for inclusion in the TMP include:

1) Introduction (Cover Page, Table of Contents, Professional Engineer Certification, etc.)
2) Executive Summary
3) TMP Roles, Responsibilities and Contact Information
4) Project Description, including goals and constraints
5) Existing Conditions
6) Work Zone Impacts Assessment (Refer to Section 3.16.05.03 of this Performance Specification)
7) Work Zone Traffic Analysis (Refer to Section 3.16.05.04 of this Performance Specification)
8) Work Zone Impact Management Strategies (Refer to Section 3.16.05.06 of this Performance Specification)
9) Access and Mobility Plan (refer to Section 3.16.05.07 of this Performance specification)
10) Contingency Plan (Refer to Section 3.16.05.08 of this Performance Specification)
11) Incident Management Plan (Refer to Section 3.16.05.09 of this Performance Specification)
12) Public Outreach Proposal (Refer to TC 3.21 – Public Outreach)
13) Implementation and Monitoring Plan (Refer to Section 3.16.05.10 of this Performance Specification)
14) Supporting Documentation (e.g., Traffic Control Plans)

3.16.05.03 Work Zone Impacts Assessment

Identify how the project's construction phasing, temporary traffic control zone design, and work zone impact mitigation efforts will impact the project area, how they will affect each other, and how they might adversely impact specific areas, if any. Issues to be considered and discussed in this section of the TMP include:

A) Identification of High-level Construction/Traffic Control Approaches, including proposed construction phasing, traffic control and management, and construction schedule. Discussion may include need for lane closures, total roadway closures, shoulder closures, use of shoulder for travel during construction, use of detour routes and times related to these needs (off-peak, night-work, weekend work, intermittent closures, etc.). High-level

maintenance of traffic plans shall be developed that include, but are not limited to, all major traffic shifts, use of temporary roadways, temporary traffic signals, and access modifications to businesses or residences. The duration of each phase shall be noted on the plan. The plans may take the format of 8 ½ x 11, 11x17, or plan-sized (22x34) sheets. These high-level Maintenance of Traffic plans will be used as a basis for the development of the Traffic Control Plans.

B) **Identification of Safety Issues**, including pre-existing safety issues and safety implications of proposed construction approach (es). Pre-existing safety issues may include crash history, curve and gradient issues, line of sight issues, weather related safety issues, lack of adequate shoulder width or prevailing speeds. Examples of safety issues from proposed construction approach (es) include implication of night work, lane width issues, lane-closure related safety issues, channelization and work area separation issues, construction staging areas, construction traffic access issues, and management/enforcement of speed in advance of and through the work zone.

C) **Identification of Community Impacts and Related Issues**, including accessibility issues and other coordination issues. This involves the identification of work zone impacts on the community businesses and residents likely to be affected by the project. Examples include business access relocation, ramp-closure related access issues, detour related mobility impacts, and pedestrian and bicycle related impacts. Other coordination issues may include utility related issues and construction noise issues.

D) **Identification of Combined Impacts and Coordination Issues**, including identification of nearby and/or concurrent projects and assessment of potential combined impacts of these projects at the corridor/network level.

3.16.05.04 Work Zone Traffic Analysis

Using the year of opening traffic volumes (as provided by the Administration), the Design – Builder shall analyze all Maintenance of Traffic Phases to ensure that there are no operational or safety issues. Work Zone traffic analysis shall be performed in accordance with the methods and tools described in the "Work Zone Lane Closure Analysis Guidelines". Mobility impacts shall be limited to the allowable mobility thresholds as described in the "Work Zone Lane Closure Analysis Guidelines".

The Administration recognizes that specific work activities and time periods may make it infeasible to comply with the threshold levels contained in the Work Zone Lane Closure Analysis Guidelines. These circumstances shall be outlined in the TMP. For these situations, the Design – Builder shall analyze other MOT alternatives to reduce the mobility impacts below thresholds. If the MOT Alternatives Analysis does not produce an option that reduces impacts below thresholds, the Design-Builder shall propose

additional impact management strategies (transportation operations and/or public information and outreach strategies) to minimize the impact, subject to review and approval by the Administration.

Elements to be included in the traffic analysis portion of the TMP include:

A) **Traffic and Travel Characteristics at the Project Location** – Include a summary of traffic and travel characteristics in the project area. This may include recurring congestion issues (pre-existing bottlenecks, high-volume areas, etc.) and non-recurring congestion issues (special event traffic issues, weather related delays, potential for incident related traffic congestion, etc), heavy vehicle volumes, directional traffic, and recreational or seasonal traffic issues.

B) **Traffic Analysis Strategies** – Include a brief description on how the expected traffic conditions during construction were determined. Include source and date of traffic data. Any traffic reduction factors or other parameters assumed for the calculations should be documented.

C) **Identify Measures of Effectiveness** – List the measure of effectiveness used for the analysis, such as capacity, volume, queue, travel time, diversion rates, safety, adequacy of detour routes, etc.

D) **Analysis Tool Selection Methodology and Justification** – List the traffic analysis tools used. Include a brief summary on how the tool was selected and criteria used to select the most appropriate tool.

E) **Mobility Implications of Construction Approach (es) –** Discuss construction approaches that have the potential to impact mobility during the project. This may include lack of shoulders during construction that may require incident management strategies, doing work at night to reduce traffic delays, or traffic capacity and management issues that may exist on a proposed detour route.

F) **Analysis Results** – Compare existing and construction traffic conditions and operations, with and without work zone impact management strategies (where included). Detour route analysis should be included where detours will be used. Traffic analysis should also address, in a more quantitative manner than the general impacts assessment, the impacts on:

1. Access for residences, businesses, and non-emergency services
2. Access for pedestrians, bicyclists and persons with disabilities
3. Emergency service impacts (fire, ambulance, police, and hospitals)
4. Safety
5. Adequacy of detour routes
6. Intersection traffic control (signal timing, signage, etc.)
7. Heavy vehicle traffic (including over-height, over-weight vehicles)
8. Transit operations (bus stops, school buses, other transit operations)
9. Seasonal impacts (beach traffic, etc.)

3.16.05.05 Approved Analysis Techniques and Software

The Design – Builder may utilize the following software packages for analysis of Maintenance of Traffic Plans.

A) For arterial maintenance of traffic operations, the Design-Builder may use QuickZone 2.0, MD QuickZone 2.0, Quewz-98, Lane Closure Analysis Program (LCAP), Highway Capacity Software (HCS 2010), Synchro/SimTraffic (version 6.0 or higher), or approved equal (as appropriate) to determine the queuing, delays, and level of service impacts caused by the maintenance of traffic plans.

B) For freeway maintenance of traffic operations, the Design – Builder may use QuickZone 2.0, MD QuickZone 2.0, Quewx-98, LCAP, CORSIM, VISSIM, HCS 2010, or approved equal (as appropriate) to determine the queuing and level of service impacts caused by the maintenance of traffic plans.

3.16.05.06 Additional Work Zone Impact Management Strategies

In addition to the impact management strategies and MOT requirements included in this Performance Specification, the Design-Builder shall list any additional work zone impact management strategies that will be included and discuss anticipated traffic and/or safety impacts of the strategy. The Design-Builder is encouraged to provide additional, cost-effective services to enhance the overall Transportation Management Plan. Additional services should adhere to the standards and be a supplement to the services outlined in this Performance Specification. Any such enhancements may be implemented at any time during the Project and are subject to the Administration's written acceptance.

3.16.05.07 Access and Mobility Plan

The Design-Builder shall develop an Access and Mobility Plan depicting haul routes and access points. The Access and Mobility Plan shall be reviewed through the design review process with participation by the Administration. Plans shall be presented on paper no smaller than 11" by 17" with appropriate scale.

3.16.05.08 Contingency Plan

The Design-Builder shall develop a contingency plan that specifies actions that will be taken to minimize traffic impacts should unexpected events (unforeseen traffic demand, inclement weather, etc.) occur in the work zone. This plan should also address activities under the Contractor's control within the work zone. The contingency plan should include, but not be limited to, the following:

A) Information that clearly defines trigger points which require lane closure

lifting (i.e., inclement weather, length of traffic queue exceeding thresholds);

B) Decision tree with clearly defined lines of communication and authority;

C) Specific duties of all participants during lane closure operations, such as coordination with Maryland State Police;

D) Standby equipment and availability of personnel for callout.

3.16.05.09 Incident Management Plan

The Design-Builder shall develop an incident management plan for accidents occurring within the Project limits, including accident prevention strategies, emergency procedures, reporting requirements, and mitigation strategies. The incident management plan shall meet the following requirements:

A) The Design-Builder shall provide immediate response to emergencies by trained personnel from an incident response team per the requirement of TC 3.21 – Public Outreach.

B) Immediately following the initiation of actions necessary for the security of people and property, the Design-Builder shall coordinate with the Administration on the investigation(s) of accidents and/or other incidents.

C) At a minimum, the Design-Builder shall provide documentation to the Administration with details on:
1. Cause of disruption (i.e., whether it is construction oriented or not);
2. Actions being taken to alleviate the problem;
3. Responsible parties for the actions; and
4. Anticipated duration of the disruption.

D) The Design-Builder shall establish and manage an emergency response telephone tree per the requirements of TC 3.21 – Public Outreach. All appropriate emergency response agencies shall be included on this telephone tree for immediate response in the event of an emergency. The telephone tree shall be divided into areas of expertise so the proper people are called for specific emergency situations.

3.16.05.10 Implementation and Monitoring Plan

The implementation and monitoring plan shall define processes to ensure that the Transportation Management Plan and associated elements, including the Traffic Control Plans and Incident Management Plan, are developed and implemented efficiently and appropriately, and that they are kept up-to-date with necessary modifications during the project.

3.16.06 Traffic Control Plans

MOT Phase Plans shall be developed for each major phase of construction that requires diversion of traffic. MOT Phase Plans shall be presented on paper no smaller than 22” by 34” with

appropriate scale. The MOT Phase Plans shall be site specific for each separate portion of Work and shall not simply reference typical drawings, taper tables, or illustrations in various Administration Standards, the MUTCD or the MD MUTCD. The following components shall be included in/with each MOT Phase Plan:

A) Description of MOT phase with respect to lane, ramp, or road closures and proposed detour routes;
B) Traffic Analysis/Traffic Modeling for the MOT phase;
C) Signal timing plans, if changed;
D) Temporary roadway and striping plans along with plans for any off-site modifications to local roads to accommodate detoured or diverted traffic including restoration plans to return the site to pre-construction condition;
E) Appropriate channelizing devices and barrier locations with spacing and type of barricades;
F) All temporary traffic control devices necessary to safely and efficiently construct a particular portion of Work;
G) Motorist information and guidance;
H) Temporary signing, signal, and lighting plans;
I) Specific sign messages with sign sizes, spacing or referenced distances, and MD MUTCD sign designations. The Design-Builder shall provide details for all proposed non-standard MD MUTCD signs;
J) Proposed phased construction of permanent signing;
K) Proposed phased construction of traffic signals;
L) Proposed phased construction of lighting systems;
M) Pavement marker changes shall be specific and clearly shown on the Traffic Control Plan with respect to lane widths and pavement marking material, color, location, and widths. Dimensions are necessary to assure proper installation of the pavement markings;
N) Flagging locations; and
O) Emergency response information.

TC 3.17 DRAINAGE, STORMWATER MANAGEMENT, AND EROSION & SEDIMENT CONTROL PERFORMANCE SPECIFICATION

3.17.01 GENERAL

Provide drainage systems, stormwater management, and erosion and sediment control required to serve the Project defined in these Contract Documents. Assess existing drainage and stormwater management as well as the construction of new facilities. Improve these if possible. Ensure that new or rehabilitated facilities cause no adverse impacts upstream and downstream of the project site.

3.17.02 GUIDELINES AND REFERENCES

Design and construction of drainage systems, stormwater management, and erosion and sediment control shall be in accordance with this Drainage, Stormwater Management, and Erosion & Sediment Control Performance Specification and the relevant requirements of the Guidelines and References in TC 3.08.

3.17.03 REQUIREMENTS

3.17.03.01 Surface Drainage Design

Design all surface drainage conveyances including but not limited to open channels, inlets, closed storm drainage systems, cross culverts and entrance driveway pipes.

Waterway Construction (COMAR 26.17.04) review and approval is required for waterway impacts. Deliver submittals for MDE approval to the Administration for review and coordination with MDE. The Administration has established a review and approval process with MDE for the project. Under that process, the Administration will review and comment on the Design-Builder's plans and, once satisfied that the plans will meet MDE requirements, the Administration will coordinate with MDE to obtain formal approval of the Design-Builder's Waterway Construction plans and calculations.

3.17.03.01.01 Surface Drainage Design - General Requirements

Perform drainage design in accordance with the following criteria and regulations:

A. Replace all inlets, manholes, cross culverts or pipes, or other drainage structures, clean-out of existing clogged inlets, brick structures regardless of condition within the Project Limits as well as any unstable or deteriorating outfalls. Do not replace any existing box culverts in good conditions. Concrete pipes can be left in place provided the design build team can prove visually to the Highway Hydraulics division that the pipe is in good condition. Any visual deterioration can allow the highway hydraulics division to request a replacement pipe. Refer to the Office of Structures Policies and Procedures Manuel to help determine the condition of the structure. Seek approval from the Office of Structure prior to replacing any existing box culverts.

B. Clean all existing and new pipes and drainage structures to be free of debris and sediment at conclusion of project.

C. Remove all existing pipes and drainage structures which will not be used in the Final Design or abandon by filling with Flowable Backfill.

D. Provide completed designs for all temporary and permanent pipe systems.

E. Do not construct work so as to trap water along any section. Provide adequate measures to ensure positive drainage after construction, if during design or construction an area of the Project is identified as not having positive drainage in pre-construction conditions

F. Provide adequate connections to maintain all existing drainage systems. Ensure that adequate drainage is provided during interim paving operations (e.g., constructing asphalt berms to divert flow from base course paving to storm drains in closed sections or other precautions as necessary).

G. Adverse impacts to upstream or downstream properties, infrastructure, or environmental resources will not be allowed. Work will be performed beyond the accepted limits of the roadway improvements if necessary.

3.17.03.01.02 Surface Drainage Design - Specific Criteria

Follow these Specific Criteria where conflicts arise between these Specific Criteria and those contained in the General Requirements.

3.17.03.01.02.01 Cross Culverts

Refer to Structures Performance Specification, Section 3.11, and Environmental Performance Specification, Section 3.20, for additional cross culvert design requirements.

A. Calculate discharges for appropriate return period storms for cross culverts using USDA, NRCS TR-55 and TR-20 hydrology MODELS using the latest NOAA 14 rainfall data unless the drainage area exceeds 200 acres, for which GIS Hydro is added as an acceptable model. Use HEC-RAS for floodplain modeling.

B. Ensure the 100-year headwater pool at new culverts remains within the right-of-way or easements. For existing, replacement, or extended culverts, ensure that the 100-year storm headwater elevation for the proposed conditions is at or below the existing 100-year headwater elevation.

C. Calculate culvert headwater and perform overtopping analysis using the latest version of HY-8. Analyze the outfall using the subroutine and submit the information as part of the drainage reports.

D. Culvert crossings under roadway embankments that meet MD Code 378 criteria, must be designed to Code 378 embankment standards.

E. Structures S-1 and S-3 are anticipated to overtop the roadway during the 100 year storm events. These will be exceptions from that requirement. Structures S-1 and S-3 must pass the 50 year storm without overtopping the road. The roadway at these locations must be designed to MD Code 378 standards for Dam Embankments.

F. The design will provide fish and aquatic organism passage as well as land animal passage as required for the extension or replacement of the existing culverts as required by MDE wetland and waterways and the US Army Corps of Engineers. The exact structures covered by this section shall be determined bySHA.

3.17.03.01.02.02 Stream Grading and feature implementation for Channel and Bank Stability and Aquatic and Herp Passage

A. For stream CB-4, the design build team is responsible for providing grade controls upstream and downstream of structure S-1. The design build team is responsible for obtaining the approvals from the appropriate approval authorities. Copies of all submittals and correspondence regarding this work shall be submitted to SHA-HHD. Upon completion of construction, the design will only be approved upon a site visit and concurrence of all approval authorities. Review time for submissions to outside Agencies and SHA-HHD shall not be the basis of a claim or time extension against the Administration.

12-14-2015

B. For the stream CB-1, the design build team is responsible for providing grade controls upstream. The downstream channel will be modified to provide herp and fish passage through the culvert. Grade controls will also be introduced within the downstream channel. The design build team is responsible for obtaining the approvals from the appropriate approval authorities. Copies of all submittals and correspondence regarding this work shall be submitted to SHA-HHD. Upon completion of construction, the design will only be approved upon a site visit and concurrence of all approval authorities. Review time for submissions to outside Agencies and SHA-HHD shall not be the basis of a claim or time extension against the Administration.

3.27.03.01.02.02 Roadway Drainage Design

A. Flow spread in a closed section for a 2-year storm event is no more than 8 ft. and in no case can cover more than one half of any travel lane.

B. Flow across entrances is no more than 1 cfs for the 2-year storm event. Maximum flow from the end of curb and gutter is 0.5 cfs for the 2-year storm event.

C. Use the roadway inlets and drainage structures in the Administration's "Book of Standards for Highways and Incidental Structures" or approved equal(s) where practicable. Submit for approval non-standard structures prior to construction. Place COG or COS inlets within the travel or turning lanes when applicable. Place concrete aprons around the inlets unless specifically waived for grated inlets within the travel or turning lanes. Use bicycle friendly grates such as reticular (WR, WRM, NR, NRM) or curved vane (CV-S, CV-E) grates for grate inlets within the travel or turning lanes unless specifically exempted. Ensure that inlets in or immediately adjacent to crosswalks are compliant with the American with Disabilities Act (ADA).

D. Do not allow breaks in curb, such as curb cuts, for drainage purposes.

E. Design ditches to ensure positive drainage flow. Do not allow standing water, except for stormwater management.

F. Design ditch linings using HEC-15 "Design of Roadside Channels with Flexible Linings ". Use Soil Stabilization Matting A (SSM A) rather than riprap where practicable. Type A matting is temporary matting and is used in ditches where shear stress is less than 1.75 psf or for slope stabilization. Type B matting, permanent matting designed to reinforce the turf stems, is used in ditches where shear stresses are between 1.75 and 3.0 psf. Type C matting is a soil infilled permanent matting used to reinforce the turf root system and is used in conjunction with type B matting where shear stresses are between 1.75 and 7.0 psf.

G. Design pipe outfalls using HEC-14 "Hydraulic Design of Energy Dissipaters for Culverts & Channels" Calculate outlet velocity and at a minimum, provide outfall protection for the same design storm as the culvert. Provide protection for conditions that indicate a greater outfall velocity may occur at a lesser storm event.

H. Do not construct concrete lined ditches and concrete slope or channel protection unless prior approval is received from the Administration.

I. Refer to Geotechnical Performance Specifications for slope design and construction requirements, and the Environmental Performance Specification for permitted wetland impacts and wetland avoidance.

12-14-2015

J. All added or replaced storm drain pipe must be reinforced concrete either class 4 or class 5.

3.17.03.02 Floodplain and Waterway/Wetland Coordination

Coordinate analysis of applicable drainage crossings with MDE, FEMA and the Administration for structures S-1 and S-3.. Refer to the Structures Performance Specifications TC-3.11 for Floodplain crossing requirements.

Prior to construction, the Administration will notify property owners adjacent to floodplains and jurisdictional waterways and wetlands of the upcoming construction project. Incorporate the time requirements of this notice into the design and construction schedule, and make available the necessary construction plans for property owner review, in accordance with MDE Water Management Administration requirements.

3.17.03.03 Stormwater Management (SWM)

Utilize the Concept SWM Report as a template for stormwater management for the project. Provide management acceptable to the SHA if a revised roadway improvement scope is implemented.

For SWM design, the Design-Build team is to use the NOAA 14 rainfall data and distribution.

3.17.03.03.01 BMP Selection

Construct SWM facility types based on the following criteria:

A. Implement the best fit given the site context, the adjacent community, and the local ecology.

B. Implement non-structural and ESD practices first when feasible.

C. Implement alternative surfaces and micro-scale practices before larger structural Best Management Practices (BMPs).

D. Implement BMPs that require lower maintenance first. Potential maintenance needs are considered when designing SWM facilities.

3.17.03.03.02 Water Quality Bank

Provide Water Quality treatment of stormwater runoff according to the afore-mentioned regulations and guidelines. Account for new impervious area, impervious area removed, redevelopment, loss of existing water quality, and treatment provided. Complete the final Water Quality Summary Sheet (WQSS), using the same format as the conceptual WQSS, upon the Final Design. Do not debit the water quality bank for any 6 digit watershed. Provide a proposed WQSS to the Administration's Highway Hydraulics Division (HHD) 2 working days prior to any submission to the SWM/ESC Approval Authority using the signed WQSS. HHD will sign the WQSS and return it to the Design-Builder so they may pursue final design approval. Provide to the HHD both a photocopy and electronic Excel spreadsheet that includes the XML conversion tool upon approval and signature by the SWM/ESC Approval Authority. Accompany those copies with a copy of the SWM/ESC approval letter. Provide all of the above each time the SWM/ESC approval authority issues a modification to the approval.

3.17.03.03.03 SWM Specific Engineering Criteria Structural BMPs

A. Coordinate details for all the new stormwater management facilities throughout the Project and ensure that they are worked into the concepts for the corridor landscaping. Ensure consistency of facility types, outfall structure designs, detailing, colors, planting palette, landforms, surface area shapes and fencing (if required). Refer to SHA Stormwater Site Development Criteria Review Guidelines for further information regarding landscaping design and SWM.

B. Locate structural BMPs so that the 2-year water surface elevation limit at its closest point is a minimum distance of 15 feet from the edge of pavement.

C. Riser structures and pipe outfall systems are to be designed and constructed according to MD Pond Code 378. Concrete risers and outfall systems are preferred. Seek approval from HHD prior to installing other riser and pipe systems.

D. Use pressure rated reinforced concrete pipe for stormwater management pond outfalls meeting the requirements of ASTM C-361.

E. Set riser structures into embankments or place so they are easily accessed for maintenance. Riser structures shall also be placed so they are visually unobtrusive. Risers shall be cast in place or precast as one unit. Refer to the 2000 Maryland Stormwater Design Manual for additional SWM specifications.

F. Ensure trash racks on riser openings are adequately protected from corrosion. Hot-dipped galvanized steel, M 111-80 or epoxy coated steel are preferred. Design trash racks that stand away from and completely enclose the riser opening(s). Attach ends of the steel to a frame that attaches to the structure. Use similar detailing for all trash rack designs on the structure and throughout the Project.

G. Use concrete slabs to cap outfall structures whenever possible. When open tops are necessary, place a non-horizontally mounted trash rack at an angle of not flatter than 1" vertical for every 12" horizontal in order to reduce the potential for clogging.

H. Use slotted perforated pipes surrounded by aggregate for low flow and dewatering. Geotextile is not acceptable. Anchor pipes extending into ponds against flotation.

I. Plant SWM embankments with impervious cores and/or cut-off trenches with herbaceous plants or turf grass. Do not plant woody material on such embankments, within 15 feet of the toe of pond embankments, or within 25 feet of pond outfall structures. Allowable material for the SWM embankment clay core and cut-off trench conforms to A-2-7, A-7-2, A-4-7, A-7-4, or A-7. Maximum particle size is three inches.

J. Use filter diaphragms for embankment seepage control. Anti-seep collars are not allowed unless specifically approved.

K. Obtain a BMP number for each structural BMP constructed on the Project.

12-14-2015

L. Provide adequate access to SWM facilities for maintenance. Ensure each part of the facility is accessible by the equipment needed to maintain or rehabilitate the facility. Underground facilities require that no point within each separate chamber of a facility shall be more than 100 feet from an access point. For example, a 200 foot long chamber with a manhole in center meets this requirement since no point in chamber is more than 100 feet from an access point.

M. The minimum required service life for the structural elements (including pipes) of underground SWM facilities is 50 years. Whenever any of the structural elements are under a roadway, or extend more than 10 feet below the surface, the minimum required service life is 100 years. Pipes shall be reinforced concrete either class 4 or class 5.

N. Perform anti-flotation checks and stability checks with a Factor of Safety against overturning for all Riser Structures.

O. Construction of structural BMPs (i.e. chapter 3 facilities) will not grant water quality credit above the project requirements. Structural BMPs may only be used to obtain credit equal to the project requirement provided they cannot be supplied with ESD facilities.

P. Must set all orifices and draw down devices above the seasonal groundwater table during and after construction.

Q. Assign each structural facility a BMP tracking number.

3.17.03.03.04 SWM Specific Engineering Criteria Non Structural BMPs

A. Design check dams to be made of top soil with 6:1 slopes in the clear zone and 3:1 slopes minimum outside the clear zone and 1 foot flat at the top.

B. Do not construct wet swales or any SWM facility that will leave water impounded in the median.

C. Do not design Submerged Gravel Wetlands within 100 feet of residential properties without prior approval from the administration.

D. Seek approval from the Administration prior to installing any proprietary items.

E. Assign each ESD facility a BMP tracking number. Provide HHD with this information.

F. Fill out the most recent up to date tabulations table for each ESD facility. Provide these tables to HHD.

G. Fill out the most recent up to date checklist for each ESD facility. Provide this checklist to HHD

H. Submerged Gravel Wetlands will not be lined at the bottom. Submerged Gravel Wetlands must obtain 100% of ESDv credit within the surface storage.

3.17.03.04 Erosion and Sediment Control (ESC)

Design, obtain approval from the SWM/ESC Approval Authority, and implement an E&S Plan and Sequence of Construction. Obtain all approvals prior to commencing earth disturbing activities.

3.17.03.04.01 ESC Specific Design Criteria

Ensure that Erosion and Sediment Control Designers have successfully completed the Administration's "Designers Erosion and Sediment Control Training"

Clearly delineate the Limit of Disturbance (LOD) on the ESC Plans by including a table of the break points with Station and Offset, northing and easting. Submit grading plans that show the size of each grading unit being opened at a given time unless permitted otherwise by the SWM/ESC Approval Authority. Uphold and follow all guidance from the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control* when creating these units. Work will be sequenced so that grading activities begin one unit at a time. Stabilized ground is any graded earth that is not exposed. Stabilized earth can be achieved through multiple methods such as hydro-seeding, erosion control matting, rip rap, sod, pavement etc. Reference the

2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control for further direction on what is considered stable or refer to the SHA Quality Assurance Inspector if not expressly stated in the above reference. Proceed forward with construction once these grading plans have been approved by the SWM/ESC Approval Authority.

Cover slopes outside the roadway hinge point, flatter than and including 3:1 slopes, with 4 inches of topsoil prior to permanent seeding and mulching. Cover slopes within the roadway hinge points, flatter than and including 3:1 slopes, with 4 inches of topsoil.

Retain sediment generated by construction operations within the site by performing the following:

- Stone check dams, compost socks, linings, strip sod, or other erosion inhibitors in influent ditches to sediment traps;
- Ensure effective drawdown and dewatering of sediment traps and basins prior to forecast rain events by pumping to filter bag(s) and mulch berm(s) or other approved devices to ensure that dewatered storage component of sediment trap is available for the future storm event(s);
- Minimize the potential for re-suspension of particulates; and
- Any techniques not meeting the project requirements must be approved by the SWM/ESC Approval Authority as part of approval of the ESC plans.

3.17.03.05 Stormwater Facility Maintenance

The Design-Builder will maintain all stormwater facilities it constructs until the As-Built plans have been approved by the SWM/ESC Approval Authority and the project has been accepted for maintenance. This may include, but is not limited to, vegetation management, regular mowing, ensuring all potential underdrains and piping is functioning properly, and cleaning all pipes and structures to ensure they are not clogged.

TC 3.19 CONSTRUCTION REQUIREMENTS PERFORMANCE SPECIFICATION

3.19.01 Construction Standards

3.19.01.1 Book of Standards

Details and dimensions of drainage structures, TCPs, traffic barriers, etc., shall comply with the Administration's "Book of Standards, Highway and Incidental Structures."

3.19.01.2 Specifications for Construction and Materials

Shall comply with the Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, July 2008, including all Special Provision Inserts and these Special Provisions.

3.19.01.3 Industry Standards

Industry standards, such as ASTM and AASHTO, that are referenced in the Administration's or Utility and utility owners' specifications and standards shall also be met. If an item of work is not covered by the Administration's specifications and standards, the materials and construction methods used shall meet the appropriate, nationally accepted industry standards and be submitted to the Administration for approval.

3.19.01.4 Utility Details

All Utility work shall be done in accordance with the latest edition of the utility owners' details and specifications.

3.19.02 Construction Stakeout

The Design-Build Team shall refer to SP 107 - CONSTRUCTION STAKEOUT (For Design-Build Projects) for project specific requirements.

The Design-Build Team shall engage a Registered Professional Land Surveyor, licensed in the State of Maryland, to determine all lines and elevations for various parts of the Work, as the work progresses:

a. Verify that the field locations of the established horizontal controls and benchmarks correspond with figures shown on the Design-Build Team's Contract Drawings.
b. Establish vertical references and axis lines showing elevations and other lines and dimensional reference points as required for the execution of the work.
c. Field check facilities and surveys thereof as required by the technical sections of the Specifications.
d. Stake out the limit of disturbance at all wetland areas and tree protection fencing at all

a. Tree Preservation Areas.

b. Stakeout the Right-of-Way Line

3.19.03 Maintenance of Traffic

All maintenance of traffic work is to comply with the approved traffic control plans, the MD Manual on Uniform Traffic Control Devices (MD MUTCD), and special provisions.

a. Advanced Notice Requirements

The Design-Build Team shall notify the Administration's Engineer in advance of implementing any changes in traffic patterns as per requirements of the Maintenance of Traffic Performance Specification.

b. Schedules/Sequences of Construction

The Design-Build Team shall schedule tie-in operations so as not to be working intermittently throughout the area. Schedule and pursue excavation and other construction activities to permit making the connection without unnecessary delays. Perform utility work in conformance with the maintenance of traffic requirements shown on the approved Drawings and/or as indicated in the Standards.

c. Protection of Open Excavation

Pursuant to the General Provisions, the Design-Build Team is responsible for protection of the work and safety of the public.

The use of decking or plates to close trenches, temporary wedge material to prevent pavement edge drop-off, and the installation of temporary channelizing devices and/or traffic barriers may be required as unforeseen conditions develop during construction operations.

3.19.04 Erosion and Sediment Control

Except as noted below, all work shall be done in accordance with the erosion and sediment control (E&S) plans to be prepared by the Design-Build Team and approved by the SWM/ESC Approval Authority.

a. Compliance Requirements

Ensure daily stabilization for land disturbance within any drainage areas adjacent to wetlands and streams in the design and implementation of the ESC plans. Provide resources to provide immediate stabilization for the contract at all times.

Keep an erosion and sediment control manager (ESCM) on site at all times. The sole responsibility of the ESCM will be to ensure compliance with SHA standards and that all

measures adhere to the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control*. The ESCM must strictly perform E&S related work. Daily erosions and sediment control meetings between the ESCM and SHA Erosion and Sediment Control (ESC) Inspector will be held to discuss the status of the project and the daily E&S report. Weekly meetings between the ESCM, SHA E&S Inspector, Independent Environmental Manager and REC will be held to discuss the status of the project and the E&S reports for the week.

At any time, the QA Inspector may request the contractor to disclose the total graded area throughout the project that is not stabilized. The contractor is responsible for providing proof within 48 hours that they are in compliance with the grading unit law.

b. Plan Adjustments and Revisions

For field adjustments, the contractor is to follow the OOC-62/ QA-3 process outlined in the Sediment and Stormwater Guidelines and Procedures Maryland State Highway Administration Version 1.2 (*November 24, 2015)*.

When directed by the Administration's Engineer, the contractor shall be responsible to implement additional erosion and sediment control measures and modifications to the approved erosion and sediment control plan as required by the SHA QA Inspector and the Administration's Environmental Monitor to address unforeseen site conditions during design at no additional cost to the Administration.

Comply with all Federal, State and local laws, ordinances and regulations pertaining to environmental protection.

Level 2 modifications to previously approved plans shall require 2 days advanced notice and shall be reviewed within 7 calendar days.

Level 3 modifications to previously approved plans shall require three days advanced notice and shall be reviewed within 14 calendar days.

Review times by SHA Plan Review Division and/ or SHA Highway Hydraulics Division shall not be the basis of a claim of time extension against the administration.

c. Protection of Existing Waterways and Highways

Do not dump debris or rubbish of any kind or allow it to fall into a river or on highways. This includes paint splatters and spillage during painting operations. Take care to prevent damage and injury to personnel, vessels, and vehicles using rivers, highways, or pedestrian ways. Provide devices and maintain as required to prevent such occurrences. Promptly remove any material or items falling in a river, on adjacent banks, or on highways and immediately report to the Engineer and the jurisdictional agency.

d. Fish and Wildlife Resources

Do not alter water flows or otherwise disturb native habitat near or adjacent to the project construction area, unless otherwise stipulated in the project's permits and approved as an authorized action by the appropriate regulatory agencies.

e. Staging Areas

Do not use, in connection with this Contract, for storage, as a staging area, or as a preparation site any cultural resource facility, building, site or cleared area that is, as of the date of this Contract, on or eligible for listing on the National Register of Historic Places (16 U.S.C., paragraph 470a) without prior approval of the Engineer.

For the purpose of the preceding paragraph, the term "cultural resource" includes districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, or culture.

3.19.05 Protection of Existing Utilities

Attention of the Design-Build Team is directed to the presence of utility lines of various types in the existing and proposed streets or highways in which the construction project is to be performed. The Design-Build Team shall exercise special care and extreme caution to protect and avoid damage to utility company facilities as described in this RFP. The Design-Build Team shall take into consideration the adjustments and installations by public utilities in areas within the limits of this contract. Existing utilities are located and shown in the utility designation file as they are believed to exist; however, the Administration assumes no responsibility for the accuracy of these locations. The Design-Build Team shall be responsible for determining the location of all existing utilities and incorporating them into the design prior to initiating construction.

The Design-Build Team shall locate all existing utilities and be responsible for their safety and continuous service. Should any existing utilities be damaged or destroyed due to the operations of the Design-Build Team, the damaged or destroyed components shall be immediately replaced or repaired as necessary to restore the utility to a satisfactory operating condition. These repairs or replacements shall be at no additional expense to the Administration or the owner of the utility.

The Design-Build Team shall inform the respective utility companies at least fourteen days prior to working in any area. In addition, the Design-Build Team shall give sufficient notice to the specific utilities of the Design-Build Team's overall plan for construction and utility relocations. The utility companies will establish the lead time necessary to meet the applicable utility work schedule and coordinate with the Design-Build Team's work operations based upon the Design-Build Team's overall plan.

For a list of the known utility owners have existing facilities within the limits of this contract see TC 3.15 – Utility Design and Relocation, location elsewhere within this RFP:

All notifications to the above utility companies and "MISS UTILITY", 1.800.257.7777, shall be given 48 hours (two full working days) in advance of working in the area of the specific affected utility. The notification to "MISS UTILITY" is required whenever any excavating or similar work is to be performed.

The Design-Build Team shall be responsible for all frame and cover adjustments required by the project, either making the adjustment, or reimbursing the utility owner. The Design-Build Team shall provide for access to all utility manholes, valves, vaults, poles, and all other above ground utility equipment, both during and after construction. This access shall consist of a firm, ten foot minimum width, route to the equipment, drivable for an AASHTO SU 30 truck. This access shall also consist of a ten foot minimum width by twenty foot minimum length parking area immediately adjacent to the equipment. Both the route and the parking area shall be completely with in State right-of-way, shall have a four percent maximum cross slope, and shall have an eight percent maximum longitudinal slope. Shoulders may be part of these routes and parking areas, but travel lanes shall not be. The Design-Build Team shall design and construct this access so utility company personal and vehicles can safely get to the equipment from public roads, work at the equipment, and safely return to the public road.

If an adjustment is required to facilities, it is necessary that the existing facilities remain in service until the new construction is complete and placed in service. Also, when adjustments are required, establishment of lead times is necessary to meet the applicable utility schedule and coordination with the Design-Build Team's work operation.

Working around or protecting the utilities, removal and disposal of materials from the utilities and cooperation with the owners of the utilities and with other contractors will not be measured but the cost will be included in the Contract Lump Sum Price Proposal.

3.19.06 Engineers Office

The Design-Build Team shall supply one (1) Engineer's Office Type D, for use by - Administration personnel, conforming to the requirements of Section 103 of the Standard Specifications.

One phone in the conference room of the Engineer's Office shall have conference call and speakerphone capabilities.

The Design-Build Team shall provide the Administration with two (2) desktop computers, one (1) laptop computers, one (1) digital camera, and four (4) cellular phones, and is described in special provisions in this RFP.

The Design-Build Team shall provide the CPM schedule, as is described in the special provision in this RFP.

TC 3.20 ENVIRONMENTAL PERFORMANCE SPECIFICATION

3.20.01 General

The Design-Builder shall conduct its design and construction activities in accordance with these specifications such that no action or inaction on the part of the Design-Builder shall result in non-compliance with the requirements contained in the Clean Water Act section 404 and 401 authorizations/permits, floodplain permits, approvals, and all other necessary permits and approvals required by the Project.

3.20.01.01 General Environmental Philosophy

The MD 32 project passes through an area of diverse environmental, community, and cultural resources. Protection of these resources is of paramount importance. The philosophy followed by the Maryland State Highway Administration (Administration) during the development of the RFP was to incorporate environmental stewardship measures to avoid and minimize impacts to the natural and forest areas, community, cultural resources (Section 106 Resources), and Parkland (Section 4(f)) to the greatest extent feasible and practical. The Design-Builder shall continue this environmentally sensitive approach and philosophy during the preparation of final design plans and through Project implementation. The Administration has implemented innovative approaches to reward the Design-Builder for high quality environmental performance, as stated in various sections of this Performance Specification. These innovative approaches include incentives for reductions to forest impacts and to wetland/waterway impacts.

3.20.02 Guidelines and References

The Design-Builder shall design and implement Environmental requirements in accordance with this Environmental Performance Specification and the relevant requirements of the Guidelines and References in TC Section 3.08.

3.20.03 Owner's Environmental Roles and Responsibilities

The Administration has conducted extensive coordination with various environmental and regulatory agencies and the public. The Administration shall provide an Independent Environmental Monitor (IEM) on behalf of the USACE and MDE that will work with the Design-Builder to confirm that the Design-Builder's plans and construction methods are in compliance, and that all regulatory permit conditions and commitments are met. The Independent Environmental Monitor will:

A. Review plans as they are developed;

B. Review the Design-Builder's environmental compliance implementation;

C. Notify the Design-Builder of deficiencies in the compliance with the commitments,

considerations, permits and approvals; and

D. Coordinate and attend any meetings involving resource or regulatory agencies.

The Administration will coordinate all activities and issues during design and construction with the agencies and the IEM.

3.20.04 Design-Builder's Responsibilities

The Design-Builder shall be responsible for compliance with the permit conditions throughout the design and construction of the Project. The Design-Builder shall demonstrate compliance by producing a Compliance Report each quarter, which tracks and confirms compliance with each commitment pertaining to the construction of the Project, and also tracks impacts to wetlands and Waters of the US. The checklist and memorandum shall be submitted to the Administration within one week after the end of each quarter.

3.20.05 Permits and Approvals

The Administration will be relying on the Design-Builder to achieve and maintain commitments and permits through a strong Environmental Compliance Plan and partnering with the Administration. The Design-Builder is encouraged to consider environmental stewardship measures that exceed those in the standards and permits, while considering reasonable cost and practicality.

A. As part of this RFP, the Administration is providing the following permits and approvals based on the proposed activities:

1) US Army Corps of Engineers (USACE) Corridor Permit and MDE Non-Tidal Wetlands and Waterways Permit

2) Reforestation Site Review Permit (from Maryland Department of Natural Resources, DNR)

3) Conditional Letter of Map Revision (CLOMR) from FEMA for the 2 floodway crossings

B. The Design-Builder shall obtain the following permits and/or approvals:

1) Erosion and Sediment Control Approval (from SHA-PRD)

2) Stormwater Management Permit (from SHA-PRD)

3) NPDES Permit (from MDE).

4) Letter of Map Revision (LOMR) from FEMA. The design build team is responsible for all application fees associated with this permit.

5) Surface Water Appropriation Permit (from MDE) will be required if the Design-Build Team intends to use water from the streams for any purpose other than rerouting the water with stream diversion

6) All other approvals, permits and licenses, pay all charges, fees and taxes and give notices necessary or appropriate for the implementation of the Project beyond those obtained by the Administration. This includes but is not limited to approvals for on or off-site staging, stockpiling areas, disposal sites and borrows pits;

C. The Design-Builder shall conduct a pre-work meeting with the Administration, USACE, and MDE to discuss permit conditions, compliance measures, design review and coordination, and scheduling.

3.20.06 Permit Modifications and Approvals

The Design-Builder shall obtain approvals from the Administration for any changes in design and/or construction activities that affect any permit conditions and would require a modification approval from the regulatory agencies.

All conditions in the permits shall be adhered to unless modifications are accepted and approved by the Administration and the regulatory agencies.

Delays due to permit modification approval for permits listed in TC Section-3.20.05, requested by the Design-Builder, will not result in additional costs to the Administration nor will the Contract be extended.

The Design-Builder shall not alter the design in such a manner that increases or creates new impacts to forest, cultural resources, parkland, wetland, wetland buffer, waterway, or floodplain compared to those impacts which were authorized by the permits and defined in the Joint Permit Application impact plates and tables. If the Design-Builder determines that changes to impacts are to be considered through design and/or construction, the Design-Builder shall be responsible for providing the Administration with all necessary information required to request and to obtain the permits, approvals or modifications from the regulatory agencies. Request for modification to the permits listed shall be accompanied by documentation provided by the Design-Builder to demonstrate that there is no practical alternative. Additional mitigation required with approval of modifications shall be the responsibility of the Design-Builder. The Administration's Highway Hydraulics Division shall be copied on all correspondence delivered to MDE in regards to the Joint Permit Application, this includes comment letters, phone conversations transcripts, transmittals, reports, plans, and revisions to plans.

3.20.07 Environmental Summaries (ES)/Reevaluation Process

Modifications and/or design changes proposed by the Design-Builder, which occur inside or outside of the RFP limits of disturbance, such as shifts in alignment, staging areas or alignment

shifts, etc., shall be reviewed for impacts by the Design-Builder, including impacts to the natural, social and cultural environments. In addition, the environmental summary/reevaluation process is triggered by the following activities:

A. Change in scope or design;

B. Change in the limits of disturbance;

C. Change in surrounding environment;

D. New information becomes available;

E. Change that occurs outside of the planning area evaluated in the FONSI and the approved re-evaluation, such as staging areas and alignment shifts;

F. Final Design review, and

G. Changes in applicable laws and regulations.

The Design-Builder shall provide all the information needed such as narratives and figures to the Administration prior to construction for any of the items identified above and prior to initiation of construction for the affected Design Unit. The Administration will prepare the NEPA documentation based on the information provided by the Design-Builder. The Administration will coordinate approvals with the regulatory agencies and FHWA. Delays due to environmental summary/reevaluation approval for design changes, requested by the Design-Builder, will not result in additional costs to the Administration nor will the Contract be extended. The step by step process for Environmental Summary Reevaluation for design changes is described below. If the Design Builder proposes a design change that is outside of the LOD the following is the step by step process to obtain approval:

1. Design-Builder determines a design change is warranted
2. Design-Builder environmental staff conducts a quick review to determine if any environmental, social or cultural impacts will occur due to the change
3. Design-Builder presents information to the SHA Project Engineer and SHA Environmental Manager including Environmental Summary (ES) narrative and figures
4. SHA Project Engineer conditionally approves the change
5. SHA Environmental Manager determines specific agency involvement
6. SHA Environmental Manager and/or the EMT prepares the Environmental Summary (ES) and sends documentation letters required to regulatory agencies (such as MHT letter, permit modification, etc.)
   a. Permit modification (signed and mailed within 1 week of Design-Builder submission)
   b. MHT concurrence (SHA mailed within 2-4 weeks of Design-Builder submission depending on the extent of the resource, MHT concurrence within 30 days)
   c. Rare Threatened or Endangered (RTE) responses (typically takes 30 days to receive responses for DNR and FWS)

7. Obtain all agency approvals (1 -2 months depending on the complexity of the change)
8. SHA submits the ES to FHWA for formal approval (4 weeks)

Note: FHWA could request more information before they will approve an ES. Supplying the additional information is the responsibility of the Design-Builder/EMT.

3.20.08 Natural Resources

3.20.08.01 Groundwater

The Design-Builder shall be responsible for design measures that maintain and discharge natural groundwater flows and seeps associated with waters of the US and wetlands. The proposed design measures will be reviewed by the Administration prior to implementation.

The Design-Builder shall provide protective measures at cut slopes ditching and other activities adjacent to non-impacted or temporarily impacted wetlands, to ensure that the source of hydrology to that wetland is preserved. If it is determined that the wetland has been altered hydrologically, it will be considered an additional impact, for which the Design-Builder shall be responsible for providing permit modification documentation as well as mitigation at the designated ratios, per COMAR Section 26.23.04, for the impacts.

Within one year of the completion of the construction, an inspection will be conducted by the Administration and the regulatory agencies to determine whether any remnant wetlands have lost their hydrology. If it is determined that remnant wetlands are no longer functioning as a jurisdictional wetland, the Design-Builder shall be responsible for costs associated with the additional mitigation required. Mitigation ratios for the lost wetlands shall be in accordance with COMAR.

3.20.08.02 Surface Water

For details on Erosion and Sediment Control and Stormwater Management, see the Drainage, Stormwater Management, and Erosion & Sediment Control Performance Specification.

The Design-Builder shall not discharge or allow the release of any sediment laden construction water unless properly treated. The Design-Builder shall obtain Administration approval of all dewatering operations prior to pumping and discharge. Water to be pumped and discharged shall be in conformance with the COMAR Standards (Section 26.08.02).

To minimize potential for untreated discharge, the Design-Builder shall designate, design and construct, utilize, maintain and upon conclusion of operations, properly close concrete wash-out pits for all concrete production, transport and placement operations. The location of concrete wash-out pits shall be approved by the Administration prior to use. The pits shall be managed such that no concrete waste or wash water is discharged into wetlands or waters of the U.S. This

may include the implementation of drying beds with proper sediment controls and treatment of excess wash water on-site or proper off-site disposal.

If construction discharges exceed water quality standards identified in COMAR, the Design-Builder shall immediately notify the Administration and resolve any Project related deficiencies within 24 hours.

The Administration will request spot-check inspections at any time to verify compliance.

3.20.08.03 Aquatic Biota

The Design-Builder shall:

A. Conduct all work so as to avoid/minimize fish mortality from both construction related water quality impairment and in-stream activities. The Design-Builder shall notify the Administration 48 hours prior to the commencement of any stream dewatering or other in-stream activities.

B. Comply with all water quality standards stated in the COMAR for the protection of aquatic biota.

C. Minimize culvert length to the greatest extent practicable. New culverts shall be appropriately sized and depressed. Where existing culverts are being extended, appropriate measures to promote/restore passage of aquatic life may be required.

D. Conduct all in-stream work in compliance with the Maryland mandated stream closure period for the Use IV-P stream (March 1 through May 31, inclusive in any year). Any riprap placed shall be constructed so as not to obstruct the movement of aquatic species, unless the purpose of the activity is to temporarily impound water. Existing riparian vegetation in the area of the stream channel should be preserved as much as possible to maintain aquatic habitat and shading to the stream.

3.20.08.03.01 Rare, Threatened and Endangered Species (RTE)

No federally listed rare, threatened, or endangered species, nor any critical habitats, refuges or fish hatcheries, have been identified in the vicinity of the Project. However, perennial stream reaches in the area are expected to support warm and cool water resident fish species typical of the region. While not a stocked stream, these reaches are a tributary of the mainstem of Middle Patuxent River, which is stocked with adult trout during the spring season approximately 6 miles downstream of the project location. Depending upon flow and in-stream conditions, small numbers of stocked trout may be found near the project site.

The fisheries resources in the above area should be adequately protected by the instream work restrictions referenced in the MDE and USACE corridor permits, and in TC Section 3.20.08.03. Stringent sediment and erosion control methods, and other Best Management Practices typically

used for protection of stream resources shall be effectively applied.

3.20.08.04 Wetlands and Waters of the US

Direct impacts to wetlands and waterways are anticipated to occur under the Project. The impact plates and table in the Joint Permit Application present the total impacts permitted for the MD 32 Project. All wetlands and waterways were identified, delineated and surveyed within the Project. Surveyed boundaries of waterways and wetlands are depicted in the design. Prior to performing any work on the Project, the Design-Builder shall be responsible for installing temporary orange safety fence and prohibitive signage in English and Spanish adjacent to non-impacted areas of wetlands and their buffers as identified in the MDE Nontidal Wetlands & Waterways and USACE Section 404 Permit for the MD 32 Corridor, along the limits of disturbance and/or right of way. The orange safety fence shall be installed at a maximum of 25 feet from the proposed toe of cut/fill adjacent to wetlands as depicted in the design. The wetland fencing locations should be staked prior to the pre-construction meeting. All personnel of the Design-Builder or subcontractors shall be alerted to these designated protection areas.

3.20.08.04.01 Occupying Wetlands/Waterways and Best Management Practices for Work in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains

See Contract Provisions CP – Occupying Wetlands.

3.20.08.04.02 Best Management Practices for Work in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains

3.20.08.04.02 Best Management Practices for Work in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains

A. The Design-Builder shall not stockpile or store excess fill, construction material, equipment nor debris in un-permitted nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.

B. The Design-Builder shall not place materials in a location and manner, which adversely impacts surface or subsurface water flow into or out of nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.

C. The Design-Builder shall not use excavated material as backfill if it contains waste metal products, unsightly debris, toxic material, or any other deleterious substance. If additional backfill is required, the Design-Builder shall use clean materials that are free of waste metal products, debris, toxic material, asphalt, or any other deleterious substance.

D. The Design-Builder shall not operate heavy equipment in a manner that will damage unpermitted nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.

E. The Design-Builder shall repair and maintain any serviceable structure or fill so there is no permanent loss of nontidal wetlands, nontidal wetland buffers, or waterways, or permanent modification of the 100-year floodplain in excess of that lost under the originally permitted structure or fill.

F. The Design-Builder shall restore any nontidal wetlands, wetland buffers, waterways, or 100-year floodplain temporarily impacted by any construction to the full satisfaction of the Administration, regulatory agencies, and in accordance with the requirements of the USACE and MDE permits.

G. The Design-Builder shall use the following species for all stabilization in the nontidal wetland and nontidal wetland buffer: annual rygrass (lolium multiflorum), millet (setaria ithilica), barley (hordeum sp.) oats (uniola sp.), and/or ry (secale cereal). Other non-persistent vegetation may be acceptable, but must be approved by the Administration and MDE Nontidal Wetlands and Waterways Division. Kentucky 31 fescue shall not be utilized in wetland or buffer areas. Areas shall be seeded and mulched to control erosion after construction activities have been completed. Refer to PS 303 Drainage and PS 301-Planting and Landscape Architectural for Details.

H. The Design-Builder shall make post construction grades and elevations the same as original grades and elevations in temporarily impacted areas after construction has been completed.

I. The Design-Builder shall protect aquatic species. In-stream work is determined by the classification of the stream and the time of year restrictions specified in the MDE Water Quality Certification.

J. The Design-Builder shall control stormwater runoff from impervious surfaces to prevent washing of debris into the waterway

K. The Design Builder shall use disposal areas for excess excavation that do not impact wetlands or waterways. The Design-Builder shall track the disposal of all excess excavation to insure that there is no unauthorized discharge of fill in regulated wetlands or waterways and shall notify the Administration of the intended disposal site location for excess excavation or rubble waste removed from the project.

3.20.08.04.03 Avoidance and Minimization

The Administration proposed avoidance and minimization techniques during the planning and preliminary engineering phase which consisted of alignment shifts where practicable, avoiding skewed stream crossings and reductions in overall

roadway widths at stream crossings where safety considerations allow, and relocation of stormwater management facilities.

The Design-Builder shall focus its efforts to continue to minimize impacts to wetlands, waterways, and floodplains in all areas of the Project, especially sensitive areas where the administration has made specific wetland/waterway avoidance and minimization commitments. Engineering designs shall continue to emphasize avoidance and minimization of impacts as the feasibility and effectiveness of using measures such as retaining walls, steeper fill slopes, increased headwall heights, reduced roadway sections and any other feasible minimization efforts are evaluated.

Side slopes shall be 2:1 or steeper wherever the fill material is adjacent to wetlands or waterways. Additional avoidance and minimization efforts such as retaining walls, MSE walls, and Reinforced Earth Slopes are encouraged, especially at wetlands. Refer to the Geotechnical Performance Specification.

3.20.08.04.04 Wetland and/or Waterway Impact Reduction Incentive

The Design-Build Team is advised upon final acceptance of the constructed project, completion of as-built plans and approval of permit modification by USACE/MDE, the contractor will be reimbursed for any permanent wetland or waterway impact reduction in increments of 0.10 acre. The reimbursement only pertains to reduced permanent impacts within the Limit of Disturbance. The reimbursement only pertains to reduced permanent impacts within the Limit of Disturbance. Conversion from permanent impacts to temporary impacts in forested systems or conversion of forested wetland systems to emergent wetland systems will not qualify for reimbursement. This determination will be made by comparing the permanent impacts determined in the as-built plans against the permanent impacts permitted by MDE/USACE in the initial Nontidal Wetlands and Waterways permit and the Section 404 Individual Permit. This incentive will be paid at $8,000.00 per 0.10 acre saved.

3.20.08.04.05 Conversion from Forested and Scrub-Shrub Wetlands to Emergent Wetlands

Vegetation in temporarily impacted wetlands and converted wetland areas may be cleared, but shall not be grubbed. The topography and hydrology connections shall remain the same as, or be restored to pre-construction conditions. The Design-Builder shall replace damaged vegetation, and shall present a proposed planting list to the Administration for review and written comment prior to implementation of replacement vegetation.

3.20.08.04.06 Temporary Impacts to Streams

Temporary impacts are defined as waterways that are temporarily altered during construction, but are restored to pre-construction conditions after construction is

completed. Additional stream stabilization measures may be required to insure stability of the restored section. Impacts shall be avoided and/or minimized to the greatest extent possible.

Construction details of any temporary stream crossings, temporary stream divisions, temporary stream relocations, and utility installations across waterways shall be prepared for Administration review and for MDE authorization prior to proceeding with construction. Earthen materials will not be permitted in the construction of temporary stream diversions; stream crossings; or cofferdams, due to the potential for washout during storm events.

3.20.08.04.07 Temporary Impacts-Stream, Wetland and Floodplain Restoration Efforts

The restoration plan for temporary impacts shall include but are not limited to the following elements:

A. Removal of all construction and temporary fill material;
B. De-consolidation and/or scarification of compacted soils;
C. Replacement of topsoil and/or organic matter lost to erosion and sediment control measures;
D. Re-establishment of grades to preconstruction conditions;
E. Removal of temporary stream crossings;
F. Restoration of stream banks with woody vegetation as specified in PS 301-Planting and Landscape Architectural and PS 303-Drainage;
G. Avoid disturbance to riparian vegetation, particularly within 30 feet of stream banks ; and
H. Replant any area within 30 feet of a stream bank with what was disturbed temporarily, and that was vegetated pre-construction, with native vegetation similar to pre-construction species composition, with the exception of underground utility corridors. Refer to PS 301-Planting and Landscaping Architectural for details.

3.20.08.04.08 Stream Relocations

All stream relocations shall be designed to the geomorphic characteristics of stable local streams to avoid downstream scour, channel degradation, and shall not create fish blockages. Where the RFP plans show a right-of-way bump-out for a stormwater management pond or erosion and sediment control basin in the vicinity of a stream, the pond or basin shall be constructed in a manner that does not impound the stream. For any stormwater management pond constructed in the vicinity of a stream, the pond shall be located a sufficient distance from the stream to maintain a 15 foot wide cleared area beyond the toe of any berms surrounding the pond, plus an additional 30 foot wide, or larger, vegetated buffer along the stream. All stream relocation designs shall be approved by the administration and MDE prior to implementation.

3.20.08.04.09 Permit Modifications

Changes to the RFP Plans may result in the need for a permit modification, in which case the Design-Builder shall be responsible for supplying to the Administration all information needed to obtain approval and authorization from the regulatory agencies for permits that are listed in Section 3.20.05 (A) as the responsibility of the Administration. The Design-Builder shall be responsible for addressing any comments or issues the regulatory agencies and/or the Administration may have, including those pertaining to avoidance and minimization measures. The Design-Builder shall also be responsible for any cost associated with providing the additional mitigation which may be required by the regulatory agencies. If available and compensation agree, the Administration may allow the Design-Builder to use excess acreage at the approved mitigation sites. It is not the responsibility of, nor guaranteed by, the Administration that approval or authorization of the proposed permit modification will be granted by the regulatory agencies. All time delays and costs that result from obtaining a modification approval shall be borne by the Design-Builder.

The Design-Builder shall be solely responsible for the permits listed in Section 3.20.05 (B) and modifications.

3.20.08.05 Reforestation

Reforestation work shall include the performance of all required and applicable Maryland Reforestation Law associated with the Project.

3.20.08.05.01 Forest Avoidance and Minimization

Direct impacts to forest are anticipated to occur under the Project. Surveyed boundaries of forests are depicted. Prior to performing any Work, the Design-Builder shall be responsible for performing all tree preservation measures in accordance with Section 120-Tree Preservation of the Standard Specifications for Construction and Materials.

Specimen trees (trees greater than 30” in diameter measured at 4.5’ from the ground) were identified, evaluated and are depicted on the Landscape Plates. The Design-Builder shall avoid as many specimen trees as possible without affecting resources with equal or greater regulatory protection. As the design advances, it may be found that specimen trees are located near the outer edge of the required LOD/ROW or just outside the LOD/ROW. If this condition exists, the Design-Builder shall coordinate with the Administration to mark and provide a buffer for any such tree to avoid its removal during clearing and grubbing activities. An adequate buffer is defined as the critical root zone (drip line). Critical Root Zones for individual significant or specimen trees, as defined by the Maryland Department of Natural Resources:

Measured from the center of the tree's trunk; 1.5 foot of radius per inch of DBH (Diameter at Breast Height).

Before reforestation is approved by the MD DNR, every reasonable effort shall be made by the Design-Builder to minimize the cutting or clearing of trees. Only the minimum number of trees may be cut, and sound design practices shall be utilized.

The Department of Natural Resources has analyzed the forested area adjacent to the project site. The analysis suggests that this forested area contains Forest Interior Dwelling Bird Species (FIDS) habitat. The conservation of this habitat is strongly encouraged by the Department of Natural Resources. The Design-Builder shall adhere to the following guidelines to minimize the project's impacts on FIDS habitat and other native forest plants and wildlife:

a. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.
b. Do not remove or disturb forest habitat during May-August, the breeding season for most FIDS.
c. Maintain forest habitat as close as possible to the road and maintain canopy closure where possible.

3.20.08.05.02 Forest Impact Reduction Incentive

The Design-Builder is advised upon final acceptance of Work, completion of as-built plans and approval of modifications by the DNR, the Design-Builder will be provided additional compensation for any upland forest impact net reduction in increments of 0.5 acre. The additional compensation only pertains to a net reduction of impacts within the limits of disturbance. This determination will be made by comparing the impacts determined in the as-built plans against the impacts approved by the DNR. The incentive will be paid as follows:

Project Location	Incentive
Forest Impact Reduction within LOD	$2,500 / 0.5 Acre
*Excludes forest comprised primarily of invasive species such as Callery Pear, Tree of Heaven and other invasive tree species	

3.20.08.05.03 Forest Mitigation

Land disturbed by construction activities shall be revegetated as soon as practical after construction is completed in accordance with the Drainage, Stormwater Management, and Erosion & Sediment Control and Planting & Landscape

Architectural Performance Specifications.

Mitigation shall be the responsibility of the Design-Builder for additional impacts proposed beyond those originally approved by DNR for the Project, and may include a site search, agency reviews and approvals, design, and obtaining right of way and construction. If available and compensation agreed, the Administration may allow the Design-Builder to use excess mitigation at the approved mitigation sites.

3.20.08.06 Terrestrial Wildlife (TW)

3.20.08.06.01 Rare, Threatened and Endangered Species (RTE)

No federally listed rare, threatened, or endangered (RTE) species are anticipated to be directly impacted by construction of the Project.

3.20.08.07 Cultural Resources

Historic Properties, including archaeological sites and historic standing structures, are afforded protection by Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and the Maryland Historical Trust Act of 1985, as amended, State Finance and Procurement Article §§ 5A-325 and 5A-326 of the Annotated Code of Maryland.

The Federal Highway Administration, Maryland State Historic Preservation Officer (MD SHPO), and Maryland State Highway Administration executed a Memorandum of Agreement stipulating the treatment of cultural resources during construction of the MD 32 from MD 108 to I-70 Corridor project, including design refinements and ancillary project activities outside the Limits of Disturbance identified in the Bid Package.

Maryland State Highway Administration senior archaeologist Ms. Lisa Kraus (410-545-2884 or via email at lkraus@sha.state.md.us) (the SHA Archaeologist) shall act as the archaeological liaison with the SHA Construction Engineer. The SHA Archaeologist shall be available to report to the job site within 24 hours of notification to inspect any archaeological features that might be discovered during construction.

Should cultural resources be encountered during Design-Build activities, the following requirements will apply:

A. Unauthorized Project Impacts are prohibited;

B. Material changes to the highway alignment that result in impact beyond those identified will not be allowed without the prior written consent of the Administration;

C. Proposed changes shall be supported by the necessary investigations, documentation, and submittals needed for these approvals by applicable resource management agencies; and

D. Time and cost implications resulting from design changes shall be solely borne by the Design-Builder.

3.20.08.07.01 Unanticipated Discoveries of Archeological Resources During Design-Build Activities

It is not anticipated that archeological resources are present within the RFP limits of disturbance, based on investigations conducted by the Administration and coordinated with the MD SHPO. However, should such resources be encountered during Design-Build activities, the following procedures will be followed.

1. In the event that previously unrecorded archaeological sites, features, artifacts, or other archaeological resources (hereafter, "Resources") are discovered during construction, all construction work in the immediate vicinity of the archaeological Resource shall be temporarily halted to prevent further damage to the discovered Resource, or to any unidentified Resources that might be present in the vicinity. The Design-Builder shall immediately notify the Administration's Engineer, who shall coordinate with the SHA archaeologist, Ms. Lisa Kraus (410-545-2884).

    a. The SHA archaeologist, or an archeologist approved by the Administration, shall perform a preliminary inspection of the Resource to evaluate its potential eligibility to the National Register of Historic Places.

    b. If the Resource cannot be avoided by construction, the SHA archaeologist shall, in consultation with the MD SHPO, develop a Treatment Plan for its protection, recovery, or destruction without recovery. The archaeological investigation may include further clearing and excavation to define the archaeological Resource, photography, measured drawings, and archaeological excavation (recovery) of all or part of the Resource.

    c. Construction shall be temporarily suspended in the immediate vicinity of the Resource until the archaeological investigation has been completed, as provided for in the Standard Specifications for Construction and Materials under Section TC-5.04 (Cultural Resources) and Section TC-4.04 (Work Suspension). Construction can and should continue in all other parts of the project area.

    d. If the Administration's Engineer determines that the discovered Resource is located in a part of the project that will affect the critical path of construction, investigations will be limited to the minimum time required to complete necessary archaeological investigations and secure the approval of the MD SHPO.

e. The SHA Archaeologist shall consult with, and shall provide the proposed Treatment Plan to, the Maryland SHPO for their review and approval. Construction may resume within the area of the archaeological Resource once the Treatment Plan has been approved by the MD SHPO, all of its provisions have been successfully completed, and the SHA archaeologist notifies the Administration's Engineer of the MD SHPOs concurrence.

f. Work in the affected area shall not proceed until either:

- The development and implementation of appropriate data recovery or other recommended mitigation measures, or

- The determination is made that the located remains are not eligible for inclusion on the National Register.

3.20.08.07.02 Human Remains

A. Should any human remains (hereafter, "Remains") be encountered during construction, all construction work in the vicinity of the Remains shall immediately be halted to prevent damage to the Remains, or to any additional Remains that might be present in the vicinity. The Design-Builder shall immediately notify the Administration's Engineer, who shall coordinate with the SHA Archaeologist, Ms. Lisa Kraus (410-545-2884).

1. The SHA archaeologist shall perform a preliminary inspection of the Remains to evaluate the age and cultural affiliation of the remains. In consultation with the MD SHPO (Elizabeth Cole, Administrator, Review and Compliance), the SHA Archaeologist shall inspect the Remains within 24 hours of notification.

2. If the Remains cannot be avoided by construction, the SHA Archaeologist shall, in consultation with the MD SHPO, prepare a preliminary evaluation of the Remains and shall develop a plan (hereafter, "Plan") for their protection, recovery, or destruction without recovery. The archaeological investigation may include further clearing to define the Remains, photography, measured drawings, and archaeological excavation (recovery) of all or part of the Remains. If warranted, appropriate law enforcement agencies shall be informed, and Native American groups or other consulting parties shall be notified and consulted.

3. Construction shall be temporarily suspended in the immediate vicinity of the Remains until the archaeological investigation has been completed, as provided for in the Standard Specifications for Construction and Materials under Section TC-5.04 (Cultural Resources) and Section TC-4.04 (Work Suspension). Construction can and should continue in all other parts of the project area.

4. If the Administration's Engineer determines that the Remains are located in a part of the project that will affect the critical path of construction, investigations will be limited to the minimum time required to complete necessary archaeological investigations.

5. The SHA Archaeologist shall consult with, and shall provide the proposed Plan to, the Maryland SHPO for their review and approval. Construction may resume within the area of the archaeological feature once the Plan has been approved by the MD SHPO, all of its provisions have been successfully completed, and the SHA archaeologist notifies the Administration's Engineer of the MD SHPOs concurrence.

6. Work in the affected area shall not proceed until either:

   - The development and implementation of appropriate data recovery or other recommended mitigation measures, or

   - The determination is made that the located remains are not eligible for inclusion on the National Register.

3.20.08.08 Hazardous Materials

A. The Design-Builder shall prepare and implement a plan for management and disposal of controlled hazardous materials and contaminated soil and groundwater that may be encountered during structure demolition, land clearing, or excavation activities.

B. The plan shall address worker safety and health in accordance with applicable federal, state, and local regulations.

C. The plan shall provide procedures for management, handling, transportation, and disposal of demolition debris and contaminated soils and groundwater that contain controlled hazardous substances in accordance with applicable federal, state, and local regulations.

3.20.09 Tracking of Sediment

The Design-Builder shall implement means to reduce tracking of sediment such as:

A. Elongated and widened stabilized construction entrances;

B. Use of wash racks;

C. Use of street cleaning equipment;

D. Increased maintenance of entrances; and

E. On-site concrete wash-out pits in proximity to all major pour sites.

3.20.10 Submittals

The Design-Builder shall provide the following:

A. Surveyed as-built 22x34 plans of post construction conditions in the same format as the RFP Plans and the revised impact tables that were included in the Joint State/Federal Nontidal Wetlands and Waterways Permit application.

B. Forest Impact Plans.

TC 3.21 PUBLIC OUTREACH PERFORMANCE SPECIFICATION

3.21.01 General

This Performance Specification outlines the requirements for Public Outreach (PO) and defines the roles and responsibilities for this effort.

The PO program includes Administration and Design-Builder activities, including the following:

A. Public Outreach;

B. Community involvement and meetings;

C. Communications with the public;

D. Public notices;

E. Media relations; and

F. Maintenance of Traffic (MOT) plan.

The residents, businesses, elected officials, communities, motorists, and other interest groups within the project area have been kept informed and their engagement in the construction process is critical to the successful completion of the Project. In support of the Administration, the Design-Builder shall commit to significant assistance of the Administration with regard to community participation and interaction activities during the development of the design and throughout the construction of the Project.

The Design-Builder shall provide a Public Relations Coordinator who is responsible for assisting the SHA and Design-Build Team in developing integrated communication plans, including planning, research, implementation and evaluation. The Coordinator must have strong writing skills, excellent communication skills, community outreach skills and experience handling sensitive and/or controversial issues. The Administration reserves the right to request a resume to verify qualifications. Duties include but are not limited to:

- Research, write and edit draft news releases, fact sheets, traffic alerts, briefing memos, advertising copy, speeches, web content, social media content, newsletters and brochures that will be submitted for approval to SHA.
- Collects and provides clips of media coverage of the project for inclusion in SHA's daily report.
- Gathers information on construction updates and project timelines and works with SHA to input and distribute the data through all applicable communication channels such as mainstream, social media, and website postings.
- Drafts responses to correspondence, emails, and other inquiries, including Customer Care Management System assignments.

- Assists with website content management and development, including writing, editing and potentially uploading content on multiple websites; as well as photographs and video of the project progress.
- Facilitates and coordinates obtaining any aerial or digital photography, graphical maps of traffic patterns and project design, art or other materials needed for public relations
- Coordinates and participates in a variety of community/stakeholder events and meetings. Coordinates with SHA the DBT's development of graphics, presentations, videos, power point, slide shows or other visual presentations for those events and meetings.
- Helps implement/coordinate special events on the project and/or VIP and media events, including materials preparation and logistics.
- Develops and writes copy for marketing materials such as, but not limited to, e-blasts, inserts, newsletters, brochures, fliers, fact sheets, calendars and maps. Manages distribution including zip code mailings, door hanger posting, etc.…
- Researches inquiries from the public, elected officials and/or media and develops response to be provided by the Coordinator or other designed project or SHA official.

3.21.02 Guidelines and References

The Work shall be in accordance with this Public Outreach Specification.

3.21.03 Requirements

The community involvement and participation element is intended to carry forward the dialogue with residents, landowners, community groups, local officials, and other similar groups. This effort shall include activities such as, but not limited to, the Design-Builder supporting the Administration in meetings with individual land owners, local officials, and community groups and public meetings to keep the public involved in design and construction activities.

Public Outreach is intended to keep the public informed of major activities and decisions through design and construction. This element will involve the preparation and distribution of Project information to the assigned Administration representative for further dissemination to the public and media.

The Design-Builder shall make a good faith effort to address any concerns the public may have, and take under consideration any suggestions or wishes they express if those suggestions are reasonable in regard to cost, time, and construction effort. Documentation shall be in the form of meeting minutes and correspondence, including e-mails. The Design-Builder shall direct

requests it receives to the Administration and shall assist in preparing responses. All design or construction modifications are subject to written acceptance by the Administration.

3.21.03.01 Administration Public Outreach Responsibilities

The Administration and the Design-Builder have shared responsibility for the PO Program. The Administration will be the lead on Public Outreach activities, with active support provided by the Design-Builder, to include project research, adequate support staff, graphic design, materials, and printing.

The Design-Builder shall have primary responsibility for performing the activities specified in this Public Outreach Specification as was well as in the Contract Documents.

The Administration's responsibilities include the following activities:

A. Maintain Questions & Answers/Frequently Asked Questions of any approved communication efforts by the Design-Builder; and

B. Liaising with and monitoring the Design-Builder's performance for compliance with the Contract's public outreach requirements.

3.21.03.02 Design-Builder Responsibilities and Requirements

3.21.03.02.01 Design-Builder's Response to Inquiries and Comments

A. Questions or comments from residents, businesses, or other member of the public shall be referred to the Administration within 4 hours. The Design-Builder shall take necessary steps to facilitate such contact.

B. If Design-Builder receives a complaint regarding its conduct of work on the Project, the Design-Builder shall notify Administration within 4 hours. The Design-Builder shall provide necessary information, staff support, and representation to assist in resolving the issue.

C. If Design-Builder receives a complaint regarding flooding, erosion, water quality, or any other drainage or environmental concern, the Design-Builder shall notify the Administration's Highway Hydraulics Division within 4 hours. The Design-Builder shall provide necessary information, staff support, and representation to assist in resolving the issue.

D. On occasions specified by the Administration, the Design-Builder shall commit its Project Manager to serve as a spokesperson for the Project for technical and safety issues with certain audiences.

3.21.03.02.02 Public Notifications

A. The Design-Builder shall facilitate the Administration's notification of the public and community in general and specifically affected businesses and residents along the Project. As directed by the Administration, this may include personal contact to affected parties of construction progress and upcoming events.

B. The Design-Builder shall provide the specific notifications listed in Table 1.

C. Utility shut-off/diversion announcements shall be coordinated in advance with the Administration and the utility company. The Design-Builder shall prepare a written notice to the affected parties.

TABLE 1
NOTIFICATIONS

Notice	Requirement
Lane Closure	Written notices posted at least 7 days in advance of planned closures at start and end of Project and at intermediate intersections/junction with United States (US), state, or county highways and roads. Notice provided to Refer to Maintenance of Traffic Performance Specifications.
Critical Utility Shut-off/Diversion	Written notice at least 72 hours in advance of, but not more than 96 hours before, shut-off and/or diversions. Copy of notice to Administration and Utility Company.
Business/Commercial Utility Shutdown	Written notification of Utility shutdown or diversion for businesses and commercial property at least 72 hours in advance of shut-down. Notice shall be coordinated in advance with Administration and Utility Company.
Residential Utility Shutdown	Written notification of Utility shutdown or diversion for residential property 72 hours in advance of shut-down. Notice shall be coordinated in advance with Administration and Utility Company.
Weekly Construction Updates	Construction updates shall be provided weekly and shall identify all Planned traffic shifts, lane closures and utility shut-downs and activities.
Road and Driveway Closures	Written notice and personal contact at least 72-hours in advance of closure. Copy of notice to Administration. Refer to Maintenance of Traffic Performance Specifications

3.21.03.02.03 Public Contact Records

The Design-Builder shall maintain a consistent system for documenting all contact with business owners, residents, media and property owners. Unless otherwise directed, the Design-Builder should not act as spokesman for the Project. The Design-Builder shall provide Administration an electronic copy of all public contact records. File should be received by the 1st of each month and should include all contacts made prior to the 25th of the previous month.

3.21.03.02.04 Construction Schedule/Maintenance of Traffic and Access

Information regarding Project design and construction shall be readily available in a form that can be quickly disseminated to the public. Information provided to the public shall be consistent with information contained in the Baseline Progress Schedule, schedule updates, and the applicable Maintenance of Traffic Plan.

3.21.03.02.05 Signage

The Design-Builder shall install signs throughout the Project to be placed at the start and end of the Project, at intersections with County and State highways, at Design-Builder's main office (if along the Project alignment), and at all field

offices. The signs shall identify the Administration by its SHA official logo and show the name of the Project, the Project hotline number, and the Project Web site address is applicable. Signs and lettering shall be sized appropriate for the speed limit in the area using MUTCD size guidelines.

3.21.03.02.06 Telephone Trees

The Design-Builder shall establish and manage an emergency response telephone tree. All appropriate emergency response agencies shall be included on this telephone tree for immediate response in the event of an emergency. The telephone tree shall be divided into areas of expertise so the proper people are called for specific emergency situations.

3.21.03.02.07 Public Forums

At the specific request of the Administration, the Design-Builder shall participate in Administration organized public forums to give the public the opportunity to discuss the Project. The Design-Builder, in coordination with the Administration, shall hold a public meeting to advise the public of the construction prior to beginning construction activities.

The Design-Builder shall provide all graphics and printed materials for these forums and work with the Administration in developing all materials.

3.21.03.02.08 Construction Progress Photographs

The Design-Builder shall provide to the Administration high-resolution construction progress photographs in electronic format at least monthly or at any time that a new significant activity commences. Monthly submission should include at a minimum of 10 (ten) new progress photos. In addition, the Design-Builder will facilitate requests and make arrangements for the Administration to take additional photos on an as-requested basis. Distinct from progress documentation photos, the purpose of photos identified in this section is to facilitate public information via the Project Web site, newsletters and other such materials.

3.21.03.03 Other Design-Builder Activities

The Design-Builder is encouraged to provide additional, cost-effective services to enhance the overall Public Outreach Community Relations Program. Additional services should adhere to the standards indicated in the Public Outreach Plan and be a supplement to the services outlined in this Performance Specification. Any such enhancements may be implemented at any time during the Project and subject to Administration's written acceptance.

These activities may include part of the federal Transportation Management Plan

guidelines to draft a Public Information & Outreach plan for the project, which shall include:

- Standard language for constituent response (i.e. correspondence, phone inquiries, memos, etc.) in accordance with the Administration's guidelines.
- Creation/printing of overall project brochure and supporting materials
- Creation/printing of community updates for distribution
- Development of community contacts list
- Educating the public on work zone safety

3.21.03.04 Media Relations

An ongoing media relations effort will be handled by the Administration. The Design-Builder shall assist in providing timely information to the Administration regarding construction activities for use in media events.

NEITHER THE DESIGN-BUILDER NOR ANY SUBCONTRACTOR NOR THEIR EMPLOYEES SHALL INTERFACE WITH THE MEDIA WITHOUT THE EXPRESSED CONSENT OF THE ADMINISTRATION, EXCEPT AS SPECIFICALLY DIRECTED BY THE ADMINISTRATION. IN EMERGENCY SITUATIONS, THE DESIGN-BUILDER SHALL IMMEDIATELY NOTIFY THE ADMINISTRATION OF ANY SITUATIONS THAT MAY INVOLVE THE MEDIA.

TC 3.23 INTELLIGENT TRANSPORTATION SYSTEMS (ITS) PERFORMANCE SPECIFICATION

3.23.01 General

The Design-Builder shall design, construct and implement the elements of the Intelligent Transportation System (ITS) in accordance with the requirements of this specification, including performance requirements, Standards and References, warranties, design and construction criteria, and required submittals. The Design-Builder shall retain the services of a Maryland registered Professional Engineer with a minimum of five (5) years proven experience in ITS design.

The Design-Builder shall furnish, install, test and integrate all equipment, software, and materials necessary to provide a fully functional Intelligent Transportation System (ITS) to facilitate traffic monitoring and surveillance, motorist information, average speeds, and incident management along MD 32 from MD 108 to Linden Church Road. All equipment supplied must be fully compatible from a hardware and software perspective with the Administration's Coordinated Highway Action Response Team (CHART) system. The sub-systems shall include:

A) Two Closed Circuit Television (CCTV) cameras and associated equipment cabinets, including uninterruptible power supplies (UPS).
B) Two (2) Side-fired microwave-based Traffic Speed Detectors, mounted on the CCTV camera poles.
C) 62.5 micron 12-strand multi-mode fiber cable for CCTV T1 communications, if needed.

The approximate locations for the ITS equipment to be provided are shown in Table 1, below:

Table 1: ITS Devices

DEVICE	LOCATION	REMARKS
CCTV/DETECTOR (On the same pole)	MD 32 at Linden Church Road	The exact location of the pole will be determined by the Design-Builder in consultation with CHART and Office of Maintenance Communications Division.
CCTV/DETECTOR (On the same pole)	MD 32 West of MD 108	The exact location of the pole will be determined by the Design-Builder in consultation with CHART and Office of Maintenance Communications Division.

All system elements to be designed and installed within the Project right-of-way will be operated by the Administration and shall be integrated with both the SOC and CHART system. All ITS Work shall be based on a systems engineering analysis meeting the requirements in 23 CFR 940.11.

Some ITS devices may require electrical and communications services that are located at great distances from those sites. As a result, dry transformers and heavy cables for power, and fiber-optic based communications services may be needed. This is particularly true of CCTV cameras that require T1 data services which have a limited transmission distance (500-600ft.) over copper lines. At these sites, two cabinet setups will be required: one adjacent to the Verizon communications source, and the other at the CCTV site. Each cabinet will contain a fiber-optic transceiver unit with 62.5-micron, 12-strand multimode fiber in an SHA-approved conduit system between them. The Design-Builder will be responsible for all communications service infrastructure, including conduits, 6-pair jelly-filled copper cable or 12-strand multi-mode fiber (as required), and manholes/hand holes.

The Design-Builder will be responsible for all power connections necessary to provide a 120/240 VAC service to the load centers in the cabinets, including conduits, manholes/hand holes, cables, SS disconnect switches, base-mounted metered or un-metered service pedestals, and any dry transformers needed for providing such power connections over long distances.

Routers and specialized communications equipment will be installed and commissioned by the SHA Communications Division (Radio Shop).

The Design-Builder shall coordinate the ITS work in this contract with the SHA Communications Division (Radio Shop), provide access as required, perform testing and deliver a fully functional system.

The Design-Builder shall provide the Engineer with detailed descriptions and data sheets of all equipment and services proposed on the Project. All submittals shall be in accordance with Section 800 Traffic “Catalog Cuts and Working Drawings”. The Design-Builder shall provide the Engineer with detailed setup/configuration and software documentation. The Design-Builder shall also provide to the Engineer all licenses required for equipment, services, hardware and software supplied.

The Design-Builder shall provide site installation plans to the Engineer before installation and as-built drawings after installation. The as-built drawings shall include but not be limited to equipment, configurations, wiring diagrams, components, location diagrams, and connection data. The Design-Builder shall provide the Engineer with the configuration information of all installations.

The Design-Builder shall identify and provide all permits, government fees and licenses required to execute the Contract if required. The Design-Builder shall provide copies of these executed documents to the Engineer.

The Design-Builder shall provide the Engineer with a recommended spare parts list.

3.23.02 Standards & References

The Design-Builder shall design and construct the ITS in accordance with this ITS Performance Specification and the relevant requirements of the Guidelines and References in TC Section 3.08.

3.23.03 Performance Requirements

The Design-Builder shall design and construct the ITS using the criteria specified within this Section to:

A) Provide a fully functional ITS meeting the Contract requirements.
B) Integrate the Project ITS system equipment with the regional and statewide CHART network to provide continuous and uninterrupted service of the ITS equipment and associated communications throughout the project area.
C) Facilitate system integration by using materials and components that are consistent and 100 percent compatible with those of the existing system(s) used by the Administration's CHART system.
D) Maintain the operation of all existing ITS components within the Project limits throughout the duration of construction, except as otherwise stated herein.
E) Provide a final product that facilitates and accommodates routine maintenance of ITS components without impacting normal traffic operations.
F) Construct and integrate Project ITS components at the earliest practical time to improve Maintenance of Traffic.
G) Test all equipment installed, and provide the results of those tests to the Administration's Communications Division. The Design-Builder must coordinate the testing with Communications Division personnel.
H) Upon request, provide training of CHART personnel for high level administration, maintenance and operation of all Design-Builder supplied equipment

3.23.04 Design and Construction Requirements

If existing ITS devices are impacted by this projects, the maximum outage time shall be 24 hours unless otherwise approved by the Administration. All proposed and existing ITS components within the Project shall be working limits shall be working upon completion of the Project. Any existing ITS component that is impacted by the construction of this Project shall be disconnected, reconnected, and made fully operational by the Design-Builder as part of this Project. All abandoned cables shall be made safe.

3.23.04.01 Existing Administration Systems

The Design-Builder shall perform design and construction necessary to deliver

functional and fully operational ITS elements that are fully compatible with the Administration and CHART communication network. ITS elements shall be compatible and shall comply with existing maintenance requirements.

The Design-Builder shall design, provide, install, and assist with the integration and testing of all constructed and interconnected System elements, in accordance with procedures presented to the Administration for review and written comment, so as to satisfy requirements and demonstrate compatibility and interoperability with the existing systems and communication networks. Design, construction, installation, and integration activities shall include equipment installation, functional integration, and testing at multiple levels. Configuration changes required to the CHART system will be completed by the Administration.

The Design-Builder shall perform design, construction, installation, relocation, integration assistance and testing of existing (if impacted), relocated, temporary and permanent operational ITS field elements for the Project.

The ITS shall be implemented using a construction sequencing approach maximizing the ability to use temporary or permanent ITS field elements to actively monitor and manage recurring and non-recurring Project traffic congestion, as well as to detect and confirm incidents during construction and post construction activities.

The Design-Builder shall coordinate and provide requested data to the Administration and CHART for modifications and updates of existing databases to add new ITS field elements. Updated data shall include device identification, interfaces for fiber optic communications network and updates to graphical user interfaces. All software and database modifications, and associated modules, files and documentation to compile updates to the system shall become the sole property of the Administration, and shall be delivered as a condition of Acceptance for Maintenance.

The Design-Builder shall design and install a grounding system and transient protection devices that are suitable for the specific installation and equipment being supplied for each type of ITS element. The Design-Builder shall ensure that all equipment, devices, interconnect wiring, communication devices, communication lines, power supplies, antennas, operator controls, and power service are protected from external and internal electrical transient surges and line noise sources, including power surges, lightning, induced voltages, and static discharge. Systems and devices shall be designed and installed in accordance with the National Electric Code.

The Design-Builder shall provide operational and maintenance training to Administration personnel if requested for all ITS elements prior to transfer of maintenance responsibilities.

No part or attachment of any equipment shall be substituted or applied contrary to the manufacturers' recommendations and standard practices.

The Design-Build Contractor shall understand that any work not specifically mentioned in this Specification, but which is necessary, either directly or indirectly, for the proper performance of the work, shall be required and completed, and be performed just as if it were described in this Specification at no additional cost to the ADMINISTRATION. This shall include software or firmware upgrades needed at any time prior to project completion to guarantee the proper performance or compliance of the equipment with the CHART system, and any hardware changes or additions associated with those upgrades.

3.23.04.02 Plan Sheet Requirements

The Design-Builder shall prepare and present 1"=50' ITS plans with a scale appropriate for the Project, generally. Plans shall include existing and proposed geometry, existing and proposed utilities, right-of-way, landscape features, applicable drainage features, applicable structural facilities, and other information required for coordination of utilities. Plans shall show the location of new ITS equipment, removal and relocation of existing ITS equipment if necessary, conduit, cable types and installation method, manholes/handholes/junction boxes, ground rod locations, electrical service locations, telecommunications service locations, and other details pertinent to the construction.

3.23.04.03 Existing ITS Equipment

The Design-Builder shall perform a survey and inventory to verify existing and proposed ITS field element locations and annotate any variations with the existing and prevailing field conditions. Field location adjustments may be allowed if compelling conditions warrant relocation.

3.23.04.04 Power requirements

The Design-Builder shall provide alternating current (AC) metered power service to every ITS cabinet without interruption of existing metered service. In addition, all CCTV/Detector sites shall have an Uninterruptible Power Supply (UPS) system in a separate cabinet with sufficient capacity to allow the operation of the camera system for 24-28 hours. The CCTV controller cabinet and UPS cabinet shall share a common foundation. A foundation detail for stand-alone Type 332 cabinets can be found in the Administration's Book of Standards.

The Design-Builder shall be solely responsible for all Work, materials, and costs associated with obtaining power and maintaining power throughout construction for all ITS devices, including coordination with the power company and obtaining power supply for all ITS devices required for this Project. The Design-Builder shall be responsible for completing all electrical service application materials necessary for obtaining service

from the appropriate power company. All materials shall be submitted to the power company.

The Design-Builder shall be responsible for all ongoing monthly electricity costs for any new ITS elements installed under this Project until Partial Acceptance for Maintenance of the ITS elements.

3.23.04.05 Location of ITS Equipment

All ITS elements shall be installed within the Project right-of-way at the approximate locations shown in Table 1. All ITS elements shall be located in an area where access to equipment will not affect traffic operations or require traffic control unless otherwise identified. Maintenance access to all ITS devices, including cabinets, shall be provided by an all-weather maintenance pull-off, or by a widened shoulder with a minimum width of 12 feet, and a minimum length of 100 feet, unless otherwise specified. Where provided, an all-weather maintenance pull-out shall be sufficient to accommodate access and egress of a single unit maintenance vehicle load in all weather conditions. The pullout roadway surface shall consist of a permanent pavement suitable for access vehicle loading conditions. The pullout shall be located behind guardrail or other roadside barrier suitable for protection of maintenance personnel and shall be located downstream of the ITS element.

The Design-Builder may install barrier wall, guardrail, or crash protection devices to protect equipment that is temporarily in the clear zone due to maintenance of traffic *I* construction staging.

The Design-Builder shall locate all underground existing facilities and design all ITS elements to avoid or minimize conflicts with these facilities.

The Design-Builder shall ensure that all equipment, devices, interconnect wiring, communications devices, communications lines, power supplies, antennas, operator controls, and power service are protected to eliminate damage from external and internal sources, including power surges, lightning, induced voltages, and static discharge. The Design-Builder shall design and install a grounding system and protection devices that are suitable for the specific installation procedures and equipment supplied.

3.23.04.06 ITS Work Elements

The Administration will operate and control messages for all electronic displays that are potentially in the public view. The Design-Builder shall not activate any display or ITS component without prior coordination with the Administration.

The Design-Builder shall design, furnish and install all required materials and equipment for operational elements of the ITS, as listed below. For each of these elements, the Design-Builder shall design and construct all wiring and cabling connections to provide

both local and remote operations for a complete and accepted ITS element including the following:

A) Each of the CCTV cameras shall be capable of local control (PTZ and all remotely-controllable functions) from their respective controller cabinets. All CCTV functions (camera video and control) shall be transmitted to The Administration's CHART System and the Statewide Operations Center via T1 data circuits. The Administration's CHART System/SOC shall have complete control of all camera functions at all times.

B) The traffic detectors shown in Table 1 shall be mounted to the hinged CCTV poles installed by the Design-Builder. The Administration's standard for the poles shows mounting plates that are permanently welded to the poles at locations that are at the appropriate height for a typical roadside installation. Any adapters or extensions needed to adjust the height shall be the responsibility of the Design-Builder. Traffic detectors utilize side-fired radar technology, and must be installed so that they have an unobstructed right-angle view of traffic on the target roadway.

3.23.04.07 Communications Systems

The Design-Builder shall design, furnish, and install a communication system capable of transporting data to/from field devices. The communications system shall support the following minimum functional requirements:

Provide two-way data communications between the CHART system and field devices using leased T1 phone lines or wireless cellular modems to update, poll, monitor, and control traffic management elements.

3.23.04.07.01 Design Criteria

Work to be performed as part of this Project shall include, but is not limited to:

A) Assist with the integration of existing and proposed ITS field devices, within the Project limits, into the CHART system communications network.
B) Provide fiber optic cable to support the CCTV sites along MD 32, if needed.

The Design-Builder shall furnish, install and test telephones and supporting systems, if required.

The Design-Builder shall coordinate with the Administration's Communications Division and CHART SOC to develop an appropriate IP/Network Plan.

The Design-Builder shall be responsible for the design and installation of any modification to the existing/previously installed communications network or cabinet

locations along roadways that would tie into the Project network in the project area. These modifications shall serve to support and integrate the existing/previously installed field devices. The Design-Builder shall be responsible for integrating the existing/previously installed and proposed field devices to the proposed IP/Ethernet network. Existing Administration-owned fiberoptic cables are generally not available for local ITS communications use.

All fiber optic cable used for T1data or cabinet-to-cabinet communications on this project shall be 62.5-micron multi-mode, non-dispersion shifted optical fiber with a rodent-resistant outer jacket. For cabinet to cabinet patch panels shall be installed in both cabinets. The Design-Builder shall ensure compatibility with the existing fiber used by the Administration, and shall make connections with existing/previously installed fiber if required.

The Design-Builder shall provide documentation for all fiber work performed on this Project.

3.23.04.08 CCTV/Detector Sites

3.23.04.08.01 Design Criteria

Each CCTV Camera/Detector site shall be located in accordance with the AASHTO Roadside Design Guide and in areas where access to equipment shall not require traffic control. Maintenance access to CCTV/Detector sites may be provided by an all-weather maintenance pull-off, or by a widened shoulder with a minimum width of 12 feet, and a minimum length of 100 feet. Since traffic detectors must be maintained using a bucket truck, this maintenance pull-off must allow room for such a vehicle.
CCTV/Detector sites shall be selected to yield the optimum unobstructed camera view of the roadway, while giving consideration to the setback requirements of the side-fired detector used. In situations where a camera is to be located at the intersection of two roadways, the pole location may be selected so that both roadways may be viewed, unless the Design-Builder is directed otherwise by CHART. The detector will normally be oriented toward the major roadway, or as directed by CHART.

3.23.04.08.02 Material Requirements

The Design-Builder shall be responsible for all site installation, insurance, interim storage, labor, and transportation costs associated with equipment pickup and transportation between Design-Builder- provided storage and field sites. All materials shall be provided in accordance with the requirements of this specification.

3.23.04.08.03 Construction Requirements

The Design-Builder shall locate the base/foundation of the CCTV camera pole to avoid existing underground utilities, and place the camera base/foundation at a site that is flatly graded so the associated cabinet and any handholes are installed level with the finished grade.

The Design-Builder shall install foundations for CCTV poles to SHA standards.

The Design-Builder shall install two 3-inch diameter conduits in each CCTV pole foundation as shown in the Hinged CCTV Camera Pole Details (Plates ITS-18 to ITS-20) listed in Table 2, with one oriented toward the intended camera cabinet location. The Design-Builder shall provide a "locator wire" or tape that allows future non-destructive identification from the surface grade.

3.23.04.09 ITS Cabinet Requirements

This work shall consist of design and construction of ITS equipment cabinet bases, electrical power work, junction boxes, conduit, grading, cables and conductors. ITS cabinets shall be required for each of the new ITS device locations and shall be utilized as the device communication connection points. ITS cabinets shall be, at a minimum, Type 332/334, NEMA-3X rated. Front and rear concrete pads shall be furnished and installed at all cabinet sites to provide level and dry surfaces for a maintenance technician to stand on while servicing the cabinet sites. This work includes excavation, gravel base, backfilling, and treated timber cribbing. Concrete pads shall be provided for all doors on ITS cabinets.

All Type 332/334 cabinets provided for ITS equipment shall have heating, ventilation, and LED lighting systems, and shall have a pull-out “laptop” drawer/shelf situated in an appropriate rack position below the device controller to allow ease of maintenance by SHA technicians.

3.23.04.09.01 Design Criteria

Each ITS equipment cabinet shall be located in accordance with the AASHTO Roadside Design Guide and in areas where access to equipment shall not require traffic control. Maintenance access to ITS cabinets may be provided by an all-weather maintenance pull-off, or by a widened shoulder with a minimum width of 12 feet, and a minimum length of 100 feet.

3.23.04.09.02 Material Requirements

The Design-Builder shall be responsible for all site installation, insurance, interim storage, labor, and transportation costs associated with equipment pickup and transportation between Design-Builder- provided storage and field sites. All materials shall be provided in accordance with the requirements of this

specification.

3.23.04.09.03 Construction Requirements

The Design-Builder shall locate the base of the ITS equipment cabinet to avoid existing underground utilities, and place the ITS equipment at a site that is flatly graded so the handholes are installed level with the finished grade.

The Design-Builder shall design and install cabinet bases for ITS cabinets.

The Design-Builder shall install two 3-inch diameter conduits for fiber optic communication drop cable from the fiber distribution handhole to the cabinet. The Design-Builder shall provide a "locator wire" or tape that allows future non-destructive identification from the surface grade. The Design-Builder shall provide two (2) empty conduit stubouts to any pad-mounted ITS cabinet. The conduit stubs from the cabinet shall terminate in the ground for future power and communication usage. Cabinets shall be configured for their specific application (e.g., DMS, etc.) and site location. Each cabinet shall be identified by a specific cabinet ID derived using an approved naming convention.

The Design-Builder shall provide a cabinet heater/thermostat in the cabinet to reduce condensation and enhance the performance of the electronics installed in the cabinet. The cabinets shall not be insulated for heat retention.

3.23.04.10 ITS Electrical Power

The Design-Builder shall provide appropriate power elements to ITS elements as part of this Project. The Design-Builder shall be responsible for all design and construction of elements that are required to provide adequate power to all ITS elements of this Project. The Design-Builder shall comply with the National Electric Code (NEC) for all power work, all enclosures, service disconnects, and transformers. Equipment shall be NEMA-3X rated at a minimum.

All ITS power service points shall utilize a 120/240-V base-mounted metered service pedestal whose design has been approved by the appropriate utility company. In addition, a NEMA-4X rated stainless-steel safety switch shall be installed on the controller cabinet as a service disconnect if the controller cabinet is located more than 50 feet from the metered service pedestal, or across a roadway.

The Design-Builder shall determine the appropriate load required for each cabinet, performing voltage drop calculations, and sizing the wire for each cabinet and DMS. Each cabinet shall include an additional load allowance of 12 Amps for powering convenience outlets. These calculations shall be part of the design review information. The voltage drop, as measured between the power service point (at the meter) and the device(s) it is serving, shall not exceed five percent. Conductors shall be sized

appropriately to satisfy this requirement.

Power service arrangements shall be reviewed and approved by the power service provider and by the Administration.

3.23.04.11 Cabling and Conductors

The Design-Builder shall furnish and install conductors and cables in accordance with the design standards listed in this performance specification. The minimum gauge for all electrical conductors shall be #12 AWG.

The Design-Builder shall furnish and install all video and control cables and connectors for the CCTV and DMS locations in accordance with the manufacturer's recommendations and signal attenuation requirements, on a per site basis. The maximum conduit fill ratio shall be 25%.

3.23.04.12 Vaults and ITS Manholes/Handholes

Design of manholes/handholes below finish grade shall conform to Administration standards. The Design-Builder shall prepare all necessary drawings and instructions for any manholes and handholes, and any pull boxes that are to be installed above ground, in barriers or walls, or any other unique application not covered by Administration standards.

3.23.04.12.01 Design Criteria

Communication vaults may be required at certain field locations if there is a need for additional space for splices, coiling or other communication related features. Communication vaults shall not be located within ditches. Communications vaults shall be constructed of concrete.

3.23.04.12.02 Construction Requirements

Communication vaults that connect with fiber optic conduit and cable runs shall be spaced no more than 600 ft. apart. Handholes used for all other conduit and cable runs shall be spaced no more than 300 ft. apart. Handholes along fiber optic lines may be placed as needed to facilitate the installation of fiber optic cable. All vaults, manholes, handholes and pull boxes shall be installed with underdrain in accordance with Standard No. MD 811.04. The stone surrounding these structures shall not be considered a suitable outfall. Underdrain shall be connected to a suitable outlet such as underdrain outlet pipe to a slope or drainage structure.

3.23.04.13 ITS Conduits

The Design-Builder shall design and construct all conduits, including all necessary hardware, fasteners, and accessories, in accordance with the requirements of this document. Longitudinal conduits for T1 communications networks shall not be installed under the paved surfaces.

3.23.04.13.01 Material Requirements

The Design-Builder shall design and construct all buried conduit to meet the material requirements of the Contract Documents.

All vertical run conduit located from two feet below ground to ten feet above ground shall be galvanized rigid steel.

All materials used in the installation of conduit, such as bends, adapters, couplings, and fittings, shall meet or exceed all of the recommendations of the conduit manufacturer for suitable installation.

The Design-Builder shall use complete conduit sections in 20 feet (nominal) sections when PVC conduit is used and include mid-body gasket to provide watertight integrity. The Design-Builder shall use complete conduit rigid bend sections complete with bell and spigot. When used, PVC shall be shall be Schedule 80. HDPE shall be Schedule 80 equivalent (SDR 13.5)

The Design-Builder shall provide flat profile, low stretch polyester, sequential footage marked, 2500 lb. tensile strength Mule Tape or approved equivalent in each empty conduit or cell.

The mounting rail for the locator wire connection device shall be zinc dichromate plated steel.

3.23.04.13.02 Construction Requirements

When crossing finished curbs and gutters, sidewalks, concrete flatwork, and textured or decorated surfaces, conduit shall be installed so as not to damage these sections. Any section damaged by the operations of the Design-Builder shall be replaced entirely at no additional cost to the Administration.

The Design-Builder shall place all conduits in the same trench before surfacing. Galvanized rigid steel shall be used in all above ground conduit installations, unless otherwise specified; and PVC or high density polyethylene (HDPE) shall be used in all underground conduit installations. The Design-Builder shall install plugs on all empty conduits inside all handholes.

Any installation of buried conduit shall be located away from potential guardrail installations.

Mule Tape shall be installed in all empty conduits. The Design- Builder shall leave 2 ft. of Mule Tape outside of the end cap and fasten it securely.

Conduits shall be installed in a manner that allows the backfill to completely surround all exterior surfaces of the conduit. Multi-duct conduits shall be separated by use of a commercially available conduit spacer or Administration-approved equivalent.

Non-metallic conduit that contains a conductor shall conform to the abrasion requirements per Section 346-8 of the NEC. Grounded bushings shall be installed on the ends of metal conduits per Section 347-12 of the NEC.

The Design-Builder shall construct all conduits into structures. Installation of multi-duct conduit on structures shall require additional Design-Builder prepared details specific to each particular structure and situation. The Design-Builder shall prepare any necessary details and instructions for multi-duct conduit on structures, including all materials, location of assembly relative to other structural features, expansion/contraction fittings, and the method used for passing conduit through diaphragms and abutments.

Conduit expansion fittings shall be installed at locations where the conduit crosses structural expansion joints.

The Design-Builder shall install the following cables and conductors in separate conduit runs and junction boxes:

A) Power service conductors (120 V and above);
B) Communication cables;
C) CCTV coaxial and control cables.

The Design-Builder shall not install any combination of the above categories of cables and conductors in a common conduit or junction box, unless within the junction box that is installed immediately adjacent to the cabinet, which can accommodate any cables or conductors that are less than 120 V. Power service conductors shall enter the cabinet through a separate junction box with no other cables or conductors. Only fiber optic cable shall be installed in multi-duct conduit.

3.23.04.14 Integration and Testing

The Design-Builder shall assist the radio shop with the integration of the following devices into the CHART system under this Contract:

A) DMS System;
B) CCTV Systems;
C) Traffic Detector Systems; and
D) Fiber Optic Communication Systems.

For all devices connected to the proposed fiber optic cable installed under this Project, integration shall include field site integration and subsystem integration. The Design-Builder shall develop an ITS test plan for conducting all required tests. This test plan shall be submitted to the Administration for review and written comment. The Design-Builder shall not be allowed to conduct any testing until the Administration has approved the test plan. The Design-Builder shall permit the Administration to adjust the proposed schedule of the test by up to seven days, at no cost to the Administration, to allow for availability of personnel. Administration personnel or an authorized Administration representative will witness and sign off on all tests. This person is the only person who can sign off that each test is complete.

3.23.04.15 Tests Applicable To All Devices

The Design-Builder shall conduct, pass, and document a subsystem communication throughput test over the communication path between each field device and the EOF. The Design-Builder shall document that the bit error rate (BER) over the path, for each cabinet, is zero over a five-minute period. The Design- Builder shall supply the bit error rate test equipment. The test shall occur after all communication installation for a particular site has been completed, the communication paths between the device and the EOF have been functional for at least 48 hours, and all fiber tests have been successfully passed. The Design-Builder shall notify the Administration a minimum of 72 hours prior to the commencement of testing.
After successful completion of all subsystem test procedures, and after all mainline lanes as well as ramps are open, each site shall be tested for proper communication operation for 30 consecutive days. During the testing period, all Design-Builder provided, installed or relocated equipment at the site shall operate without failures of any type. If any component malfunctions or fails to provide the capabilities specified herein during the 30-day test period, the Design-Builder shall troubleshoot to find the exact cause of the failure. If the failed equipment is Administration-furnished, the equipment shall be removed and replaced by the Design-Builder with replacement equipment from the Administration. This troubleshooting shall occur within 48 hours of notification by the Administration.

After the component malfunction has been corrected to the satisfaction of the Administration, the Design- Builder may be required to restart the 30-day test period. In the event of a failure in equipment furnished by the Administration, the 30-day test will be suspended until failures with the Administration provided hardware are corrected, at which time the test will resume.

3.23.04.16 Cable Conductor Test, Field Operation Test, and 30 Day Burn In Tests

The Design-Builder shall conduct, pass, and document a local field operations test for CCTV, HAR, and DMS device testing to demonstrate that all hardware, cables, and connections furnished and installed by the Design-Builder operate correctly and that all

functions are in conformance with the requirements described herein. The Design-Builder shall verify the power supply voltages and the functionality of the cabinet fans and heaters. A five (5) day pretest notification shall be required and a completion notice shall also be required.

A 30-Day Device Burn in test is also required.

The Design-Builder shall submit documentation indicating successful passing of each test to the Administration for approval prior to final acceptance. The Design-Builder shall not perform any testing until the Administration has approved the testing Plans prepared by the Design-Builder.

3.23.04.17 Maintenance During Construction

The Design-Builder shall maintain the existing/previously installed and new ITS until Acceptance for Maintenance.

3.23.05 Verizon Coordination

It is the Design-Builder's responsibilities to contact Verizon to verify that T1 data line service can be obtained at or within reasonable distance of the proposed CCTV locations. A number of variables can affect the availability of T1 service which may force the Design-Builder to change the intended location of a CCTV site or sites, so no further design work should be done until this verification has been obtained, and a written and signed commitment has been received from Verizon. Failure to do this may result in substantial re-design and/or device relocation costs which will be borne by the Design-Builder. The Administration will not be liable for any of the costs incurred resulting from ambiguities in the T1 data line source location(s).

The typical turnaround time for Verizon is 7-14 days. It may be necessary to modify the thirty percent plans after this verification is obtained if the design must be changed due to a lack of T1 data service availability.

TERMS AND CONDITIONS

TC SECTION 4
CONTROL OF WORK FOR DESIGN-BUILD

TC-4.01 WORKING DRAWINGS.

(a) General.

DELETE: Paragraph 3 in its entirety.

INSERT: The following:

The Design-Build Team shall prepare working drawings as described in the Standard Specifications, with the exception that the drawings shall not be submitted to the State Highway Administration, but shall be submitted to the Design-Build Team's Lead Design Firm and Independent Design Quality Management (IDQM) Firm for review and approval. Following approval by the Lead Design Firm and the IDQM Firm, two copies of the approved drawings shall be forwarded to the Administration. The Administration shall review the drawings to determine that they meet minimum job performance specifications only. Acceptance of the drawings shall not relieve the Design-Builder of any responsibility in connection therewith and the Administration assumes no responsibility for the accuracy of the drawings. A two-week period will be permitted for SHA review of the working drawings. The approved working drawings shall be stamped and signed by the Design-Build Team's Lead Design Firm and IDQM Firm and forwarded to:

Maryland State Highway Administration
Director
Office of Highway Development
707 North Calvert Street
Baltimore, Maryland 21202

(b) Working Drawings for Falsework Systems.

In the first paragraph, substitute Design-Build Team's Engineer for Engineer.

In the third paragraph, substitute Design-Build Team's Engineer for Engineer.

12-14-2015

TERMS AND CONDITIONS

TC SECTION 4
CONTROL OF WORK

TC-4.02 FAILURE TO MAINTAIN PROJECT

98 **ADD:** As a third paragraph.

Additionally, an appropriate deduction will be made from the Contractor's next progress estimate for each day or portion thereof that Maintenance of Traffic deficiencies exist, and will continue until the deficiencies are satisfactorily corrected and accepted by the Engineer. Any portion of a day will be assessed a full day deduction. The deduction will be equal to a prorata share of the lump sum price bid for Maintenance of Traffic or an amount prorated from the Engineer's estimate, whichever is more. The amount prorated will be the per diem amount established by using the working days (based upon calendar dates when required) divided into the total value of the bid item or the Engineer's estimate of that item, whichever is more.

The above noted deduction will be assessed on the next progress estimate if:

The Contractor does not take action to correct the deficiencies and properly assume the responsibilities of maintaining the project (as determined by the Engineer) within four hours of receiving a notice to comply with the required maintenance provisions.

The deduction will be equal to the daily prorated share of the lump sum price bid for Maintenance of Traffic or $1,000 per day, whichever is more for each day or portion thereof that the deficiencies exist, and will continue until the deficiencies and proper assumption of the required maintenance provisions are satisfactorily corrected and accepted by the Engineer. The amount of monies deducted will be a permanent deduction and are not recoverable. Upon satisfactory correction of the deficiencies, payment of the Maintenance of Traffic lump sum item will resume.

TERMS AND CONDITIONS

TC SECTION 5
LEGAL RELATIONS AND PROGRESS

TC-5.01 INSURANCE

100 **DELETE:** In its entirety.

INSERT: The following.

TC-5.01 INSURANCE FOR DESIGN-BUILD

In addition to the provisions of GP-7.14 (Liability Insurance), the following shall apply on Administration Contracts.

The Contractor shall maintain in full force and effect third party legal liability insurance necessary to cover claims arising from the Contractor's operations under this agreement that cause damage to the person or property of third parties. The insurance shall be under a standard commercial general liability (CGL) form endorsed as necessary to comply with the above requirements and the other requirements of this Section. The State of Maryland shall be listed as an additional insured on the policy. The limit of liability shall be no less than $1 000 000 per occurrence/$2 000 000 general aggregate. The insurance shall be kept in full force and effect until all work has been satisfactorily completed and accepted.

When specified in the Contract Documents or otherwise required by law, the Contractor shall carry the type and amounts of insurance in addition to any other forms of insurance or bonds required under the terms of the Contract and these Specifications.

All insurance policies required by this Section, elsewhere in the Contract Documents, or otherwise required by law, shall be kept in full force and effect until all work has been satisfactorily completed and accepted. The Contractor shall be responsible for the payment of all deductibles or self-insured retentions.

All insurance policies required by this Section, elsewhere in the Contract Documents, or otherwise required by law, (other than Workers' Compensation Policies) shall include endorsements:

(a) Stating that the State of Maryland and Howard County are additional insured with respect to liability arising from the Contractor's operations under this agreement that cause damage to the person or property of third parties.

(b) Stating that such coverage as is provided by the policies for the benefit of the additional insureds is primary and any other coverage maintained by such additional insureds (including self-insurance pursuant to the Maryland Tort Claims Act) shall be non-contributing with the coverage provided under the policies.

(c) Containing waivers of subrogation with respect to all named insureds and additional insureds.

(d) Stating that the insurer has the duty to adjust claims and provide a defense with regard to such claims made against the additional insured.

All insurance policies required by this Section, elsewhere in the Contract Documents, or otherwise required by law, (including Workers' Compensation Policies) shall be endorsed to state that the insurer shall provide at least 7 days notice of cancellation or nonrenewal to:

Maryland State Highway Administration
Director, Office of Construction
7450 Traffic Drive
Hanover MD 21076

Evidence of insurance shall be provided to the Administration at the address listed above prior to the award of the Contract by means of a Certificate of Insurance with copies of all endorsements attached.

Any policy exclusions shall be shown on the face of the Certificate of Insurance or provided with the Certificate of Insurance.

Certificates of Insurance shall comply with all requirements of the Maryland Annotated Code, Insurance Article, § 19-116. Certificates of Insurance shall be on a form approved by the Maryland Insurance Commissioner (Commissioner). Standard Certificate of Insurance forms currently adopted for use by the Association for Cooperative Operations Research (ACORD) or the Insurance Services Office (ISO) are deemed approved by the Commissioner and are acceptable. Outdated ACORD or ISO forms (those with a revision date prior to the date of the form currently adopted for current use by ACORD or ISO) are not acceptable. The Contractor shall ensure that all required Certificates of Insurance satisfy all requirements of §19-116 of the Insurance Article, including the prohibition against the issuance of any certificate of insurance that contains false or misleading information or that purports to amend, alter, or extend the coverage provided by the policies referenced in the certificate.

The Certificate of Insurance shall be accompanied by a document (a copy of State License or letter from insurer) that indicates that the agent signing the certificate is an authorized agent of the insurer.

No acceptance and/or approval of any Certificate of Insurance or insurance by the Administration shall be construed as relieving or excusing the Contractor, or the Contractor's Surety from any liability or obligation imposed upon either or both of them by the provisions of this Contract or elsewhere in the Contract Documents.

The cost of the insurance will not be measured but the cost will be incidental to the Contract lump sum price.

Contractor and Railroad Public Liability and Property Damage Insurance shall be provided as specified in TC-6.05.

.01 Indemnification

The Design-Build Team shall indemnify, defend and hold the Administration and its officers, directors, employees, agents and consultants from and against all claims, actions, torts, costs, losses, and damages for bodily injury (including sickness, disease or death) and/or tangible property damage (other than to the Work itself) arising out of or resulting from the performance of the Work by the Design-Build Team, any subcontractor, subconsultant, engineer, supplier, any individual or entity directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. Damages covered by the preceding sentence include, but are not limited to, all fees and charges of engineers, attorneys and all other professionals and all mediation, arbitration, court or other dispute resolution costs.

The indemnity obligation set forth in the preceding paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Design-Build Team or any subcontractor, subconsultant, engineer, supplier, or other individual or entity under Workers' Compensation acts, disability benefit acts, or other employee benefit acts.

.02 Additional Insurance Requirements

.02.1 Professional Liability Insurance

Professional Liability Insurance Policy, which covers the Indemnification Clause of this contract (paragraph .02 above), as it relates to errors, omissions, negligent acts or negligent performance in the work performance under this contract by the Designer, its subcontractors, employees and agents. The limitation of the Courts and Judical Proceedings Article states Annotated Code of Maryland Section 5-108(b) shall apply.

.02.2 Workers' Compensation Insurance

Workers' compensation, as required by the laws of the State of Maryland, including Employer's Liability Coverage and coverage for the benefits set forth under the U.S. Longshoremen and Harbor Workers' Compensation Act, the Jones Act, and other federal laws where applicable.

.02.3 Comprehensive Automobile Liability Insurance

Comprehensive Business Automobile Liability covering use of any motor vehicle to be used in conjunction with this contract, including hired automobiles and non-owned automobiles. Loading and unloading of any motor vehicle must be covered by endorsement to the automobile liability policy or policies.

.02.4 Administrative & General Provisions

a. Each policy, with the exception of Workers' Compensation and Professional Liability Insurance, shall name the State Highway Administration.

b. Defense of Claims

Each insurance policy shall include a provision requiring the carrier to investigate and defend all named insured against any and all claims for death, bodily injury or property damage, even if groundless.

c. Compliance

The Design-Build Team shall be in compliance with this Section provided it procures either one policy or insurance covering all work under the contract or separate insurance policies for all segments constituting the entire project. In either case, a certificate of insurance must be filed for each policy with the Administration indicating that all required insurance has been obtained.

The Design-Build Team is responsible for assuring that insurance policies required by this Contract comply with all the requirements. The Design-Build Team is also responsible to determine that all subconsultants, subcontractors, suppliers, and all other individuals or entities performing Work for the Project carry all applicable insurance coverages set forth in this section, including, in all cases, Workers' Compensation, Automobile, and Commercial General Liability Insurance. The Design-Build Team shall indemnify and hold harmless the Administration from any claims arising from the failure to fulfill said responsibilities.

d. Reporting Provisions

Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the Administration, its officers, agents and employees.

e. Separate Application

The insurance provided by the Design-Build Team shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

.02.5 Notice of Cancellation or Modification

All policies of insurance provided in this Section shall be endorsed to provide that the insurance company shall notify the Administration, the Design-Build Team, and each named insured at least thirty (30) days prior to the effective date of any cancellation or modification of such policies.

TC-5.03 SUBCONTRACTING AND SUBCONTRACTORS

102 **INSERT**: The following before the paragraph titled '**Subcontractors Prompt Payment**.'

Percentage of Own Workforce Required. The Design-Build Team must perform at least fifty percent of the value of the on-site construction work with its own workforce, not including the percent goal required in the contract proposal to be performed by DBE's. The Designer must perform at least fifty percent (50%) of the value of the design work with its own workforce, not including the work required by DBE's.

106 **ADD**: The following sections at the end of section **'TC-5.05 DETERMINATION AND EXTENSION OF CONTRACT TIME.'**

TC-5.06 OWNERSHIP OF DOCUMENTS

All plans, specifications, inspection records, or other documents ("Documents") generated by the Design-Build Team and all consultants, subcontractors, suppliers, manufacturers performing Work on the Project are the property of the Administration. Upon request by the Administration, the Design-Build Team or any other person or entity performing Work will produce and deliver such Documents as requested, both in hard copy and electronic format.

TC-5.07 ACCESS TO AND RETENTION OF RECORDS

The Design-Build Team and its employees and Subcontractors shall make all project records available for inspection by the Project Manager and all other persons authorized by the Administration, and shall permit such representatives to interview employees during working hours. Project records include daily time reports, records of force account work, quality control or assurance documentation, inspectors reports, employment records, payrolls, equal opportunity records, construction conference records, partnering records, and any other documents in any way related to the Project substantiating payment. These records shall be retained at least three years after final acceptance of the project.

TERMS AND CONDITIONS

TC SECTION 6
RESTRICTIONS AND PERMITS

112 **DELETE:** TC 6.10 – RECYCLED OR REHANDLED MATERIAL in its entirety.

INSERT: The following.

TC 6.10 – RECYCLED OR REHANDLED MATERIAL.

Refer to 900.03 in the Contract Documents.

TERMS AND CONDITIONS

TC SECTION 6
RESTRICTIONS AND PERMITS

TC-6.12 — STRUCTURE UNDERCLEARANCES AND OVERHEAD CLEARANCES

114 **DELETE:** The last paragraph, "Resurfacing" in its entirety.

INSERT: The following.

Resurfacing. The minimum underclearances shall be maintained whenever resurfacing a roadway. This may require grinding the existing pavement prior to placing the resurfacing material. Immediately after completing the resurfacing operation and when the lane closures are still in the effect, the Contractor, in the presence of the Engineer, shall measure the minimum vertical underclearance. The Engineer will submit results to the Office of Structures. The cost of these measurements will be incidental to other pertinent items specified in the Contract Documents. Whenever highway overpass bridges are in the general vicinity of a pedestrian bridge and the grinding is not required to maintain the specified clearances, the roadway under the pedestrian bridge shall be ground to provide a higher undreclearance than the adjacent bridges. This requirement will be waived whenever the Engineer contacts the District Engineer and the Office of Structures and determines that the grinding would have an adverse effect on drainage, utilities, etc.

TERMS AND CONDITIONS

TC SECTION 6
RESTRICTIONS AND PERMITS

115 **DELETE:** TC-6.14 STORING MATERIALS AND EQUIPMENT ON/AGAINST STRUCTURES RESTRICTIONS in its entirety.

INSERT: The following.

TC-6.14 RESTRICTIONS FOR PLACING AND USING EQUIPMENT ON STRUCTURES, OR STORING MATERIALS ON/OR AGAINST STRUCTURES

Materials, and waste shall not be stored on or against any structure or structure element and equipment shall not be placed or used on any structure during the construction phase or finished or final configuration unless the written permission is obtained from the Administration's District Office and the Office of Structures for each type of material or equipment to be stored.

Loads, vehicle or other weight (materials etc.) that exceeds the bridge posted weight limit, if posted, or exceeds Maryland's legal vehicle loads on bridges, (with no posted bridge weight limits), are prohibited on the structure at any time, except as modified by the following. If the Contractor's intended operations will impose loads on the structure that exceed the weights listed above, the Contractor shall submit to the Engineer the type of material, its weight, the area that will be affected by the load, and its location on the structure. No stock pile of material regardless of unit weight shall be more than 4 ft high. If equipment is to be used, submit the maximum gross weight, axle spacing, load per axle, and proposed location on the structure. The maximum gross weight must include the vehicle weights in the most critical load position, i.e. front axle on crane with boom extended and element hanging. A special Hauling Permit is a requirement anytime equipment is moved over a structure that is over legal weight limit.

If any load requires evaluation, then a professional engineer registered in the State of Maryland and experienced in bridge design shall perform a load analysis to ensure that the load on the structure will not create an overstress condition on any bridge element. This analysis also includes effects of legal loads crossing the structure, if applicable. Analyses shall be submitted for review and loading cannot be imposed until written approval is received. Such submission does not guarantee acceptance by the Office of Structures, which reserves the sole right to accept or reject the proposed loading.

For structures under construction or rehabilitation, the Contractor shall also submit information pertaining to the phase of construction, such as which members have been modified or separated from the remainder of the structure, or have been newly constructed.

Any materials or equipment that would have a detrimental affect to the structure such as aluminum products placed against concrete surfaces shall be adequately protected to prohibit them from coming in contact with each other. Any discoloration or damage to the structure as a result of material or equipment being stored on/against the structure shall be removed or repaired.

TERMS AND CONDITIONS

TC SECTION 7
PAYMENT FOR DESIGN-BUILD

TC-7.01 MEASUREMENT OF QUANTITIES

DELETE: This section in its entirety.

INSERT: The following:

Unless specifically noted herein, payment for all work within the Scope of Work shall be included in the Lump Sum Price shown on the Proposal Form. The Design-Build Team shall disregard all references in the Standard Specifications to actual quantities, Contract items, Contract unit prices, and any measurement or payment method other than inclusion in the Lump Sum Price.

Payments to the Design-Build Team shall be full compensation for furnishing all materials and for performing all work under the contract in a complete and acceptable manner and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof.

TC-7.02 PAYMENT ALLOWANCES FOR STORED MATERIALS

DELETE: The opening statement:

INSERT: The following statement:

When the Contractor requests payment allowance for stored materials, those materials must be identified as an Item within the Progress Payment Breakdown described in TC-7.11. The following terms and conditions shall apply:

TC-7.05 PROGRESS PAYMENTS

(a) Current Estimate.

127 **DELETE:** **(2) Variable Retainage** in its entirety**.**

INSERT: The following:

(3) Variable Retainage. The Contract will be subject to a variable retainage based upon the Administration's performance evaluations of the successful proposer and a minimum retainage for the landscaping items of work. Those qualifying may have retainage reduced upon request of the Contractor with consent of surety. This request shall be processed through the District Engineer. Landscaping items of work are not eligible to have a reduction in retainage below the minimum percentage outlined below. If at any time during the performance of the work, the evaluation of the Contractor changes, retainage reduction may be reconsidered.

Minimum Qualifications are as follows: After 50 percent project completion and upon request, Contractors with 'A' evaluations for the last two years may be reduced from 5 percent to 1 percent. Project completion percentage will be based upon actual work completed (excluding monies paid for stored materials). An interim evaluation of the current project would need to be completed and would need to be an 'A'.

At 50 percent project completion and upon request, Contractors with 'B' evaluations or any combination of 'A' and 'B' evaluations for the last two years may be reduced from 5 percent to 2.5 percent, and remain at that level until released upon final payment. Project completion percentage will be based upon actual work completed (excluding monies paid for stored materials). An interim evaluation of the current project would need to be completed and would need to be an 'A' or 'B'.

Contractors with 'C' evaluations or any combination of 'C' and 'D' evaluation for the past two years will begin and remain at 5 percent for the life of the project.

Contractors with a 'D' evaluation for the last two years will begin at 5 percent. Project performance will be evaluated monthly with the retainage being raised to 10 percent for continued 'D' performance.

New Proposer. Contractors who have not been previously rated by the Administration may be eligible for a reduction in retainage. To be eligible, their past performance on highway and bridge work shall be documented by the government agency with whom they had a contract and their performance shall be documented on Administration forms. Contractors who do not fit into the above criteria would require a 5 percent retainage throughout the life of the Contract.

Landscaping Items of Work. For all landscaping items of work, the retainage shall be 25 percent for the life of the project. Project performance will be evaluated monthly with the retainage being raised to 30 percent for neglect, improper maintenance, or failure to complete operations as required or directed. This retainage will be paid to the Contractor only at the final payment.

(b) Semi-Final Estimate Payments.

129 **DELETE:** Delete the entirety of subsections (1), (2), and (3).

INSERT: The following:

(1) Upon completion of the project and the acceptance by the Administration for maintenance, the Administration, at the Contractor's request and with the consent of surety, will initiate a Memorandum of Action by the Director, Office of Construction, State Highway Administration, authorizing semi-final payment. Such a semi-final estimate payment will be based upon: (a) quantities the Administration has computed and set up as proposed final quantities, and (b) a reasonably accurate estimate for those quantities for which the Administration has not yet completed computations. The quantities that the Administration sets forth as proposed final quantities shall be so designated. To arrive at the amount of the semi-final estimate, the following will be deducted from the apparent estimated value of the Contract: (a) total of all amounts previously paid to the Contractor as current estimates, (b) the retainage for landscaping items of work, (c) sums deemed chargeable against the Contractor including penalties and liquidated damages, and (d) as an additional retainage, a sum not less than 1 percent of the total value of the Contract, excluding landscaping items of work.

(2) In cases where there has been substantial completion of the project and there are remaining only inconsequential or minor work items such as painting, seeding, mulching, or planting to be completed and such items cannot be completed for an extended period of time because of seasonal or weather conditions, a semi-final inspection will be made. If the work completed is found to be satisfactory, then there is deemed to be a partial acceptance on the entire project except for the uncompleted work items. Upon the above referred to partial acceptance, the Administration, within 30 days from such partial acceptance, upon request of the Contractor and with consent of surety, shall pay to the Contractor, what is hereby known as a partial semi-final estimate payment. Such a semi-final estimate will be based upon: (a) quantities the Administration has computed and set up as proposed final quantities, and (b) a reasonably accurate estimate for those quantities for which the Administration has not yet completed computations. The quantities that the Administration sets forth as proposed final quantities shall be so designated. To arrive at the amount of the semi-final payment, the following will be deducted from the apparent estimated value of the Contract: (a) total of all amounts previously paid to the Contractor as current estimates, (b) the retainage for landscaping items of work, (c) sums deemed chargeable against the Contractor including penalties and liquidated damages, and (d) as an additional retainage, a sum not less than 1 percent of the total value of the Contract, excluding landscaping items of work.

(3) If all retained funds have not been paid to an escrow agent, as provided for in (a)(4), the Administration shall, upon payment of the semi-final estimate, place the remaining retainage in a interest-bearing escrow account, as designated and on such terms and conditions as specified by the procurement officer. At the time of the final payment, any retainage due, and any interest accrued on the retainage due from the time of payment of the semi-final estimate, shall be paid to the Contractor.

130 **ADD:** The following at the end of Section TC-7.05:

(c) Application for Progress Payment.

In order to receive payment, the Design-Build Team shall submit a written Application for Progress payment to the Administration on a monthly basis. Receipts, invoices, and other vouchers, including invoices from subcontractors shall be included. Invoices shall be based on the proportionate quantities of the various classes of work satisfactorily designed, checked, and completed or incorporated in the work in accordance with the Schedule of Work and the value thereof determined from the Contract Progress Payment Breakdown as described in TC-7.11. If the Application for Progress Payment is inconsistent with the Payment Breakdown, the Projected Schedule of Payments, or the actual progress of work, the Application must include a written explanation for such inconsistencies and the Administration reserves the right to withhold the applicable payment in whole or in part.

(d) Payment of Invoices.

All invoice payments shall be subject to correction in subsequent invoices and payments and upon final acceptance and payment. No payment shall be made when, in the judgment of the Administration, the work is not proceeding in accordance

with the provisions of the Contract or when the total value of the work done since the last estimate amounts to less than $500.00. Portions of the progress payment may be withheld in accordance with the Contract provisions.

(e) Payment for Mobilization.

The total of payments for Mobilization will not exceed 10% of the Contract Price (less price adjustments and incentives).

(f) Payment for Changes.

Differing site conditions, changes, and extra work meeting the requirements of this Contract will be paid using the following methods as appropriate:

a. Unit prices agreed upon in the order authorizing the work.

b. An agreed upon lump sum amount.

c. On a Force Account basis, if agreement cannot be reached and if directed by the Administration. Refer to TC-7.03

TC-7.10 COST BREAKDOWN AND SCHEDULE OF PAYMENTS

.01 Submittal of Cost Breakdown

Concurrent with the submission of the Price Proposal, the Design-Build Team shall submit to the Administration an itemized Cost Breakdown and supporting documentation to be used to evaluate Price Proposals and as a basis of payment. This breakdown shall present a realistic and documentable presentation of the costs for the major elements of work that comprise the lump sum price for the work. At a minimum, the following Lump Sum Items shall be included:

Clearing & Grubbing
Mobilization (refer to TC-705,e.)
Design Engineering (including Utility relocation engineering)
As-Built Drawings
Engineer's Office
Maintenance of Traffic
Construction Stakeout
Earthwork - Excavation & Embankment
Drainage
Erosion & Sediment Control
Culverts
Retaining Walls
Paving Items – hot mix asphalt, concrete pavement, and graded aggregate base
Concrete
W-beam and concrete barrier
Topsoil, Seed & Mulch

Landscaping Plantings
Lighting & Electrical
Pavement Markings
Permanent Signing
Signals and Beacons
Utility relocations costs for MD Broadband – construction

The Design-Build Team shall also submit to the Administration a Cost Breakdown of the Design Engineering item. This cost breakdown shall include the name and fee for each consultant and subconsultant firm that is included in this item.

The Administration may require additional items to be identified and included prior to approval

Note that to enable the Administration to make effective progress payments, the successful Design-Build Team will be required to submit for approval the more detailed Progress Payment Breakdown described in TC-7.11. All progress payments will be based on an approved Progress Payment Breakdown. The Progress Payment Breakdown may be submitted in place of the Cost Breakdown described above.

All costs associated with the preparation, submission, or revision of any Cost Breakdown will not be considered as an item for payment, but shall be included in the Design-Build Team's Lump Sum price.

The successful Design-Build Team will be required to submit an Initial Critical Path Method Project Schedule Design-Build Activities Chart within thirty (30) working days after notification of Award. This is in addition to the requirements outlined in Section 109- Critical Path Method Project Schedule Design-Build.

.02 Review and Approval

Within 14 working days after Execution of the Contract, the Administration shall approve the Cost Breakdown or return it to the Design-Build Team with deficiencies noted. The Administration will not approve a Contract Cost Breakdown that is unbalanced. The Design-Build Team shall then submit the Cost Breakdown until an acceptable Cost Breakdown is approved. The Design-Build Team is responsible for incorporating time for submission and approval of the Cost Breakdown in its Schedule of Work.

.03 Projected Schedule of Payments

Within 7 working days after approval of the Cost Breakdown, the Design-Build Team shall provide the Administration with a Projected Schedule of Payments for the Project. This schedule will provide the Administration with an estimate of monthly cash flow requirements by forecasting the Design-Build Team's monthly Applications for Progress Payments for the duration of the Project. The Projected Schedule of Payments must be in accordance with the Contract, the approved Cost Breakdown.

.04 Justification of Cost Breakdown or Projected Schedule of Payments

The Administration may require the Design-Build Team to provide explanations and supporting documentation if the Cost Breakdown or Projected Schedule of Payments indicate unbalancing or do not reasonably reflect the actual cost of performing the work or the value of work received by the Administration.

TC-7.11 CONSTRUCTION PROGRESS PAYMENT BREAKDOWN

.01 Submittal of Progress Payment Breakdown

The successful Design-Build Team shall submit to the Administration an itemized Progress Payment Breakdown and supporting documentation to be used as a basis for payment. This breakdown shall be a realistic and documentable presentation of the costs for the major elements that comprise the Contract Lump Sum price for the work. The breakdown shall be sent to the District Engineer. No progress payment will be made until such time that this breakdown has been accepted by the Administration. The Design-Build Team shall submit additional updates to the Payment Breakdown as the design and construction progresses and as directed by the Administration. The Administration reserves the right to request additional detail from the Design-Build Team in order to process progress payments. The breakdown shall be in MS Excel format and include at a minimum, the following items.

Section 1000

LS for Design Costs
LS for Mobilization (refer to TC-7.05, e.)
LS for As-Builts
LS for Clearing & Grubbing
LS for Engineer's Office
LS for Maintenance of Traffic
LF of Temporary Barrier
LF of Temporary Striping
SF of Temporary Signs
EA of Drums
EA of Arrow Panels
EA of VMS

Section 2000

CY of Excavation

Section 3000

LF of RCCP
LF of CMP

LF of HDPE Pipe
EA of Drainage Structures
LF of Underdrain Pipe
LS for Erosion & Sediment Control
LS for Stormwater Management

Section 4000 (if applicable)

CY of Structure Excavation
LF of Piling
LF of Caissons
CY of Substructure Concrete
CY of Superstructure Concrete
LS for Reinforcing Steel
LS for Fabricated Structural Steel
LS for Cleaning & Painting New Structural Steel
LS for Pre-stressed Concrete Beams & Panels
LS for Retaining Walls
LS for Noise Barrier
LS for Retaining Walls

Section 5000

SY of Graded Aggregate Base
Tons of Superpave Asphalt Mix for Surface
Tons of Superpave Asphalt Mix for Base
Tons of Superpave Asphalt Mix for Wedge/Level

SY of Grinding Existing Pavement
SY of Portland Cement Concrete Pavement (if applicable)
LF of Pavement Markings

Section 6000

LF of Curb & Gutter or monolithic median
LF of Traffic Barrier
EA of Traffic Barrier End Treatments
LF of Concrete Traffic Barrier
LF of Chain Link Fencing

Section 7000

SY of Subsoil and Topsoil
SY of Permanent Seeding
SY of Temporary Mulch and Temporary Seed
SY of Soil Stabilization Matting
LS for Plantings (Tree, Shrub, Bulbs, Annuals and Perennial) Installation
LS for Establishment, Care & Replacement, and Warranty of Plantings and Seeding

Section 8000

CY of Concrete for Foundations
LS for Sign Structures
SF of Permanent Signing
EA of Lighting Structures
EA of Signal/Beacon Structures
LF of Wire, Conduit for Lighting, Beacons and Signals

The breakdown shall also contain the Design-Build Team unit prices for Superpave Asphalt Mix, Superpave Asphalt Mix for Pavement Patching, each type of concrete mix to be used on the project, and each type of pavement marking. These prices will be used to determine a reduction in payment if necessary due to materials not meeting required specifications such as PCC compressive strength, AC content, asphalt density, pavement marking thickness, and reflectivity. Additionally, the breakdown shall include the hourly rate, including overhead, for each Design Key Staff member. This price will be used by the Administration to set a baseline cost associated with any work determined to be out of scope and agreed to by the Administration prior to the work being performed.

The Design-Build Team shall use the Progress Payment Breakdown format in preparing and documenting its Applications for Payment. The Administration will use the Cost Breakdown to assist in evaluating requests for payment. All costs associated with preparation, submission, or revision of the Progress Payment Breakdown will not be considered as an item for payment, but shall be included in the Design-Build Team's Lump Sum price.

TC SECTION 7
PAYMENT

TC-7.09 PRICE ADJUSTMENT FOR DIESEL FUEL

(a) General. A Price Adjustment (PA) will be made to provide additional compensation to the Contractor or a credit to the Administration for the fluctuation in the cost of diesel fuel.

The monthly index price used for calculating the PA will be the On-Highway Diesel Fuel Price for the Central Atlantic Region published by the U.S. Department of Energy, Energy Information Administration, at www.eia.doe.gov. The monthly index price will be the average of the weekly prices posted for the month.

The prevailing base index price will be the price specified for Diesel Fuel currently posted at www.roads.maryland.gov (Business Center /Contracts, Bids, and Proposals) prior to bid opening. A historical database will be maintained by the Administration.

The adjustment factors for specific categories of the work are included in Table TC-7.09. Category D will apply to this Contract.

The PA will be calculated when the index for the current month increases or decreases more than 5 percent of the base index. The total dollar amount of fuel adjustment will be limited to 5 percent of the Contract Total Amount as bid. If an increase or decrease in costs exceeds 5 percent of the Contract Total Amount as bid, no further adjustment will be made.

Computations for adjustment will be as follows:

$$\text{Percent Change} = [(E - B)/B] \times 100$$

$$PA = [E - (B \times D)] \times F \times Q$$

Where:

PA = Amount of the price adjustment
E = Current monthly index price
B = Prevailing base index price
D = 1.05 when increase is over 5%; 0.95 when decrease is over 5%
F = Applicable fuel adjustment factor from Table TC-7.09
Q = Quantity of individual units of work

TABLE TC-7.09

COST ADJUSTMENT FACTORS FOR DIESEL FUEL			
CATEGORY	**DESCRIPTION**	**UNITS**	**FACTOR**
A	Sum of Cubic Yards of Excavation in Category 200	Gallons/Cubic Yard	0.29
B	Sum of Structure Concrete in Category 400	Gallons/Cubic Yard	1.892
C	Sum of Aggregate Base in Category 500	Gallons per ton	0.60
D	Sum of HMA in Category 500	Gallons per ton	3.50
E	Sum of Rigid Concrete Pavement in Category 500	Gallons/Cubic Yard	0.95

Any difference between the checked final quantity and the sum of quantities shown on the monthly estimates for any item will be adjusted by the following formula:

$$FPA = [(FCQ \div PRQ) - 1] \times EA$$

Where:

FPA = Final PA for the item that increased or decreased
FCQ = Final Checked Quantity of the item
PRQ = Total Quantity of the item reported on the most recent estimate
EA = Total PA of the item shown on most recent estimate

(b) Price Adjustment Criteria and Conditions. The following criteria and conditions will be considered in determining the PA.

(1) Payment. The PA will be computed on a monthly basis. PA resulting in increased payment to the contractor will be paid under the item Price Adjustment for Diesel Fuel. The item amount will be established by the Administration, and shall not be revised by the Contractor. PA resulting in a decreased payment will be deducted from monies owed the Contractor.

The monthly base price for determining a PA for all work performed after the Contract completion date, as revised by an approved time extensions, will be the monthly base price at the time of the Contract completion date (as extended) or at the time the work was performed, whichever is less.

(2) Expiration of Contract Time. When eligible items of work are performed after the expiration of Contract time with assessable liquidated damages, no PA will be made.

(3) Final Quantities. Upon completion of the work and determination of final pay quantities, an adjusting Change Order will be prepared to reconcile any difference between estimated quantities previously paid and the final quantities.

(4) Inspection of Records. The Administration reserves the right to inspect the records of the Contractor to ascertain actual pricing and cost information for the diesel fuel used in the performance of the applicable items of work..

(5) Additional Work. When applicable items of work, as specified herein, are added to the Contract as additional work, in accordance with the Contract provisions, no PA will be made for the fluctuations in the cost of diesel fuel unless otherwise approved by the Engineer. The Contractor shall use current fuel costs when preparing required backup data for work to be performed at a negotiated price.

(6) Force Account. Additional work performed on a force account basis, reimbursement for material, equipment, and man-hours as well as overhead and profit markups will be considered to include full compensation for the current cost of diesel fuel.

CATEGORY 100
PRELIMINARY

SECTION 101 — CLEARING AND GRUBBING

101.01 DESCRIPTION.

101.01.01 Definitions.

137 **DELETE:** (e) Grading Unit in its entirety.

INSERT: The following.

(e) Grading Unit. A contiguous area not to exceed 20 acres.

101.03 CONSTRUCTION.

138 **DELETE:** 101.03.01 Erosion and Sediment Control in its entirety.

INSERT: The following.

101.03.01 Erosion and Sediment Control. The maximum area that may be cleared and grubbed is limited to a single grading unit unless otherwise specified and approved. Work may proceed to a subsequent grading unit once at least 50 percent of the current grading unit is stabilized as determined and approved by the SHA Regional Environmental Coordinator. The total disturbed area shall not exceed 30 acres at any given time.

CATEGORY 100
PRELIMINARY

SECTION 103 – ENGINEERS OFFICE

144 **DELETE:** 103.01 to 103.04 in its entirety.

INSERT: The following.

103.01 DESCRIPTION. Furnish, clean, and maintain in good condition an Engineers office at an approved location within the immediate vicinity of the project. The office shall be separate from any offices used by the Contractor, and it and all items therein shall be for the exclusive use of the Administration's Engineers and Inspectors. Rented properties that conform to the type of office specified in the Contract Documents will be acceptable.

103.02 MATERIALS. Not applicable.

103.03 CONSTRUCTION. Set up, equip, and make the office ready for use at least five days prior to commencement of construction work on the project. Progress payments for professional services may be made prior to the commencement of construction work. Leave the office and appurtenances in place until all field records are complete. Upon removal of the office, restore the location to a condition acceptable to the Engineer.

Unless otherwise specified, the office and all furnished equipment and accessories shall become the property of the Contractor at the completion of the project.

103.03.01 Mobile Housing Unit. Provide a mobile housing unit having floor space of at least 100 ft^2 and window area of at least 10 ft^2. Ensure it is entirely enclosed and waterproofed and has a door that locks. Provide a table 36 x 48 x 40 in. high and one closet equipped with a lock. Furnish two keys for each lock. Provide satisfactory heating and cooling. Relocate the unit as directed.

103.03.02 Handicap Accessibility. When handicap accessibility is necessary, comply with the Federal Register-Volume 56 No. 144-Americans with Disability Act (ADA) Accessibility Guidelines for Buildings and Facilities.

103.03.03 Mobile Office Trailers. Anchor in accordance with the manufacturer's recommendations. Office trailers, as defined under the Industrial Building and Mobile Act of Maryland, shall be approved by the Maryland Department of Housing and Community Development and bear the Maryland Certification Insignia in the interior of the office.

103.03.04 Quality Control Laboratory. Section 915.

103.03.05 Requirements for all Offices.

(a) Entirely enclosed, waterproofed, and completely insulated to at least an R11 rating.

(b) Double thick floor with building paper placed in between the floor layers.

(c) Finished inside and outside as approved.

(d) A ceiling height of at least 7 ft, a pitched roof, and a ventilating louver in each gable.

(e) A 4 x 1 ft sign with the message "ENGINEERS OFFICE - STATE HIGHWAY ADMINISTRATION" attached to or mounted in front of the office. The sign shall have a black background and have white lettering at least 3 in. high.

(f) A 5 x 7 in. no smoking sign posted on the outside of each entrance to the office, plant laboratory, and mobile housing unit.

(g) Interior and exterior doors equipped with different key locks. Interior doors keyed alike. Exterior doors keyed alike. An additional dead bolt lock for each exterior door. Four keys for each interior and exterior lock.

(h) Windows capable of being opened and closed. Equip with latches, screens, and venetian blinds or shades.

(i) Electrified in accordance with national and State electrical codes with satisfactory artificial lighting and lighting services. Ensure an illumination level of at least 75 ft-c.

(j) Equipment capable of heating the office to at least 70 F and cooling to at least 78 F.

(k) A restroom facility in accordance with the State Department of Health and Mental Hygiene or other authorities having jurisdiction. Connect to water and sewage or a well and septic system. Provide a pressurized water system capable of maintaining at least 20 psi. Furnish a wash basin, water closet, soap holder, paper towel holder, and mirror.

(l) Maintain the facilities in a clean and sanitary condition. Sweep the floor and remove the trash daily. Damp mop and wax the floor biweekly. Clean the interior and exterior of all windows monthly. Perform all work on an as needed basis and when requested.

(m) Protect the Administration and Administration employees from any loss or damage to their property stored in the Engineers Office. Provide protection in the amount of twenty thousand dollars ($20 000), nondeductible, per each occurrence, for any loss or damage due to fire, theft, vandalism, storms, or floods. Complete the reimbursement, replacement, or repair within 30 days from the date the Engineer reports the loss.

(n) A parking area for the exclusive use of Administration employees. Provide the specified number of spaces. Post signs to designate the assigned parking areas. Stabilize the parking area as directed.

(o) Fire extinguishers of a dry chemical or multi-purpose ABC type (at least 10 lb), equipped with a visual air pressure gauge, and maintained in accordance with OSHA standards.

(p) A 24 unit first aid kit furnished and maintained as described in the Code of Federal Regulations, Title 29 Subpart D, Section 1926.50(d)2.

(q) A 4 x 8 ft waterproof bulletin board. Place in an easily accessible area within the project limits and conspicuously displayed to all employees. Post and maintain all pertinent and required notices for the duration of the project.

(r) Touch-tone telephones equipped with an answering device capable of answering, recording, storing, and playing back incoming messages at least 30 minutes in length and recording outgoing messages up to 15 seconds in length. The device shall be voice activated, beeperless, record as long as the speaker speaks, and play back recorded messages without dial tone or pauses.

Replace stolen equipment and equipment that becomes defective or for any other reason does not function as intended. Provide an equal or better unit within eight hours after notification. Replacement shall be at no additional cost to the Administration. Post emergency telephone numbers at a conspicuous location.

(s) One 12 ft^3 electric refrigerator.

(t) An approved cassette player/recorder with cassettes or digital recording device.

(u) One paper copier machine, with automatic document feed capable of printing at least 15 copies per minute and documents of up to 11 x 17 in. Supply paper and provide service as needed.

(v) One sanitary electric water cooler, including bottled water and disposable cups.

(w) One paper shredder capable of shredding at least 10 sheets (20 lb bond) at a time. Throat width of at least 12 in. Speed of at least 20 feet per minute. Auto reverse or auto stop for paper jams. Power of at least 115 v.

103.03.06 Computer System. Furnish 2 desktop computers and 1 laptop computers.

General Requirements.

(a) IBM compatible with an Intel or AMD processor.

(b) Minimum hard drive storage of 500 GB (gigabyte).

(c) One CD-RW drive (re-writable CD-ROM).

(d) Operating System. Minimum Microsoft® Windows 7. The computer system will not be acceptable unless all Microsoft Windows Critical Updates are installed.

(e) Printer. When an Engineers Office is specified, furnish a color all-in-one laser printer/scanner/copier/fax with at least 64 MB of RAM and meeting the following minimum requirements:

(1) Input paper capacity of 150 sheets.

(2) Automatic document feed of 35 page capacity.

(3) Printer resolution up to 600 X 2400 dpi, and a print speed (color) of at least 15 ppm.

(4) Scanner resolution must be capable of 1200 x 2400 dpi optical. Built in Copier resolution must be capable of up to 600 X 600 dpi. Copier speed of at least 15 ppm.

(5) Fax speed of at least 2 sec / page.

(f) Software. Supply all manuals and software on original disks for retention in the Engineers Office or Administration facility for the duration of the Contract.

(1) Microsoft® Office 2007 Professional for Windows™ or later.

(2) Install and configure antivirus/antispyware software to perform an automatic update when the microcomputer system connects to the internet. (Antivirus/AntiSpyware software approved for Administration web email: *Norton, McAfee, Sophos, or ETrust.) *Norton Internet Security includes Antivirus and a Personal Firewall.

(g) Internet Access. Provide unlimited internet service approved by the Engineer. Where available, provide internet high-speed service (DSL or cable). With DSL or cable internet service, provide an external router device. Provide firewall software to protect the computer from security intrusions.

(h) Accessories.

(1) When an Engineers office is specified, provide a standard computer workstation with minimum desk space of 60 X 30 in. and a padded swivel type chair with armrests.

(2) 8-1/2 X 11 in. xerographic paper as needed.

(3) Toner and ink as needed.

(4) Maintenance agreement to provide for possible down time.

(5) Physical security system to deter theft of the computer and components.

(6) Three 4-GB USB flash drive storage devices.

(7) Blank recordable CD-RW media as needed.

Desktop Specific Requirements.

(a) Minimum processor speed of 3.0 GHz.

(b) Minimum of 4 GB RAM.

(c) Enhanced 101 key keyboard with wrist rest.

(d) Super video graphics accelerator (SVGA).

(e) Mouse and mouse pad.

(f) Flat-panel LCD monitor (19 in. minimum) meeting Energy Star requirements.

(g) Uninterruptible power supply (UPS).

Laptop Specific Requirements.

(a) Must meet military standard of durability MIL-STD 810G

(b) Minimum processor speed of 2.4 GHz.

(c) Minimum 2 GB SDRAM.

(d) Minimum 15" 1024x768 (XGA), daylight-readable, 500nits (cd/m2) LCD display.

(e) Power Supply. Two lithium ion battery packs with overcharge protection, an AC adaptor, and a vehicle DC power adaptor that operates the laptop and simultaneously charges the laptop's internal battery.

(f) Carrying Case.

(g) Printer. When an Engineers Office is not specified, furnish a portable B&W printer with DC power adapter and having a minimum resolution of 1200 dpi, at least 8 MB of RAM, and a print speed of at least 15 ppm. (Note: A color printer may be substituted if a digital camera is specified. Refer to SP-Section 113).

(h) Internet Service. If an Engineers office is not specified, furnish the laptop with an internal wireless broadband card and broadband internet service.

Have the computer system furnished complete and ready to use at least five days prior tto the payment of the first progress payment.

If for any reason the system fails to operate, is stolen, or is otherwise unavailable for use, it shall be replaced or repaired within 48 hours.

When the computer system is no longer required, the Construction Management software system including original user/operator guide manuals, program disks, and all data files (including those stored on USB flash drives, CD-R's, etc.) will be removed by the Engineer and

delivered to the District Engineer and become the property of the Administration. The remaining computer systems shall remain the property of the Contractor.

103.03.07 Facsimile (FAX) Transceiver for all Offices.

Provide a FAX machine that:

(a) Is connected to a dedicated phone jack with a separate independent telephone line and phone number.

(b) Is in accordance and compatible with CCITT Group Transmission Standards (see specific line items for compatibility requirements).

(c) Uses public switched telephone networks and standard two wire leased line through RJ11C jacks or similar devices.

(d) Transmits at least 9600 BPS with automatic stepdown to compensate for phone line conditions.

(e) Is capable of transmitting a standard 8-1/2 x 11 in. page within 20 seconds through a clear phone line, based on CCITT #1 test chart.

(f) Is capable of two levels of resolution with contrast control:

(1) Standard 200/96 lines

(2) Fine 200/196 lines

(g) Is capable of self-test and providing activity reports with page headers, time, and date.

(h) Uses standard copy paper for receiving transmissions.

(i) Has an automatic document feeder tray (see specific requirements for each transceiver class).

(j) Has handsets.

(k) Has automatic answer, receive, and disconnect features.

(l) Provide the FCC registration number, ringer equivalence, and connection circuitry for each transceiver.

103.03.08 Specific Field Office Requirements.

Type A Engineers Office – Standard office trailer with at least 200 ft^2 of floor area under one roof.

Type B Engineers Office – Standard office trailer with at least 400 ft^2 of floor area under one roof.

Type C Engineers Office – Standard office trailer with at least 700 ft^2 of floor area under one roof.

Type D Engineers Office – One-story structure containing at least 1300 ft^2 of floor area under one roof. Modular construction is acceptable. Office trailers are not acceptable.

Table 103 Specific Requirements

ENGINEERS OFFICE				ITEM
A	B	C	D	
–	1	2	–	Inner Offices–100 ft^2 each
–	1	1	–	General office area
–	–	–	4	Inner Offices–120 ft^2 each
–	–	–	1	Conference room–240 ft^2
–	–	–	1	Storeroom with shelves–120 ft^2
1	1	1	2	Restroom, 30 ft^2
–	1	1	1	Inner office ingress and egress to the other rooms
3	4	4	5	32 x 60 in. Executive type desks with center drawers
3	4	4	5	Swivel chairs, padded with arm rests
1	1	1	1	30 x 72 in. slant top drafting table and stool, approximately 40 in. high at the front edge
1	2	3	6	30 x 72 in. folding utility table, 30 in. high
–	–	–	1	12-person conference table with padded chairs
2	6	10	12	Additional padded chairs
1	2	2	3	Plan racks
1	1	1	2	Coat racks
1	1	1	1	3 x 6 ft blackboard or whiteboard
1	2	3	3	Electronic desk calculators with memory and tape readout (including manuals, and tapes as needed)
1	1	2	6	Legal size steel filing cabinets, 4 drawer fire resistant (D label) with locks
–	2	2	2	Standard size steel filing cabinets, 4 drawer with locks
1	1	1	5	Bookcases having four shelves 36 x 12 in.
1	2	2	2	Closets, full height, measuring at least 24 x 30 in., equipped with locks, and at least two shelves in each
1	1	1	–	Utility cabinet with 3 adjustable shelves
1	1	1	–	Overhead cabinet at least 8 ft long, 15 in. deep, and 18 in. high
1	1	1	2	Fire extinguisher as specified in 103.03.05

1	2	2	4	Telephones with separate lines, as specified in 103.03.05
2	2	2	2	Battery-operated smoke detectors
4	8	10	15	Designated parking spaces

103.03.09 Recycling. Recycling of recyclable paper (bond, newsprint, cardboard, mixed paper, packaging material and packaging), bottles (glass and plastic), and aluminum cans will be required at the Engineer's Office and the Contractor's facilities for the project.

Furnish approved containers, and remove the material from the site on an approved schedule or as directed. All material shall be taken to an authorized recycling facility. Maintain a log for the duration of the project documenting the type of materials recycled. The log shall include the types of material, date, time, location of facility, and signature line. Furnish a copy of the log at the completion of the project and upon request.

The Contractor shall be considered the owner of any profit and be responsible for all incurred costs.

103.04 MEASUREMENT AND PAYMENT. Engineer's office will not be measured but will be paid for at the Contract lump sum price for the pertinent Engineers Office specified.

Payment of 50 percent of the Contract lump sum price will be payable on the first estimate subsequent to complete installation of the Engineers office. The remaining 50 percent will be prorated and paid in equal amounts on each subsequent monthly estimate. The number of months used for prorating will be the number estimated to complete the work. The final month's prorata amount will not be paid until the office is removed and the area is restored. The payment will be full compensation for site preparation, utility costs, all specified furnishings, to provide, equip, clean, maintain, insure, remove and dispose of the office, restore the site, recycling, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

The only exception to the all-inclusive Contract lump sum price is the stabilization of the parking area, which will be measured and paid for using the pertinent items as directed.

Computer. The computer system will not be measured but the cost will be incidental to the Contract price for the Engineers Office item. If an item for Engineers Office is not specified, the cost of the computer system will be incidental to the payment for Mobilization. In absence of either item, payment will be incidental to the other items specified in the Contract Documents

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.01 TRAFFIC CONTROL PLAN (TCP)

104.01.01 DESCRIPTION.

149 **DELETE:** The fourth paragraph sentence "Refer to contract Documents for Work Restrictions." in its entirety.

INSERT: The following.

Work Restrictions. The Engineer reserves the right to modify or expand the methods of traffic control or working hours as specified in the Contract Documents. Any request from the Contractor to modify the work restrictions shall require written approval from the Engineer at least 72 hours prior to implementing the change. The Contractor shall submit a copy of the original work restrictions with the written request.

Work is not permitted on Saturdays or Sundays.

Work is not permitted on the holidays, or work day preceding and following holidays indicated below with an "X":

☒ New Year's Day, January 1
☐ Martin Luther King's Birthday, the third Monday in January
☐ President's Day, the third Monday in February
☒ Good Friday
☒ Easter Weekend
☒ Memorial Day, the last Monday in May
☒ Independence Day, July 4
☒ Labor Day, the first Monday in September
☐ Columbus Day, the second Monday in October
☐ Veteran's Day, November 11
☒ Thanksgiving Day, the fourth Thursday in November
☒ Christmas Day, December 25

TEMPORARY LANE OR SHOULDER CLOSURE SCHEDULE			
ROADWAY	**# LANE(S) / SHOULDER CAN BE CLOSED**	**DAY OF THE WEEK**	**CLOSURE PERIOD (TIME OF DAY)**
MD 32	0/1	Monday through Friday	12:01 am to 5:00 am 9:00 am to 3:00 pm 8:00pm to 12:00 M
	1/1	Monday through Friday	12:01 am to 5:00 am 8:00 pm to 12:00 M
	1/1	Saturday	12:01 am to 5:00 am
MD 32/Linden Church Road Interchange Ramps	Temporary Ramp Closure	Monday through Friday	8:00 pm to 5:00 am
		Saturday	12:01 am to 5:00 am
Work behind Barrier Wall			24 Hours

149 **ADD:** The following after the last paragraph, "Any monetary savings...and the Administration."

When closing or opening a lane on freeways, expressways, and roadways with posted speed ≥ 55 mph, a work vehicle shall be closely followed by a protection vehicle (PV) during installation and removal of temporary traffic control devices. The PV shall consist of a work vehicle with approved flashing lights, either a truck-mounted attenuator (TMA) with support structure designed for attaching the system to the work vehicle or a trailer truck-mounted attenuator (TTMA) designed for attaching the system to the work vehicle by a pintle hook and an arrow panel (arrow mode for multilane roadways and caution mode on two-lane, two-way roadways).

The work vehicle size and method of attachment shall be as specified in the TMA/TTMA manufacturer's specification as tested under NCHRP and/or MASH Test Level 3.

When a temporary lane or shoulder closure is in effect, work shall begin within one hour after the lane is closed. Any delay greater than one hour with no work in progress shall require the Contractor to remove the lane/shoulder closure at no additional cost to the Administration. The Contractor's Traffic Manager shall attend Pre-Construction and Pre-Paving Meetings and shall discuss traffic control and the Traffic Control Plan including procedures to be implemented for lane closures.

All closures shall be in conformance with the approved TCP and under the direction of the Contractor's Traffic Manager and the Engineer.

Workers and equipment, including temporary traffic control devices needed for setting up a lane closure or restriction, are prohibited in the lane/shoulder to be closed or restricted before the time permitted in the Contract work restrictions, unless otherwise noted below or as approved by the Engineer.

Temporary traffic control devices to be used for lane/shoulder closure may be placed on the shoulder of the roadway by workers no earlier than 30 minutes prior to actual time lane/shoulder closure or restriction is permitted. When temporary traffic control devices are being installed, all work vehicles involved in the installation shall display flashing lights that provide a 360-degree visibility of the vehicles. These lights shall remain on until the full installation of TTC devices is complete. Temporary traffic signs may be displayed to traffic at this time.

Workers shall not enter a lane open to traffic. Workers may be present on shoulders to prepare for lane closure setup no earlier than 30 minutes prior to actual time lane/ shoulder closure or restriction is permitted. During preparation for the lane closure, all work vehicles present at the site and involved in the installation of the lane closure or restriction shall display flashing lights that provide 360-degree visibility of the vehicles. These lights shall remain on until the full implementation of the road closure or restriction is complete.

All temporary lane or shoulder closures shall be restored at the end of the closure period and no travel lane shall be reduced to less than 11 ft on expressways, freeways and 10 ft on other roadways. Prior to opening the closed lane or shoulder, the Contractor shall clear the lane or shoulder of all material, equipment, and debris.

Failure to restore full traffic capacity within the time specified will result in a deduction being assessed on the next progress estimate in conformance with the following.
This is in addition to the requirements specified in TC-4.02.

ASSESSED DEDUCTIONS FOR OTHER ROADS	
ELAPSED TIME, (MINUTES)	**DEDUCTION**
For 1 Lane Closures	
1 – 10	$ 300.00
Over 10	$150.00 per minute (In addition to the original 10 minute deduction)
For 2 or more Lane Closures	
1 – 10	$ 600.00
Over 10	$300.00 per minute (In addition to the original 10 minute deduction)

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.07 ARROW PANEL (AP).

104.07.01 DESCRIPTION.

159 **DELETE:** The second and third paragraphs "Furnish APs that are……units unless otherwise specified" and "APs shall have both ……dimmer device is operational.

104.07.03 CONSTRUCTION.

160 **ADD:** The following after the first paragraph.

Furnish APs that are self-contained, vehicle-mounted or portable, and approved. Use self-contained trailer units unless otherwise specified.

Provide APs that have both manual and automatic dimmer devices capable of reducing the light intensity by 50 percent. Periodically clean the photocells in order to prevent malfunctioning of the brightness control. Dimmer devices are mandatory during night operation. The devices shall include a fail-safe system that ensures maximum brightness during daytime operations and a reduction in brightness of up to 50 percent during periods of darkness, regardless of which dimmer device is operational.

The AP's shall provide full illumination within at least a 24-degree cone perpendicular to the panel face.

Power Supply. The AP shall operate from a solar powered electrical system and consist of battery power and solar array panels, and be capable of providing power supply to the AP for 21 consecutive days without auxiliary charge.

ADD: The following after the Arrow Panel Lamp Options table.

Arrow Board Type	Minimum Size	Minimum Legibility Distance	Minimum Number of Elements
A	48x24 in.	½ mile	12
B	60x30 in.	¾ mile	13
C	96x48 in.	1 mile	15
D	None*	½ mile	12

***** Length of arrow equals 48 in. width of arrowhead equals 24 in.

DELETE: (b) "Aim the AP at approaching……that the display is level".

INSERT: (b) "Aim the AP at approaching traffic in conformance with the minimum legibility distances specified above. Ensure that the display is level".

10-05-10

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

166 **DELETE**: Section 104.11 TEMPORARY PAVEMENT MARKINGS. in its entirety.

INSERT: The following.

104.11 TEMPORARY PAVEMENT MARKINGS.

104.11.01 DESCRIPTION. Furnish, install, and remove temporary pavement markings as specified in the Contract Documents or as directed by the Engineer. These markings shall include lines, letters, numbers, arrows, and symbols.

104.11.02 MATERIALS.

Removable Preformed Pavement Marking Material	Refer to the Contract Documents
Nontoxic Lead Free Waterborne Pavement Markings	Refer to the Contract Documents
Black Out Tape	QPL

104.11.03 CONSTRUCTION.

104.11.03.01 Quality Assurance/Quality Control. Quality control testing shall be completed by the Contractor's Administration certified technicians. The Engineer will complete the quality assurance checks in conformance with MSMT 729 by performing the Nighttime Visibility Evaluations.

104.11.03.02 Warranty Period. The Contractor shall maintain and be responsible for any defects in the pavement markings for a period of 180 days from the date of application. The Contractor shall replace the pavement markings as necessary within this period as directed by the Engineer at no additional cost to the Administration. Refer to GP-5.11.

104.11.03.02 Application and Removal. The pavement markings shall be applied in conformance with the manufacturer's recommendations and the Contract Documents. Markings shall be applied in the same direction as the flow of traffic. The markings shall be located as specified in the Contract Documents or as directed by the Engineer.

Pavement markings may be applied to either new or existing paved surfaces. When applied to newly paved surfaces, the markings shall be placed before traffic is allowed on the pavement. Nontoxic lead free waterborne pavement markings shall be used for all temporary pavement markings except for the final surface. However, the Contractor may use removable preformed pavement markings at no additional cost to the Administration.

When at the "end of season", the temperatures are too low to allow the placement of removable tape on the final surface, a written exception request may be submitted to the Engineer to allow the use of nontoxic lead free waterborne paint in lieu of removable tape until the following striping season.

When it is appropriate to shift lanes, all nonapplicable pavement markings within the travel way and adjacent to the travel way as directed by the Engineer shall be completely removed.

Surface Condition. Prior to application of pavement markings, the pavement surface shall be clean, dry, and free of all contaminants, including curing compound, dirt, and loose particles. Residual pavement markings shall be removed. Loose or poorly constructed markings shall also be removed.

Pavement Marking Removal. All removable preformed pavement markings shall be completely removed prior to application of the permanent markings. On stage construction or final surfaces of portland cement concrete pavements, any objectionable adhesive residue shall be removed by water blasting or other methods as may be approved by the Engineer. Open flame is prohibited to remove adhesive residue, or any pavement markings. The Contractor shall remove all nonapplicable pavement markings so that there is no damage to the existing or final surface.

Retroreflectance. The initial retroreflectance readings for temporary pavement markings shall be a minimum of 250 and 150 millicandellas/lux/square meter for white and yellow, respectively. The Engineer will monitor the pavement markings in conformance with MSMT 729 during the Contractor's 180 day period of responsibility.

104.11.04 MEASUREMENT AND PAYMENT. Payment for Removable Preformed Pavement Markings, Removal of Removable Preformed Pavement Markings, Nontoxic Lead Free Waterborne Pavement Marking Paint, and the Removal of Existing Pavement Markings will be measured and paid for using one or more of the items listed below and as specified in the Contract Documents.

The payment will be full compensation for furnishing, placing, complete removal of lines, letters, numbers, arrows, symbols, and the removal of all residue. In addition, payment will cover maintenance and replacement during the 180 day period, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Removal and replacement of temporary pavement markings required beyond the 180 day period will be measured and paid for at the Contract unit price for the pertinent temporary pavement marking item.

Temporary markings replaced during the 180 day period as a result of plowing (as determined by the Engineer) will be paid for at the Contract unit price for the pertinent temporary marking item.

(a) Nontoxic Lead Free Waterborne Pavement Marking Paint-in width specified-per linear foot.

(b) Removable Preformed Pavement Line Markings-in width specified-per linear foot.

(c) Removable Preformed Letters, Symbols, Arrows, and Numbers per each.

(d) Removal of Removable Preformed Pavement Markings-any width-per linear foot.

(e) Removal of Removable Preformed Letters, Symbols, Arrows and Numbers per each.

(f) Removal of Existing Pavement Line Markings-any width per linear foot.

(g) Removal of Existing Letters, Symbols, Arrows, and Numbers per each.

(h) Black Out Tape Lines-in width specified-per linear foot.

(i) Removal of Black Out Tape Lines-any width-per linear foot.

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.12 DRUMS FOR MAINTENANCE OF TRAFFIC.

104.12.02 MATERIALS.

169 **ADD:** The following to the end of the first paragraph.

Drums may include recycled plastic content. The drum base may contain up to 100 percent recycled content.

104.12.03 CONSTRUCTION.

ADD: The following to the end of the third paragraph.

Damaged drums shall be recycled to the extent possible. The disposition of the damaged drums shall be provided prior to payment for any replacement drums.

104.12.04 MEASUREMENT AND PAYMENT.

ADD: The following to the end of the second paragraph.

A disposition as specified in 104.12.03 is required prior to payment.

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.14 CONES FOR MAINTENANCE OF TRAFFIC.

104.14.02 MATERIALS.

171 **DELETE:** First paragraph on this page "Cones shall be…an upright position".

INSERT: The following.

All cones shall meet MdMUTCD and be new or like new condition. All cones shall be orange in color. Cones shall be at least 28 in. high, 10 in. diameter at the inside of the base, and reflectorized with two white retroreflective stripes. The top stripe shall be 6 in. wide and located 3 to 4 in. from the top of the cone. The second stripe shall be 4 in. wide and located 2 in. below the top band.

Tall-Weighted Cones. When specified, tall-weighted cones shall be at least 42 in. high and 7 in. diameter at the inside of the base. Tall-weighted cones shall be manufactured of low density polyethylene (LDPE) and have four high performance wide angle white and orange retroreflective stripes. The stripes shall be horizontal, circumferential and 6 in. wide. Alternate stripe colors with the top stripe being orange. Any nonretroreflective spaces between the orange and white stripes shall not exceed 1/2 in.

104.14.03 CONSTRUCTION.

ADD: The following after the first paragraph "The Contractor's name…away from traffic".

Equip all cones with approved weights or anchor collars, (15 lb maximum) as needed to maintain an upright position. Anchor collars shall fit to the base of the cone. For tall-weighted cones use anchor collars weighing 10 to 30 lb.

CATEGORY 100 — PRELIMINARY

104.19 PORTABLE VARIABLE MESSAGE SIGNS (PVMS)

104.19.03 CONSTRUCTION.

104.19.03.01 Equipment.

PVMS UNIT.

Sign Controller.

179 **DELETE: (j)** in its entirety.

INSERT: The following.

(j) Contained in a secure weatherproof cabinet located on the controller housing and insulated to protect against excessive vibration, temperature or tampering.

(1) Equipped with a lockable door latch and an interior cabinet dome light.

(2) Provided with a keyboard storage location inside the cabinet.

(3) Security locks shall include those installed by the manufacturer and an additional hardened hasp/lock combination with a user changeable combination. This hasp/lock setup shall be installed in a manner to maximize its effectiveness in stopping unauthorized access to the sign controls. For control box surfaces not compatible with the hasp/lock setup, other supplemental high security locking devices may be approved by the Engineer.

Security.

(a) Lock all trailer control cabinets when not attended by Administration employee or Contractor, whether being stored, in transport, or deployed and activated.

(b) Do not store or maintain any passwords on the PVMS.

(c) Remove any password attached or inscribed on the PVMS trailer or equipment.

(d) Change the password when it is no long secure or every six months.

(e) Some older model PVMS may not have a changeable password, so extra measures shall be taken to hide the password.

(f) Do not leave Owner/Instruction manuals in the trailer control cabinets. Manuals should be copied and made available to the personnel responsible for deploying the PVMS Signs.

(g) When equipped with a detachable keyboard remove it from the trailer and secure in the transport vehicle, field office or at the respective shop.

(h) Failure to comply with these security standards or any subsequent PVMS tampering incidents will be cause for penalty under TC-4.02.

(i) Construction and District Inspectors will ensure contractor compliance.

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.21 CELLULAR TELEPHONES.

104.21.01 DESCRIPTION. Furnish and maintain new or like new cellular telephones for use by the appropriate Administration personnel. Each telephone shall be furnished with a hands-free device and be delivered to the Engineer at time of Notice to Proceed, fully activated and operational. They shall remain operational until returned to the Contractor at final acceptance of the entire project in conformance with GP-5.13.

104.21.02 MATERIALS.

Cellular Telephones	As approved by the Engineer

104.21.03 CONSTRUCTION. Not applicable.

104.21.04 MEASUREMENT AND PAYMENT. The number of cellular telephones required for this Contract is 4. The cellular telephones will not be measured but will be incidental to the Contract price for the Engineers Office item. If an item for Engineers Office is not specified, payment for the cellular telephones will be incidental to the payment for Mobilization. In the absence of either item, payment will be incidental to the other items specified in the Contract Documents. The payment will be full compensation for furnishing the telephones and hands-free devices, activation fees, battery replacement, monthly service fees, extended coverage charges, air time (peak and nonpeak time per minute), roaming rates, long distance fees in conformance with the schedules provided, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. If any of the telephones become defective, are stolen, or for any other reasons do not function as intended, they shall be replaced in-kind at no additional cost to the Administration. Nonfunctioning or stolen telephones shall be replaced within eight hours after the Contractor is notified by the Engineer.

Ownership of the telephones will remain with the Contractor. The Administration assumes no responsibility or liability for the condition of the telephones when they are returned.

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.23 PROTECTION VEHICLE.

104.23.01 DESCRIPTION.

182 **DELETE:** Fourth paragraph, "The rear facing…….Standard No. MD 104.01-18".

INSERT: The following.

The rear facing surface of the TMA/TTMA shall have an inverted "V" chevron pattern formed by alternating 4 in. wide black and yellow stripes as shown in Standard No. MD 104.01-19C. The sides of the TMA/TTMA shall have a border of 4 in. red and white reflective tape as shown on Standard No. MD 104.01-18A.

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.25 DRONE RADAR

104.25.01 DESCRIPTION. Furnish, install, and relocate drone radar as specified in the Contract Documents or as directed by the Engineer. A drone radar consists of an electronic device that activates all types of on-board radar detectors without causing interference to normal police radar operations.

104.25.02 MATERIALS.

Drone Radar	As approved by the Office of Traffic and Safety

General. The electronic device shall be capable of being securely mounted to a vertical or horizontal surface. The unit shall be of weatherproof and waterproof construction and operate efficiently from -20 to +160 F.

FCC Equipment Authorization. The device shall bear an FCC Equipment Authorization for unlicensed use by the general public under FCC Title 47, Part 15. All applicable FCC equipment regulations shall be met without any additional licensing required of the Administration or the Contractor.

Range. The drone radar shall have an effective linear range of at least 2600 ft.

Power Source. 12 volts DC or 120 volts AC compatible/convertible.

Current Consumption. 1/2 amp maximum.

Frequency. 24.150 ± 0.100 GHz.

104.25.03 CONSTRUCTION. The drone radar shall be furnished, positioned, repositioned, operated, maintained, and removed, as needed or as directed by the Engineer. The unit may be truck or trailer mounted, fixed to a special lighting unit, portable changeable message sign, arrow panel, traffic sign, or traffic barrier W beam, as directed by the Engineer.

104.25.04 MEASUREMENT AND PAYMENT. Drone Radar will be measured and paid for at the Contract unit price per day. A unit day shall consist of any approved usage within a 24 hour calendar day. If a unit is used for part of a day, it will be measured as a unit day.

The payment will be full compensation for drone radar unit, installation, power supply, wiring, supports, relocating as required by the Traffic Control Plan or as directed by the Engineer, removal, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Each Drone Radar device will be paid for only once per unit day, which will include any work necessary to maintain, re-align, or relocate the device; or replace damaged, missing or stolen devices.

CATEGORY 100
PRELIMINARY

SECTION 104 — MAINTENANCE OF TRAFFIC

104.28 SPEED DISPLAY TRAILER (SDT).

104.28.02 MATERIALS.

185 **DELETE:** Second paragraph on this page "All materials for the SDT…approach roadway at all times".

INSERT: The following.

All materials for the SDT shall be like new, corrosion resistant, and unaffected by water spray, salt, oil, gasoline, and all other contaminants in the quantities normally found along the edge of the traveled roadway. Construction, materials, and operation shall be in accordance with NFPA, ULI, and NEC. Sign messages shall be visible for a distance of 0.5 mile and legible for a distance of 900 ft from any point along the traveled approach roadway at all times.

104.28.02.01 Equipment.

186 **DELETE:** LED Illumination in its entirety.

INSERT: The following.

LED Illumination. LED illumination for each matrix element shall have the following characteristics:

(a) LED shall conform to the ITE specification for amber color for warning applications.

(b) Each LED shall produce at least 1 candela output on center at operating drive current.

(c) LED shall provide full illumination within at least a 24 degree cone perpendicular to the sign face.

(d) Operating temperature range of the LED shall be -30 to 125^{o}F.

Sign Controller.

187 **DELETE: (e)** Be contained in a sheet metal, weatherproof cabinet located on the controller housing, and insulated to protect against excessive vibration and temperature.

The cabinet shall have a lockable door latch and interior cabinet dome light.

INSERT: The following.

(e) Be contained in a sheet metal or high density polyethylene (HDPE), weatherproof cabinet located on the controller housing, and insulated to protect against excessive vibration and temperature.

The cabinet shall have a lockable door latch and interior cabinet dome light.

104.28.03. CONSTRUCTION.

188 **DELETE:** The second paragraph on this page "Aim the STD at approaching…either sunlight or vehicle headlights".

INSERT: The following.

Aim the SDT at approaching traffic that is atleast 900 ft in advance of the SDT and in accordance with the 0.5 mile minimum visibility and 900 ft minimum legibility requirement. Ensure that the SDT is level and that the sign face is not obscured by highway alignment or glare from either sunlight or vehicle headlights.

CATEGORY 100
PRELIMINARY

184 **DELETE:** SECTION 107 — CONSTRUCTION STAKEOUT in the Standard Specifications in its entirety.

INSERT: The following.

SECTION 107 — CONSTRUCTION STAKEOUT FOR DESIGN-BUILD PROJECTS

107.01 DESCRIPTION. This work shall consist of furnishing, placing and maintaining construction layout stakes as specified in the Contract Documents or as directed by the Engineer.

The Design-Builder shall, as part of the construction stakeout operation, before any clearing operation commences, demarcate any wetlands and the limit of clearing throughout the entire project as shown in the Contract Documents and labeled as Limit of Clearing or Wetlands to the satisfaction of the Engineer.

Where limits of clearing are not shown in the Contract Documents, the limit of clearing will be the top of cut, toe of slope or limit of ditch excavation.

107.02 MATERIALS. The material for flagging the clearing limits shall be a 3 in. international orange vinyl material with "CLEARING LIMIT" printed on it with 2 in. letters. The material for flagging wetlands shall be the Administration's standard 1-1/2 in. pink and white striped vinyl flagging with "SHA WETLAND" printed on it with blue letters.

107.03 CONSTRUCTION.

107.03.01 Line and Grade.

The Design-Build Engineer will provide the Design-Builder with the following:

(a) Control Points.

(1) Control Points for horizontal and vertical control shall be as shown on the Preliminary Plans.

(b) Structure Stakeout.

(1) A staked out center line or working line, whichever applies, with stations not over 100 ft apart and extending at least 100 ft beyond ends of the structure.

(2) When the structure is on a curve, the Design-Build Engineer will furnish a staked out center line or working line, whichever applies, consisting of stations not over 100 ft apart and including the P.C., P.T., and at least one point on the tangents beyond each end of the curve.

(3) At least two bench marks, one on each end of the structure, will be established by the Design-Build Engineer.

The Design-Builder will provide the following:

(a) Roadway and Stormwater Management (SWM) Facility Access Road Stakeout.

(1) A staked center line of the roadway with the maximum spacing of stations (stakes, nails, crosses, etc.) of 100 ft.

(2) Establish appropriately spaced bench marks and the necessary references including all points of curvature (P.C.), and points of tangency (P.T.) for the preservation and control of the center line.

(3) Except for SWM facility access roads, two sets of prints of the cross sections. Use the cross sections as a guide only. Dimensions or elevations scaled from the cross sections are not sufficiently precise for use in construction. Cross sections will not be provided for SWM facility access roads.

Horizontal Referencing:

- The Design-Builder will establish references to all Base Line of Construction Controls. This will include all Points of Curvature (P.C.s) and Points of Tangency (P.T.s).
- Reference points shall be positioned in pairs with the closest point placed Twenty (20) feet outside the limit of construction. Should these points fall beyond the Right of Way Line, approval from the property owner or tenant must be obtained prior to setting. Right angle and radial ties to Baselines are preferred but not required.
- Reference points, typically, shall be Number #5 (five) 5/8”Rebar two (2)feet long with a State Highway Administration(SHA) Yellow Cap affixed to the top. SHA Caps will be supplied by the SHA Plats and Surveys Division. In areas unsuitable for Rebars, markers of a stable,

permanent nature shall be used,(crosses in concrete, PK nails, Railroad spikes, etc.) NOTE: Wooden hubs are not to be used for any referencing purpose.

- References, when positioned, shall be hand referenced to local points of permanency (trees, structure corners, utility poles, etc).measured to a 100^{th} of a foot.

Vertical Referencing:

- The Design-Builder will place and establish permanent Bench Marks on structures along the project Baseline. These marks will be pre-stamped Brass Discs supplied by the S.H.A. Plats and Surveys Division and are to be placed in a suitable surface at time of pour and finish. In non-structure areas, permanent points in stable positions (Square cuts in existing concrete, Boat spikes in Power poles / large trees etc.) are acceptable.
- Benches shall be referenced to the Base Line of Construction by Station plus and offset distance.
- Spacing of Vertical Control shall be a minimum of Five (5) per mile.
- Elevations on all Benches shall be established by differential leveling and return Loop check.

NOTE: In the Horizontal and Vertical Referencing process, all work shall be shown and documented in SHA Field Survey book/s supplied by the S.H.A. Plats and Surveys Division. Upon project completion, all books shall be returned to the S.H.A. Plats and Surveys Division for archiving.

For questions regarding the S.H.A'.s specifications for Baseline Referencing or examples of S.H.A. Construction Stakeout bookwork, contact the S.HA.s Plats and Surveys Division in Baltimore, Maryland at 410-545-8940.

107.03.02 Equipment and Personnel. The Design-Builder shall engage a Registered Professional Land Surveyor, licensed in the State of Maryland, to determine all lines and elevations for various parts of the Work. The Surveyor shall have 3 to 5 years experience as a party chief or higher and have demonstrated experience working with the Maryland Plane Coordinate System – NAD 83/91 and NAVD 88, or similar. The surveyor shall use competent personnel and state of the art equipment for all engineering work required to set and maintain the elevations and dimensions as specified in the Contract Documents.

107.03.03 Control Markers. The Design-Builder shall be responsible for preserving the centerline and benchmarks set by the Design-Build Engineer. When the centerline and benchmarks are disturbed or destroyed, they shall be replaced by the Design-Builder at no additional cost to the Administration.

107.03.04 Control Stakes. For roadways as specified in 107.03.01, the Design-Builder shall furnish, set and preserve stakes at each station along each side of the project on the right-of-way or easement line, whichever is furthest from the center line of construction. Where only part of an ultimate dual highway is to be constructed, the stakes on the side of the future improvement shall be set 10 ft beyond the construction limits. On each of these stakes shall be marked its offset distance from the center line and its top elevation or the cut or fill to the profile grade line. Additional stakes as needed for horizontal and vertical controls necessary for the correct layout of the work shall be set by the Design-Builder.

For SWM facilities, furnish, set, and preserve stakes at each station along each side of the SWM facility access road and at grading points. Place additional stakes as necessary or as directed to ensure the correct layout of the work.

107.03.05 Layout. For structures as specified in 107.03.01, the Design-Builder shall proceed with the layout work. However, before any actual construction begins, the Design-Builder shall rerun and check the Design-Build Engineer's lines and grades and then establish all center line or working line intersections with the center line or center of bearing of all piers, bents and abutments. From these field layouts, the Design-Builder shall check the proposed span lengths by electronic distance measurement or chaining. When chaining is used, the measurements shall be compensated for temperature, sag, and horizontal alignment. The Design-Builder shall also check the location of the structure to affirm its correct location with relation to existing structures, roads, and existing conditions that are to remain in their original positions. If any discrepancies are found, the Design-Builder shall notify the Design-Build Engineer at once in writing, otherwise, it will be assumed that all planned dimensions, grades and field measurements are correct. All lines established on the ground shall be preserved or referenced, marked, and kept available at all times.

The Design-Builder shall establish the field elevations for all bridge seats and assume responsibility for finishing to proper grade. If any steel beams or girders are incorporated in the project, the Design-Builder shall run elevations over the tops of the beams or girders after they are in place, before any forms are attached to them, to determine the deflection of each member. This information shall then be applied to the deflection diagram to determine the corrected elevation of bottom slab forms and screed supports. After the Design-Builder has assembled this information, it will be checked by the Engineer before final adjustments are made and the placing of any concrete in the forms.

For SWM facilities, proceed with the layout work as specified. Check the locations of drainage structures to affirm its correct location with relation to the SWM facility layout, grading points, access road, roads, and existing conditions that are to remain. Correct any discrepancies. Ensure that all lines established on the ground are preserved of referenced,

marked, and kept available at all times. Ensure that the field elevations are correct and are finished to the proper grade.

107.03.06 Utilities. The Design-Builder shall furnish to the utility companies or agencies working within the limits of the project, promptly upon request, reference to control points, alignment and grade data, so that they may properly locate and coordinate their work and improvements in relation to the project.

Intersection Utility Stakeout. The Design-Builder shall notify the appropriate agencies listed below a minimum of 72 hours (excluding weekends and holidays) prior to the Design-Builder's anticipated beginning of any underground work.

(a) Request a MISS UTILITY stakeout and possess a valid MISS UTILITY clearance ticket number for any underground work.

(b) Contact all utilities within the limits of the project who are not a member of MISS UTILITY and obtain a stakeout of their respective facilities.

(c) Request the Office of Traffic & Safety's Signal Operations Section to stakeout Administration maintained traffic signal facilities.

(d) Request the District Engineer to stakeout their lighting facilities.

The Design-Builder shall stakeout the proposed construction as indicated in the Contract Documents and allow the Design-Build Engineer to verify location of the proposed facilities.

107.03.07 Right-of-Way and Easement Lines. The Design-Builder shall define only right-of-way and easement lines of the project for adjacent property owners, promptly upon request.

107.03.08 Subgrade, Subbase and Base Controls. The Design-Builder shall furnish for subgrade, subbase and base courses, a string line and grade with fixed controls having a maximum longitudinal and transverse spacing of 25 ft.

The Design-Builder shall place along each form line for cement concrete pavement line and grade with fixed controls not to exceed 25 ft.

107.03.09 Flagging. The flagging shall be placed continuously through wetland areas. In areas where trees are not to be disturbed, the Design-Builder shall individually flag those trees in a line along the clearing limits that are not to be moved or destroyed. If the clearing or wetland flagging has been destroyed and the Engineer determines that its use is still required, the Design-Builder shall reflag the areas

If the Design-Builder does not replace destroyed flagging within 48 hours after notification by the Engineer that replacement flagging is needed, the Engineer may proceed to have the area reflagged. The cost of the reflagging by the Engineer will be charged to the Design-Builder and deducted from any monies due under the Contract.

At the completion of construction, the Design-Builder shall remove all flagging.

107.04 MEASUREMENT AND PAYMENT. Payment for all work for Construction Stakeout FOR Design-Build Projects shall be included in the Lump Sum Price shown on the Schedule of Prices for the all-inclusive Project Lump Sum. The payment will be full compensation for furnishing, placing and maintaining construction layout stakes, flagging of clearing limits and wetlands, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 100
PRELIMINARY

DELETE: SECTION 109 — CRITICAL PATH METHOD PROJECT SCHEDULE in the Standard Specifications in its entirety.

INSERT: The following.

SECTION 109 — CRITICAL PATH METHOD PROJECT SCHEDULE DESIGN-BUILD

109.01 DESCRIPTION. Plan, schedule, and construct the project by using a Critical Path Method Project Schedule (CPM). Use the CPM for coordinating and monitoring the work specified in the Contract Documents including all activities of subcontractors, vendors, suppliers, utilities, railroads, the Administration, and all other parties associated with the construction of the Contract. The CPM schedule shall be used for coordinating activities for both design and construction tasks by incorporating all activities into one CPM schedule. All work including but not limited to activities associated with design elements, milestones, permits, utility relocations, and submittals shall be represented by schedule activities. All work including but not limited to submittals, major procurement, delivery, and construction activities shall be included. All appropriate schedule logic relationships between the design element activities and the corresponding construction activities shall be shown. Base the CPM upon the entirety of the Contract Documents. Utilize CPM software that generates files compatible with Primavera Project Planner.

Float. The CPM utilizes float. Float is defined as the amount of time between when an activity "can start or finish" and when an activity "must start or finish". Float is a shared commodity for the use of the Administration and the Design-Build Team and is not for the exclusive use or benefit of either party. Both parties have the full use of the float until depleted.

Scheduling Representative. Designate a scheduling representative prior to submission of the Initial Critical Path Method Project Schedule (ICPM). The scheduling representative is the person primarily responsible for development and maintenance of the CPM schedule, the Design-Build Team's representative in all matters regarding the schedule, and the designated attendee for all schedule related meetings. Replacement of the scheduling representative will require written approval from the Administration.

Submit the qualifications of the scheduling representative to the Administration for approval. This approval is required before the ICPM will be accepted. The scheduling representative shall have at least three years of verifiable experience for preparing and maintaining CPM project schedules on Contracts of similar size and complexity.

Initial Critical Path Method Project Schedule (ICPM). The ICPM shall consist of:

(a) A time scaled diagram of acceptable scale and format that is acceptable to the Engineer. Clearly label and identify each activity. Show all relationships between activities.

(b) Tabular reports with activities sorted as follows:

(1) Activity ID. Provide predecessors and successors for each activity with leads and lags shown.

(2) Activity ID. Provide and clearly define the resources assigned to each activity.

(3) Early Start, Total Float.

(4) Total Float, Early Start.

(5) Project Area (if applicable).

(6) Project Phase (if applicable).

(7) Responsibility, e.g., Design-Build Firm, Designer, Constructor, specific subcontractor, specific supplier, the Administration, etc.

Provide in the header of each tabular report: the project name, Contract number, data date, run date and number, and report type.

Provide in the body of each report: the activity identification, activity description, original and remaining duration, early/late start and finish dates, percent complete, actual start/finish dates, total float, and calendar designation for every activity.

(c) Written Narrative (WN). Comply with the requirements described hereinafter.

(d) Printed Calendars. Include a listing, description, and calendar form tabulation of all calendars used. Include the total number of anticipated work days required to complete the Contract work.

Delineate holidays and anticipated nonwork days or periods. Explain in the WN the basis for determining each nonwork day or period.

(e) A data disc containing all of the information contained in the ICPM and in a format compatible with Primavera Project Planner software. All construction activities shall have durations not exceeding 10 working days, unless otherwise approved. Activities representing review and approval of construction submittals by the Administration shall be given a duration of not less than 30 calendar days. Activities representing review and approval of design submittals by the Administration shall be given a duration of not less than 45 calendar days. A short list of highly critical approval activities may be submitted. The Engineer will make every effort to expedite the approval of these submittals; however, this will not alter the requirement to include 30 calendar days for construction submittal approvals and 45 calendar days for construction submittal approvals. Schedule the duration for activities such as curing and pre-load in calendar days. Durations for procurement activities will be evaluated on a case-by-case basis.

The latest calculated early finish date in the ICPM shall equal the calendar date for completion specified in the Contract Documents. If an earlier completion date is submitted, the Administration, upon approval of the ICPM, will issue a change order to adjust the Contract time to the completion date shown on the ICPM.

Resource load all construction activities in the schedule with the material, equipment, and manpower planned to be utilized in accomplishing each activity. Provide a full explanation of the resource loading in the WN.

The Engineer reserves the right to specify the number of activities and to require an additional breakdown of the activities at any time.

Utilize activity codes to categorize activities by at least the following: project area; construction phase; design phase; and responsibility, e.g. Design-Build Firm or specific subcontractors.

Provide a WN as part of the ICPM. Explain the sequence of work, the critical path, interim completion dates, project phasing, nonwork days or periods, maintenance of traffic, and labor and equipment resources. Explain how the ICPM provides for permit requirements, environmental requirements, coordination with other public Contractors, milestone dates (for the Contract or other related contracts), coordination with other entities, coordination with all utility companies, special nonwork days or periods, and weather. Explain the specific scope of each activity and the basis used to determine the original duration of each activity, i.e. production rates and anticipated quantities. Address all activities quantified in the Contract Documents. Explain the following in the WN.

(a) Relationships between activities not obviously identified.

(b) Equipment usage and limitations.

(c) Manpower usage and limitations.

(d) Use of additional shifts and overtime.

(e) Activity codes, abbreviations, and activity identification system.

(f) All calendars utilized in the CPM.

(g) Date or time constraints.

(h) All abbreviations.

(i) Use of calendars.

(j) Scheduling of weather and temperature sensitive activities.

(k) Design Phase/milestone dates.

Complete and submit the proposed ICPM within 30 calendar days after receiving the Notice of Award. Submit five sets of all required information for review and acceptance. Do not start any work until the ICPM is accepted. Upon issuance of the Notice to Proceed, the start date utilized in the ICPM will be adjusted to comply with the Notice to Proceed.

The Engineer will complete the review of the ICPM within 30 calendar days after submittal. If required, a Joint Review Conference will be convened at which time the Engineer and Design-Build Firm may make corrections and adjustments to the proposed ICPM. If a revision is necessary due to the Engineer's review or the Joint Review Conference, submit the proposed revision within seven calendar days after receiving the Engineer's review comments or within seven calendar days after the date of the

Joint Review Conference, whichever is the latest. Make revisions in accordance with the requirements for the ICPM. The Engineer will respond to the revised ICPM within seven calendar days after receipt.

Any delay in starting work caused by the acceptance of the ICPM by the Engineer will not be considered as a basis for any adjustment in the Contract amount or time.

Upon notification that the ICPM has been accepted, that document will become the CPM of record. The CPM of record shall be the Design-Build Firm's work plan for completing the entire Contract as specified in the Contract Documents.

Failure to adhere to the CPM of record will be cause for the Administration to deny requests for additional compensation or extensions of the Contract duration and may result in the withholding of pay estimates.

CPM Updates. Provide monthly updates of the CPM of record. Update submissions shall include the activity data as specified in (a) through (e) of the ICPM. Use the update to describe the progress to date. The WN shall include a description of the work performed during the update periods, current critical path, the amount of float on the critical path, any delays or disruptions experienced during the period of the update, any change in manpower or equipment, and any potential delays or disruptions.

The scheduling representative and the Engineer will meet to review, mutually agree to, and sign-off on the information required to update the schedule (actual start and finish dates, remaining durations, and percentages complete). Use an acceptable update form. The data date for each update shall be seven days prior to the cut-off date of the pay estimate for that month. Submit the update within seven calendar days from the data date. Failure to submit the update on a timely basis may result in the withholding of pay estimates. Upon acceptance by the Engineer, the update shall become the CPM of record for the period between its data date and the data date of the next approved update or revision.

Do not include any revisions to the CPM without prior approval.

Revisions to the Schedule of Record. Revisions are defined as one or more of the following:

(a) A change in the original duration of an activity.

(b) A change in the logic of the schedule.

(c) A change in the calendars or to the calendar to which an activity is assigned.

(d) A change to resources.

(e) A change to any actual date, previously established.

(f) The deletion or addition of an activity.

(g) A change to, addition of, or deletion of a date or time constraint.

(h) A change to, addition of, or deletion of an activity code.

(i) A change to an activity description.

(j) Any change other than updating an activity.

Discuss any proposed revision to the CPM verbally with the Engineer. If the revision is minor in nature, the Engineer may allow the revision to be included on the next Update of the CPM. If the Engineer determines that the revision is not minor in nature, submit the proposed revision for review and approval prior to deviating from the approved CPM.

When a revision to the CPM is required due to changes in the Contract initiated by the Engineer, immediately contact the Engineer to discuss the changes. If the revision is minor in nature, the Engineer may allow the revision to be included on the next Update of the CPM. If the Engineer determines that the revision is not minor in nature, submit the proposed revision for review and approval prior to deviating from the approved CPM.

The Engineer may allow a deviation from the approved CPM for specific mitigating activities.

Submit the proposed revision in the same format and with the same requirements used for the ICPM. The proposed revision shall be made to the CPM of record at the time the revision is made, i.e. the revision shall include all update information and revisions previously approved and the additional progress to the date of the revision. The WN accompanying the proposed revision shall describe the reason for the revision, the resulting critical path, and all particulars of the revision. These shall include but not be limited to changes in the method or manner of the work, changes in specifications, changes in resources, addition or deletion of work, increased or decreased quantities, defective work, and acceleration of the work.

The Engineer will review and respond to the proposed revision within 14 calendar days after receipt. Resubmit, if required, within seven calendar days after receipt of the Engineer's review comments. The Administration reserves the right to reject any proposed revision that adversely impacts the Administration, utilities, or other concerned parties.

Extensions of Contract Time or Incentive/Disincentive Date. Make requests for extension of Contract time in writing and subject to the notice and timeliness of submission provisions as provided for elsewhere in the Contract. Requests for an extension of Contract time or change in an incentive/disincentive date will be evaluated by the Engineer's analysis of the CPM of record and any proposed revision submitted. The request shall include a WN of the events, which would require an extension of the Contract time or incentive/disincentive date.

Only delays to activities that affect the Contract completion date or incentive/disincentive date will be considered for an extension of Contract time. The extension of the specified Contract completion date or incentive/disincentive date will be based upon the number of calendar days the Contract completion date or incentive/disincentive date is impacted as determined by the Engineer's analysis.

When an acceptable Update or Revision is not submitted within the time limits prescribed above, pay estimates may be withheld until an acceptable Update or Revision is submitted.

109.02 MATERIALS. Not Applicable.

109.03 CONSTRUCTION. Not Applicable.

109.04 MEASUREMENT AND PAYMENT. Payment for the accepted Initial Critical Path Method Project Schedule, Critical Path Method Project Schedule Revisions, and all accepted Critical Path Method Project Schedule Updates shall be included in the Contract Lump Sum Price for the Design-Build item.

CATEGORY 100
PRELIMINARY

209 **DELETE:** SECTION 111 — SAMPLING DEVICES AND TESTING EQUIPMENT in it entirety.

INSERT: The following.

SECTION 111 — SAMPLING DEVICES, TESTING AND SAFETY EQUIPMENT

DESCRIPTION. Furnish and maintain Sampling Devices and Testing and Safety Equipment with accessories that are required to sample and test materials used on the project. The sampling and testing and safety equipment will be used by Administration employees as directed by the Engineer. All equipment shall be as approved by the Office of Materials Technology. Furnish the sampling devices and testing equipment to the Engineer at least five days prior to commencement of work on the project. All equipment shall remain in the Engineers' possession until completion of all sampling and testing on the project. Unless otherwise specified, all testing equipment, accessories, and unused sampling devices and safety equipment will be returned to the Contractor at the completion of the project.

MATERIALS. Furnish all applicable sampling devices and containers required by the Administrations' Materials Manual, including all inserts, Sample Testing and Frequency Guide, and this Specification. Quantities will be designated by the Engineer at the preconstruction meeting.

CONSTRUCTION.

Testing Equipment Requirements. Maintain the equipment in good working condition and submit a written certification to the Administration stating when the testing equipment was last calibrated or inspected by an Administration approved testing agency. Ensure that the equipment is calibrated at the frequency required for that type of equipment as specified in the test method and AASHTO R18.

If any testing equipment or accessories are stolen, become defective, or for any other reason do not function as intended, replace with an equal or better unit at no additional cost to the Administration within eight hours after notification.

Sampling Devices and Testing Equipment with Accessories. The following is a general list for sampling devices and testing equipment to be furnished by the Contractor for the specified testing. Contact the Office of Materials Technology, Materials Management Division with any questions concerning the requirements for Sampling Devices, Testing Equipment, and Accessories. The devices, testing equipment, and accessories will be randomly inspected during Independent Assurance Audits.

(a) Sampling Devices from the Administration's Materials Manual.

(1) Soil bags (able to hold at least 35 lb).

(2) Screw top cans - 1 qt.

(3) Friction top cans - 1 qt and 1 gal.

(4) Plastic jar - 1 gal.

(5) Flow panels for joint sealer.

(b) Testing Equipment and Accessories from the Administration's Materials Manual - Determination of Moisture Content of Aggregates (MSMT 251).

(1) Electric hot plate or a gas burner, including bottle and fuel.

(2) Scale or balance conforming to M 231, Class G2.

(3) Metal container, such as large frying pan or equivalent.

(4) Pointing trowel or large spoon.

(c) Field Determination of the Amount of Stabilization Agent in Bases and Subbases (MSMT 254).

(1) Scale or balancing conforming to M 231, Class G 100 having a capacity of at least 100 lb/sample containers.

(2) Bench brush.

(3) Large spoon or scoop.

(4) Sampling mat consisting of a sheet of plywood or canvas with a surface of at least 1 yd^2.

(5) Tape measure.

(d) Field Determination of Moisture Density Relations of Soils (MSMT 351). Refer to MSMT 350.

(e) Hot Applied Joint Materials Sealer and Crack Filler (MSMT 404). Flow panels (brass panel may be used in lieu of a tin panel).

(f) In-Place Density of Embankment, Subbase, Base, Surface and Shoulder Material (T 99, T 180, T 191, and MSMT 350).

(1) Cylindrical compaction molds, 1/30 and 1/13.33 ft3.

(2) Compaction rammers, 5.5 and 10 lb.

(3) 12 in. straightedge.

(4) Scale or balance conforming to M 231, Class G 100, having a capacity of at least 100 lb.

(5) Two 10 in. pie pans.

(6) 12 in. frying pan.

(7) 12 in. rocker set complete with pan.

(8) One each of the following sieves conforming to M 92:

SIZE (in.)	SHAPE	SIZE OPENINGS
12	Square	2 in.
12	Square	3/4 in.
12	Square	No. 4
12	Square	No. 10
*8	Round	No. 10

* For density sand.

(9) Field density plate with recess to accommodate sand cone apparatus.

(10) Steel pan, 12 x 30 in.

(11) Electric plate or gas burner, including bottle and fuel.

(12) Soil density pick.

(13) Precalibrated sand cone density apparatus.

(14) Spatula, 3 in.

(15) Two water pails.

(16) Bag of density sand.

(17) Stencil brush, bench brush, sprinkling can, large spoon, and sample shovel.

(g) Sampling Hot Mix Asphalt prior to Compaction (MSMT 457) - Performed by the paving contractor).

(1) A 25 ft measuring tape.

(2) Random selection cards numbered from 0 to width of the paving lane in 1 ft increments

(3) Sample boxes

(4) Spatula.

(5) Spray paint or other suitable marking material.

(6) GPS equipment.

(7) Masonry nails or equivalent.

(8) Thermometers (50 to 550ºF).

(9) Square end shovel, fire shovel, or grain shovel.

(10) Scoop.

(11) 24 ft of 18 gauge mechanical wire or equivalent to tie through each hole of the plate template.

(h) Concrete Tests.

TEST	METHOD
Sampling	T 141
Making and Curing Concrete Test Specimens	T 23
Slump	T 119
Air Content - Pressure Method	T 152
Air Content - Volumetric Method	T 196
Temperature	T 309

(1) Air meter, pressure type for conventional concrete and volumetric air meter (Roll-a-Meter) for lightweight Concrete.

(2) Air Bulb.

(3) Air pump.

(4) Rubber mallet.

(5) Slump cone with rod.

(6) Steel straight edge.

(7) Large and small scoop.

(8) Trowel.

(9) 3/8 in. diameter tamping rod.

(10) Unit weight bucket for light weight concrete.

(11) Sprinkle can or bucket for water.

(12) Postal scale (only for lightweight concrete).

(13) Thermometer (0 to 220 F).

(14) 4 x 8 in. cylinder molds (for compressive strength specimens).

(15) 3 x 6 in. cylinder molds for latex concrete.

(16) 6 x 12 in. cylinder molds for density (unit wt) of lightweight concrete and when otherwise specified.

(17) Isopropyl alcohol for light weight concrete.

(18) Protective gloves.

(i) Other Measuring Devices.

(1) Hand held pile driving monitoring device (as approved by the Engineer).

111.03.02 Safety Equipment. Approved Safety Equipment.

(a) Fall Protection Devices for SHA Inspection Personnel.

(b) Life vests where applicable.

111.04 MEASUREMENT AND PAYMENT. Sampling devices, testing equipment, and safety equipment will not be measured but the cost will be incidental to items of work for which they are required.

CATEGORY 100
PRELIMINARY

SECTION 113 — DIGITAL CAMERA

113.01 DESCRIPTION. Furnish and maintain new or like new digital cameras for use by Administration personnel. For projects that do not include an Engineer's Office, furnish one color printer. The digital cameras and printer shall be delivered to the Engineer at the time of the Notice to Proceed. They shall remain operational and not be returned to the Contractor until final acceptance of the entire project, in conformance with GP-5.13.

113.02 MATERIALS.

(a) Digital Camera. Each digital camera shall meet the following minimum requirements and be furnished with the specified accessories:

(1) Photo Managing Software.

(2) 16.0 megapixel image resolution and 5X optical zoom.

(3) AC adapter, 2 sets of rechargeable batteries, and battery charger.

(4) 16 GB SD Card or memory stick with all items required for downloading.

(5) Lens Cover, Shoulder Strap, and Carrying Case.

(b) Color Printer. The printer shall have at least 8 MB RAM, 2400 x 1200 dpi resolution, a color print speed of 13 ppm, and a duty cycle of 5,000 pages/month.

113.03 CONSTRUCTION. Not applicable.

113.04 MEASUREMENT AND PAYMENT. The number of digital cameras required for this project is 1. The digital cameras and printer will not be measured but the cost will be incidental to the Contract price for the Engineers Office item. If an item for Engineers Office is not specified, payment will be incidental to the payment for Mobilization. In the absence of either item, payment will be incidental to the other items specified in the Contract Documents. If a digital camera or printer becomes defective, is stolen, or for any other reason does not function as intended, it shall be replaced with an approved camera or printer at no additional cost to the Administration. A nonfunctioning or stolen camera or printer shall be replaced by the SHA Project prime contractor within 5 days after the Engineer notifies the Contractor.

Ownership of the camera(s) and printer(s) will be with the assigned SHA project personnel during the progression of the project. Pictures and removable media will be the property of the State Highway Administration. The State Highway Administration assumes neither responsibility nor liability for the condition of the camera when returned after project is satisfactorily completed.

CATEGORY 100
PRELIMINARY

SECTION 114 — TRUCK STAGING AREAS AND IDLING REQUIREMENTS

114.01 DESCRIPTION. Locate truck staging areas and avoid unnecessary idling of construction equipment in order to reduce engine emissions and to provide air quality benefits to those who live or work in or adjacent to the construction site.

114.02 MATERIALS. Not applicable.

114.03 CONSTRUCTION. Establish truck staging areas for all vehicles waiting to load or unload materials at the job site. Subject to review and approval by the Administration, locate staging areas where emissions will have the least impact on sensitive areas and the public.

Sensitive areas include, but are not limited to, hospitals, schools, residences, motels, hotels, daycare facilities, and elderly housing and convalescent facilities. All sources of emissions shall be located as far away as possible from fresh air intakes, air conditioners, and windows.

Idling of all mobile construction equipment, including delivery trucks, shall be limited to five minutes except under any of the following circumstances:

(a) When forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control.

(b) When necessary to operate defrosting, heating, or cooling equipment to ensure the safety or health of the driver or passenger.

(c) When necessary to operate auxiliary equipment that is located in or on the mobile source to accomplish the intended use of the mobile source.

(d) To attain the recommended operating temperature.

(e) When the outdoor temperature is below 32 F.

(f) When undergoing maintenance that requires operation for more than five consecutive minutes.

The above requirements do not prohibit the operation of an auxiliary power unit or generator set as an alternative to idle the main engine of a motor vehicle operating on diesel fuel.

114.04 MEASUREMENT AND PAYMENT. All methods and procedures required to comply with these requirements will not be measured for payment but will be incidental to the pertinent Contract items.

CATEGORY 200
GRADING

GEOTEXTILE INCLUSION

DESCRIPTION. Furnish and Install geotextile inclusions in fill embankments to the lines and grades shown on the plans or as directed.

MATERIALS.

Geotextile Inclusions.: Class SD Type II Nonwoven 921.09

CONSTRUCTION.

The geotextile inclusions are to be used as a compaction aid and installed per the manufacturers' recommendations. Geotextile inclusions shall be minimum 12 feet in width. The vertical spacing of the geotextile inclusions shall be 3 ft. Place geotextile inclusions concurrently with the embankment material.

Unroll the geotextile onto the horizontal fill surface; parallel the centerline of the embankment. The outside edge of the geotextile shall be within 1 ft of the finished slope face. Pull the geotextile tight prior to backfilling. The geotextile shall be held in position by suitable means until the subsequent soil layer can be placed.

Do not allow tracked construction equipment to operate on the exposed geosynthetic. Place a minimum of 6 inches of uncompacted fill on the geotextile before operating tracked vehicles over the geosynthetic. Keep turning of tracked vehicles to a minimum to prevent tracks from displacing the fill and the geosynthetic. Rubber-tired equipment may pass over the exposed geosynthetic at speeds of less than 10 mph. Avoid sudden braking and sharp turns.

MEASUREMENT AND PAYMENT.

Geotextile inclusions will be measured and paid for at the Contract unit price per square yard of geotextile placed. The payment shall be full compensation for all material, labor, equipment, tools and incidentals necessary for the placement of geotextiles

omtsp 05-03-2016

CATEGORY 200
GRADING

REINFORCED SOIL SLOPE

DESCRIPTION. This work shall consist of design, furnishing materials and construction of Reinforced Soil Slope (RSS) to the lines and grades shown on the Plans, cross sections and/or as directed by the Engineer using Geosynthetic Reinforcement. The term "Geosynthetic Reinforcement" shall be considered to be inclusive of geotextile and geogrids and shall be applicable to both primary and secondary reinforcements as shown on the plans.

MATERIALS.

Geosynthetic Reinforcement.	900
Wire for Welded Wire Face	AASHTO M55

Reinforced Fill Material. The reinforced fill material for Reinforced Soil Slopes shall conform to the following requirement:

	Requirement	
Gradation	Sieve Size	Percent Passing(by mass)
	2"	100
	No. 4	50 (max)
	No. 200	7 - 12
PI	Less than 5%	
PH	3-9 (AASHTO T 289)	

AASHTO A-2-6, A-2-7, A-4, A-5, A-6 and A-7 materials are not acceptable as reinforced fill material. The reinforced fill material shall be free from organic, recycled and other deleterious materials.

CONSTRUCTION.

The Contractor shall design and construct the RSS in conformance with the typical sections shown on the plans and the following design and construction requirements. The Contractor shall be responsible for all aspects of the RSS design and construction.

a) Design Criteria.

The Contractor shall use the following design criteria for the RSS and FHWA NHI-00-043 Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines.

Criteria		**Requirement**
Design life		75 years (min)
Total strain in primary reinforcement		10% (max)
Design Traffic Surcharge		250 lb/ft^2
Embedment length* for primary reinforcement		3-ft (min)
Minimum length of secondary reinforcement		6-ft (min)
Internal Factor of Safety	Internal stability (Internal & compound)	≥ 1.3
	Surficial Stability	≥ 1.3
	Pull-out Resistance	≥ 1.5
External Factor of Safety	Global Stability (deep seated failure)	≥ 1.3
	Failure against rapid drawdown conditions	≥ 1.1
	Sliding	≥ 1.3
	Local bearing failure (lateral squeeze)	≥ 1.3
	Bearing Capacity	≥ 2.5
Vertical spacing of Geosynthetic reinforcement	Primary reinforcement	3-ft (max)
	Secondary reinforcement	12-in (max)

*The embedded length (Le) is defined as the length of reinforcement behind the most critical sliding surface. The embedded length for each reinforcement layer shall be sufficient to provide adequate pullout resistance as shown by the Contractor's design calculations.

The design of the reinforced soil slope shall consider the maximum ground water table and 100-year water surface elevation of the existing Storm Water Management (SWM) Pond.

b) Soil Design Parameters:

Reinforced Fill materials. The minimum angle of internal friction (φ), and the effective angle of internal friction (φ') of the reinforced fill material shall be 32 degrees or greater. The Contractor shall use one of the following tests to determine the shear strength parameters of the reinforced fill material:

1) ASTM D 3080 sheared at a slow rate to insure adequate drainage or
2) ASTM D 4767 (CU) triaxial tests with the pore pressure measured to determine the effective strength parameters.

The Contractor shall provide at least three shear strength test results conforming that the Reinforced Fill material to be used meets or exceeds the above minimum requirements.

Retained Soil and Foundation Material. The above soil properties (table above) are derived based on the existing geotechnical information near the proposed RSS location. It is the Contractor's responsibility to confirm and use these soil parameters. The Contractor has the option of conducting geotechnical investigation at the RSS location for the design of the RSS. The Contractor's geotechnical investigation shall be in conformance with FHWA NHI-00-043 Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines and applicable AASHTO Guidelines

c) Drainage.

A drainage blanket shall be installed along the interface of the retained fill and reinforced fill material to intercept the seepage water. The drainage blanket shall be composed of AASHTO #57 Aggregate wrapped in Class SE geotextile filter and be a minimum of 2/3 of the height of the slope. The drainage blanket shall have 100% coverage for the entire slope. Underdrain pipe shall be used to collect the water from the drainage blanket. Under drain shall be outletted at all low points and at intervals not to exceed 50 feet. A minimum of two outlets shall be provided for each slope. The Contractor shall refer to the typical reinforced soil slope section included on the Contract plans for the details.

d) Secondary Reinforcement and Surficial Stability.

Secondary reinforcement shall be used to provide long term surficial stability. Surficial stability calculations for the secondary (intermediate) reinforcement shall be provided. Refer to (a) Design Criteria for surficial stability requirements.

e) Facing Construction and Erosion Control

The Contractor shall use Welded Wire Facing for the facing construction. The Contractor shall submit construction details showing the construction of the facing with installation details for the Engineer's approval.

Welded Wire Facing: The welded wire facing consists of galvanized welded wire mesh and galvanized wire support struts. The galvanized welded wire mesh shall meet the requirements of AASHTO M 55 and AASHTO M 111. The welded wire mesh shall have a minimum length 10 feet, maximum 4 inch by 4 inch mesh opening. The wire used shall have minimum wire size number W 4, and minimum Coating Thickness Grade 65.

Horizontally adjacent facing panels shall be butted together such that no gap between facings exists. Butted together facing panel splices shall be offset from each other in adjacent layers so that the splices do not line up with one another from layer to layer. The maximum height of each welded wire facing shall be 2-ft.

The Contractor shall install permanent erosion control. The installation of SSM permanent erosion control shall be in conformance with the facing construction method selected by the Contractor. As part of the RSS design submission, the Contractor shall submit Slope Erosion Control Plans and installation details for SSM for the Engineer's approval. The contractor shall maintain the surficial stability of the RSS during construction of the project. The RSS shall be vegetated immediately after construction to prevent or minimize erosion due to rainfall and surface runoff.

f) Geosynthetic Delivery, Storage and Handling.

Geosynthetic roll identification, storage and handling shall be in conformance to ASTM D 4873. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate. Geosynthetic material shall be wrapped with a material that will protect the geosynthetic from damage due to shipment, water, sunlight, mud, dirt, debris and contamination. The protective wrapping shall be maintained during periods of shipment and storage. The geosynthetic roll shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, ultra-violet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, temperature greater than 140 F, and lower than -20 F and any other environmental condition that may damage the physical property of the geosynthetic. The material shall be accompanied by a certification stating that the geosynthetic material delivered conforms to the properties used in design. This certification shall be given to the Engineer. Damaged geosynthetic shall be replaced by the Contractor, at no cost to the Administration.

g) On Site Representative.

The geosynthetic supplier shall provide a qualified and experienced representative with at least five (5) years of geosynthetic construction for RSS on site, for a minimum of 3 days, to assist the Contractor and the Engineer at the start of construction of the Reinforced Soil Slope. The representative shall also be available on an as needed basis as requested by the Contractor or Engineer during construction of the slope.

h) Excavation and Foundation Preparation

The foundation surface for the Reinforced Soil Slope shall be level and its width shall be at least the design length of the bottom reinforcing element. The Contractor shall maintain the stability of the back slope of excavation at all times during construction. The Contractor shall direct all surface runoff from adjacent areas away from the RSS construction site.

The RSS foundation shall be prepared and proof rolled as specified in 204.03.01. Unstable foundation materials encountered during foundation preparation for the RSS shall be removed to the depth as specified by the Engineer. The removed material shall be backfilled with material meeting the requirements of Select Borrow in Section 916 or other equivalent material as approved by the Engineer. Spring Control shall be as directed by the Engineer and in conformance with Section 306.

The Contractor is alerted that boulders have been encountered in the project area and may be encountered during the excavation for the RSS.

i) Geosynthetic Placement

The geosynthetic reinforcement shall be installed in accordance with the manufacturer's recommendations, unless otherwise modified by these specifications. The geosynthetic reinforcement shall be placed within the layers of the compacted soil as shown on the plans or as directed.

The geosynthetic reinforcement shall be placed in continuous longitudinal strips in the direction of main reinforcement. Correct orientation of the geosynthetic reinforcement shall be verified by the Contractor and approved by the Engineer. Joints in the machine (strong) direction (perpendicular to the slope) shall not be permitted with geotextile or geogrid. Horizontal coverage of less than 100 percent shall not be allowed unless specifically detailed in the construction drawings. In the case of 100% coverage in plan view adjacent strips need not be overlapped.

Place only that amount of geosynthetic reinforcement required for immediately pending work to prevent undue damage. After a layer of geosynthetic reinforcement has been placed, the next succeeding layer of soil shall be placed and compacted as appropriate. After the specified soil layer has been placed, the next geosynthetic reinforcement layer shall be installed. The process shall be repeated for each subsequent layer of geosynthetic reinforcement and soil.

j) Reinforced Fill Material Placement.

Reinforced fill material placement for the Reinforced Slope shall be in conformance with 204.03 except as modified below:

Reinforced fill material shall be placed, spread, and compacted in a manner that minimizes the development of wrinkles and displacement of geosynthetic reinforcement. Reinforced fill material shall be graded away from the slope crest and rolled at the end of each work day to prevent ponding of water on the surface of the reinforced soil mass. During construction of the slope, the contractor shall grade the top of the slope to ensure that surface runoff is directed away from the face of the

RSS. The Engineer may direct that an earth berm be used to direct runoff away from the face of the RSS. This grading shall be maintained until vegetative growth is established to the satisfaction of the Engineer.

Geosynthetic reinforcement shall be placed to lay flat and pulled tight prior to backfilling. After a layer of geosynthetic reinforcement has been placed, suitable means, such as pins or small piles of soil, shall be used to hold the geosynthetic reinforcement in position until the subsequent soil layer can be placed.

When using geogrid, the geogrid shall be installed on the top of flat surface and be tensioned prior to placement of fill material. No bending or tilting or dip is allowed for the Geogrid. The geogrid shall be tensioned with the help of rods or equivalent material. Sharp, heavy rocks shall not be used to secure the geogrid.

Tracked construction equipment shall not be operated directly upon the geosynthetic reinforcement. A minimum of 6 in. of uncompacted fill is required prior to operation of tracked vehicles over the geosynthetic reinforcement. Turning of tracked vehicles shall be kept to a minimum to prevent tracks from displacing the fill and the geosynthetic reinforcement. Rubber-tired equipment may pass over the geosynthetic reinforcement at speeds less than 10 mph as approved by the Engineer. Sudden braking and sharp turning shall be avoided.

The front 6-inches of the reinforced fill material at the slope face shall be thoroughly mixed with topsoil, seeding and fertilizer to create a vegetated face.

Reinforced fill material shall be compacted to 92% of maximum dry density within ± 2 percentage points of optimum moisture content when tested as specified in T 180. The frequency T 180 testing shall be one test every 500 cubic yards of reinforced fill material placed.

k) Installation of guardrail posts, pavement underdrain etc

The Contractor shall take into consideration the installation guardrails posts and underdrains in the design of the RSS.

The Contractor shall install guardrail posts, pavement under drains, and etc in a manner that prevents buldging of the slope face and prevents ripping, tearing or pulling of the geosynthetic reinforcement. Holes through the geosynthetic reinforcement shall be the minimum size necessary for the guardrail post. The contractor shall demonstrate to the Engineer prior to beginning guardrail post inslattaltion that the installation method will not rip, tear or pull the geosynthetic.

l) Final Slope Geometry Verification.

The Contractor shall confirm that as-built slope geometry conform to approximate geometry shown in the Contract Documents.

omtsp 05-03-2016

CONTRACTOR QUALIFICATIONS

The Contractor shall have successfully completed at a minimum of three (3) RSS projects within the past five years. The projects shall be identified by project name, location, project description, size, completion date, and contract manager. The Contractor's qualification shall be submitted to the Engineer for review and approval at least 30 days prior to start of the RSS construction.

CONTRACTOR SUBMITTALS

At least 30 working days prior to the construction of RSS, the Contractor shall submit for Administration's approval, three sets of detailed design calculations, working drawings which shall include the geosynthetic certification package, and six sets of inspection verification samples. Geosynthetic samples shall be of sufficient size to permit direct comparison and verification. The calculation and drawings shall be prepared and signed by a professional engineer licensed in the State of Maryland. The reinforced slope design and construction materials shall be approved by the Administration, and all decisions concerning the approval will be final unless directed by the Engineer. No work on the RSS shall begin without written approval of the Engineer. The submittal shall be sent to the Engineer and to the following address:

Maryland State Highway Administration
Engineering Geology Division
7450 Traffic Drive
Hanover, MD 21076

Working drawings shall conform to Section TC-4.01 of MDSHA's Standard Specifications for Construction and Materials (July 2008). Design calculations and working drawings shall include the following:

a) Plan and elevation sheets:

I. An elevation view indicating elevations at top and bottom of RSS.

II. Length, size, spacing, and type or grade of primary reinforcement, including secondary reinforcement.

III. Internal drainage alignment, elevations, slope face exit points and outlet details.

IV. Plan view shall reflect the horizontal alignment and shall indicate the offset from the horizontal control line to the front face of the slope.

V. All culverts, utilities, signs, lights, etc. that affect the reinforced soil slope.

VI. Any general notes required for construction of the reinforced soil slope.

VII. Limits and extent of reinforced soil fill volume.

VIII. Right of Way Limits.

IX. Erosion and Sediment Controls.

b) Cross sections showing limits of construction fill requirements, excavation limits and drainage alignment.

c) Geosynthetic reinforcement materials certification package.

d) Facing construction details, erosion control for reinforced slopes, and all details for facing modules, showing all dimensions necessary to construct the element, erosion control, reinforcing steel, and the location of reinforcing attachment devices embedded in the panels. All details of the architectural treatment or surface finishes. Material description and properties for erosion control.

e) Secondary reinforcement details including material type, spacing, material properties with certification, and construction.

f) Temporary slope face support, if required.

g) All details for construction of the Reinforced Soil Slope around drainage facilities, overhead sign footings, abutments and other obstructions to geosynthetic placement. If additional steeping of the slope is required at large cross pipes, box culvert, etc., details shall be provided.

h) Detailed design computations including:

I. Allowable strength computations for the geosynthetic reinforcement. The allowable tensile strength shall be based on the ultimate tensile strength and partial factors of safety approved by the Engineer. The use of an allowable strength without the supporting documentation of the ultimate tensile strength and partial factors of safety will not be acceptable by the Administration.

II. Slope stability computations, including computer output, and an explanation of assumptions and analysis details within the program. The reinforced slope stability microcomputer program used for the stability computations must meet the requirements of FHWA NHI-00-043 Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines and applicable AASHTO Guidelines.

omtsp 05-03-2016

III. Cross section plots showing critical failure planes for internal and global failure modes; and a summary of the critical failure surface(s) search.

IV. Sliding stability computations.

V. Pullout computations.

VI. Seismic stability computations, where applicable.

VII. Surficial stability calculations.

VIII. Erosion control and surficial stability measures considered for permanent stability of the slope

i) Proposed schedule for construction of the Reinforced Soil Slope including the date of start of construction, sequence of construction detail, and date of seeding and mulching.

j) Laboratory testing for gradation, PH, plasticity index test results confirming that the Reinforced fill material meets or exceeds the requirement specified in materials section of this specification.

k) The Contractor shall also provide at least three shear strength test results conforming that the Reinforced Fill material to be used meets or exceeds the requirement specified in materials section of this specification.

l) The Contractor shall submit three samples (each weighing at least 35 pounds) of the reinforced fill material approved for Reinforced Soil Slopes to the Administration for verification purpose at least 30 days prior to its use.

m) Statement of design responsibility as specified in the design requirements of this Specification.

n) The Plans and design computations shall be prepared and signed by a registered professional engineer, licensed in the State of Maryland.

o) The Contractor shall provide documentation of experience in design, material installation and construction of similar previously constructed Reinforced Soil Slope projects. This includes a list of at least four (4) RSS projects successfully completed by the Contractor.

Additional time required due to incomplete or unacceptable submittals will not be cause for time extension, impact, or delay claims. All costs associated with incomplete or unacceptable submittals shall be at no additional cost to the Administration. Approval by the Engineer will not relieve the Contractor of its responsibilities to design and install the RSS in accordance with the plans and

specifications.

MEASUREMENT AND PAYMENT.

Reinforced Soil Slopes will be measured and paid for at the Contract bid unit price per vertical square foot. Payment will be full compensation for design, working drawings, on-site representation, preparation of the site, excavation, geotechnical investigation, supply and installation of geosynthetic reinforcement, all fill materials (both in the reinforced zone and behind the reinforced zone), laboratory testing, facing system, soil stabilization matting, any temporary forms for facing support, any additional borrow required, compaction of backfill materials, spring control, drainage blanket and underdrain, surficial stability control, temporary earth retaining systems, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Excavation of unsuitable foundation materials located within the limits for the Reinforced Soil Slopes will be measured and paid for at the Contract bid unit price per cubic yard for Class 1-A Excavation. Backfill material for these areas will be measured and paid for at the Contract bid unit price per cubic yard for the pertinent excavation or borrow item.

CATEGORY 200
GRADING

SOIL NAILING

DESCRIPTION. This work shall consist of designing and constructing a permanent soil nail system as specified herein. The Contractor shall furnish all labor, plans, drawings, design calculations and all other materials and equipment required to design and construct the soil nail system in accordance with this specification. Soil Nails shall be inserted into existing soil masses by high-pressure air or nails can be self drilling. The soil nails reinforce locally unstable shallow soil sloughs by transferring the tensile and shear resistance developed by the soil nails from the stable side of the slip plan to the unstable side. The soil nails shall be installed to the limits shown on the plans or as determined by the Engineer.

MATERIALS.

Soil Nails. The Contractor can opt to use one of the following depending the approved design.

1. **Launched Soil Nails:** Furnish launched soil nails composed of a 1.5 inch outside diameter, 0.120 inch wall thickness, hot-dipped galvanized, 36ksi steel tube. When applicable, provide perforated tubes that can serve as both horizontal drains and as tensile elements. Do not reuse excess cutoffs from previously launched nails.

2. **Permanently Cased Soil Nails**: Furnish permanently cased soil nails that are a three stage construction including installation of (1) an outer tube (minimum 1.5 inch outside diameter, minimum 0.120 inch wall thickness hot-dipped galvanized steel tube that is mechanically deformed, threaded, or specially galvanized through a drossing process to produce a plurality of surficial asperities); (2) neat cement grout that completely fills the outer tube; and (3) an inner bar consisting of epoxy coated, #6 (or greater) grade 60 or grade 75 rebar or thread bar depending on final design load. When applicable, provide perforated tubes that can be pressure grouted.

3. **Self Drilling Soil Nails:** Furnish self drilling soil nails that consist of a hollow, threaded bar with a sacrificial drill bit. Multiple bars may be coupled to produce final length. Bar thread pattern should be continuous and conform to the pullout requirements of ASTM A 615. Bar outer diameters shall be a minimum of 1.5 inches and up to and 3 inches depending on design load.

Bearing Plates AASHTO M183

Plate Material: ASTM A36 Steel or stronger
Plate Coating: Hot dip galvanized in accordance with ASTM A153/A123
Plate Thickness: 3/8 or 1/2 inch, depending on design

omtsp 05-03-2016

Plate dimensions: Square or Diamond Shaped, minimum area 48 square inches

Shotcrete 423

Welded Wire fabric AASHTO M55

Wire Strength: 75 ksi or greater

Wire Coating: Minimum of 0.8 ounces/square foot (as determined by ASTM A-90) Zinc/Aluminum Alloy (as per ASTM B750-09). Plain hot-dip galvanized is not acceptable. Mesh Opening Size: 2.56 inches or smaller (using maximum circle method), area of opening shall not be less than 8.2 square inches

Grout. Grout shall consist of 846 lb/yd^3 of Type II portland cement, 6 $\pm$ 1 percent air entrainment by volume, mortar sand aggregate, and water proportioned to provide a pumpable mixture. The 28 day compressive strength shall be 3500 psi minimum.

DESIGN REQUIREMENTS

The Contractor's design shall be performed by a professional Geotechnical Engineer licensed in the State of Maryland with experience in the design and construction of permanent soil nail walls.

Design the soil nail system using Allowable Stress Design (ASD) method as outlined in FHWA's Geotechnical Engineering Circular No.7 "Soil Nail Walls". Refer to applicable FHWA documents such as FHWA – FPL -93-003 "Application Guideline for Launched Soil Nails" for additional guidelines. The Contractor's design calculations shall demonstrate that a minimum factor of safety of 1.3 against global slope failure shall be attained with the design spacing, length etc of the soil nails.

CONSTRUCTION.

The Contractor shall have completed at least 3 permanent soil nail system projects during the past 3 years totaling at least 10,000 square feet of face area and at least 500 permanent soil nails. Follow the following general guidelines for construction;

1. **Launched Nails**: Furnish launched galvanized soil nails, and equipment and incidentals necessary to complete work. Insert Launched Nails with a single stroke at a chamber pressure between 750 and 3000 psi. Inserted length and spacing shall be determined based upon the shop drawings submitted for the area. Do not leave more than 4 feet of launched soil nail exposed after launching unless approved by the Engineer. Cut off the exposed portion of installed nails for inclusion into shotcrete or flush to ground in the case of no shotcrete work when not required

by plans. Do not reuse remaining lengths from cut nails for Launched Soil Nails. The Contractor bears the risk of unforeseen groundwater or adverse launching conditions.

2. **Permanently Cased Soil Nails**: Permanently cased soil nails shall be constructed by launching an outer tube with a single stroke at a chamber pressure between 750 and 3000 psi or by drilling a hole to prescribed depth at the prescribed location as shown on the plans, inserting a 1.5 inch (or larger) outside diameter steel pipe (Outer Tube) to stabilize the drill hole, fully encasing the inside of the outer tube with grout and immediately inserting an epoxy coated #6 (or larger depending on required tensile strength) reinforcing bar as the inner bar. Provide perforated tube and grout under pressure. The Contractor bears the risk of unforeseen groundwater or adverse launching or drilling/casing conditions, including excess grout take.

3. **Self Drilling Soil Nails**: Use drilling rigs capable of drilling through materials to be encountered to the dimensions and orientations required for the soil nail design. Drill straight and clean holes at locations shown in the accepted submittals. Drill hole locations and inclinations are required to be within 6" (150 mm) and 5 degrees, respectively, of that shown in the accepted submittals unless approved otherwise by the Engineer. Drill all self drilling nails with continuous grout injection unless approved otherwise by the Engineer. The Contractor bears the risk of unforeseen groundwater or adverse drilling conditions, including excess grout take.

4. **Welded Wire Fabric:** The mesh shall be stretched tight across the slope and over the nail tips. Shallow depressions at least 12 inches in diameter and at least 8 inches deep shall be dug around the nail tips. Galvanized steel plates shall be installed over the nail.

5. **Shotcrete:** Construct shotcrete with the thickness shown on the approved Contractor's shop drawings with welded wire fabric. Clean the face of the excavation and other surfaces to be shotcreted of loose materials, mud, rebound, overspray or other foreign matter that could prevent or reduce shotcrete bond. Protect adjacent surfaces from overspray during shooting. Avoid loosening, cracking, or shattering the ground during excavation and cleaning. Remove any surface material that is so loosened or damaged to a sufficient depth to provide a base that is suitable to receive the shotcrete. Remove material that loosens as the shotcrete is applied. Do not place shotcrete on frozen surfaces.

   Maintain a clean, dry, oil-free supply of compressed air sufficient for maintaining adequate nozzle velocity at all times. Use equipment capable of delivering the premixed material accurately, uniformly, and continuously through the delivery hose. Control shotcrete application thickness, nozzle technique, air pressure, and rate of shotcrete placement to prevent sagging or sloughing of freshly-applied shotcrete.

omtsp 05-03-2016

Orient nozzle at a distance and approximately perpendicular to the working face so that rebound will be minimal and compaction will be maximized. Pay special attention to encapsulating reinforcement. Do not work rebound back into the construction. Where shotcrete is used to complete the top ungrouted zone of the nail drill hole near the face, position the nozzle into the collar of the drill hole to completely fill the void.

A clearly defined pattern of continuous horizontal or vertical ridges or depressions at the reinforcing elements after they are covered with shotcrete will be considered an indication of insufficient reinforcement cover or poor nozzle techniques. In this case immediately suspend the application of shotcrete and implement corrective measures before resuming the shotcrete operations. Correct the shotcreting procedure by adjusting the nozzle distance and orientation, by insuring adequate cover over the reinforcement, by adjusting the water content of the shotcrete mix or other means.

Repair shotcrete surface defects as soon as possible after placement. Remove and replace shotcrete that exhibits segregation, honeycombing, lamination, voids, or sand pockets. In-place shotcrete not meeting the specified strength requirement will be subject to remediation. Possible remediation options include placement of additional shotcrete thickness or removal and replacement, at no additional cost to SHA.

Clean and wet the surface of a joint before adjacent shotcrete is applied. Where shotcrete is used to complete the top ungrouted zone of the nail drill hole near the face, to the maximum extent practical, clean and dampen the upper grout surface to receive shotcrete, similar to a construction joint.

Do not install shotcrete if the ground is frozen. Maintain cold weather protection if the temperature after placement is below 40°F until the in-place compressive strength of the shotcrete is greater than 725 psi. Cold weather protection may require blankets, heating under tents, or other means acceptable to the Engineer. Deposit the shotcrete mix at a temperature of not less than 40°F or more than 100°F.

Suspend shotcrete application during high winds and heavy rains unless suitable protective covers, enclosures or wind breaks are installed. Remove and replace newly placed shotcrete exposed to rain that washes out cement or otherwise makes the shotcrete unacceptable. Provide a polyethylene film or equivalent to protect the work from exposure to adverse weather.

Use 6 to 12 inch strip drains full width of shotcrete (down slope) at six foot centers to eliminate water build-up behind the shotcrete. Strip drain shall be fully encased in filter media. Drains shall extend beyond the face of the shotcrete at the downhill face. Ensure that bottom ends are open and free of shotcrete.

SOIL NAIL SAMPLING AND TESTING

Acceptance of the soil nails will be by the Contractor's certification to SHA stating the material composition and installation conforms to these specifications, combined with visual inspection of the in place soil nails and shotcrete by SHA. SHA reserves the right to require testing by the Contractor. Any requested testing of the soil nail shall follow appropriate procedures as outlined in FHWA Geotechnical Engineering Circular No. 7 and manufacturer's recommendations. Materials found not in compliance with the requirements of this Contract shall be rejected, removed and replaced at the Contractors expense.

Soil nails that do not penetrate minimum design length from the slope surface shall be rejected. Do not remove nails which do not meet minimum design length. An additional nail will be installed within an 18 in. radius of the rejected soil nail.

SUBMITTALS.

Submit the documentations outlined below at least 45 days prior to the start of construction of soil nailing. The contractor is responsible for detailing the general layout of the proposed soil nail wall system. Working drawings shall conform to TC-4.01.

Additional time required due to incomplete or unacceptable submittals shall not be cause for time extension, impact, or delay claims. All costs associated with incomplete or unacceptable submittals shall be at no additional cost to SHA.

Prepare and submit two copies of the submittal. One copy should be submitted to the Engineer. Submit the 2nd copy to the following:

Maryland State Highway Administration
Engineering Geology Division
7450 Traffic Drive
Hanover, MD 21076

Approval of the above submittals does not relieve the Contractor of his responsibility for the successful completion of the work.

The submittal shall include:

A. The Contractor shall submit a brief description of at least 3 projects, including the owner agency's name, address, and current phone number; location of project; project contract square foot of soil nail system installed including number of soil nails; and scheduled completion date and actual completion date for the project.

B. Design plans, shop drawings and design computations shall be prepared and signed by a registered Professional Engineer licensed in the State of Maryland. Plans and calculations shall include the following;:

1. An elevation view indicating elevations at top and bottom of soil nail wall.
2. Length, size, and spacing of soil nails.
3. All culverts, utilities, signs, lights, etc. that affect the soil nail system.
4. Any general notes required for construction of the soil nail.
5. Slope stability computations, including computer output, and an explanation of assumptions and analysis details within the program.
6. Cross section plots showing critical failure planes for internal and global failure modes; and a summary of the critical failure surface(s) search.
7. Cross section plots showing critical failure planes for internal and global failure modes; and a summary of the critical failure surface(s) search.
8. Sliding stability computations.
9. Pullout computations.

C. The Contractor is responsible for providing the necessary survey and alignment control; nail locations, and verifying limits of soil nail installation. Submit a Construction work Plan to the Engineer that includes the following.

1. The start date and proposed detailed wall construction sequence.
2. Drilling and grouting methods and equipment, including the drill hole diameter proposed to achieve the specified pullout resistance values shown on the plans and any variation of these along the wall alignment.
3. Nail grout mix design, including compressive strength test results (per AASHTO T106/ASTM C109) supplied by a qualified independent testing lab verifying the specified minimum 3-day and 28-day grout compressive strengths. Previous test results for the same grout mix completed within one year of the start of grouting may be submitted for verification of the required compressive strengths.
4. Nail grout placement procedures and equipment.
5. Shotcrete materials and methods.
6. Soil nails testing methods and equipment setup.
7. Identification number and certified calibration records for each test jack and pressure gauge and load cell to be used. Jack and pressure gauge shall be calibrated as a unit. Calibration records shall include the date tested, the device identification number, and the calibration test results and shall be certified for an accuracy of at least 2 percent of the applied certification loads by a qualified Independent testing laboratory within 90 days prior to submittal.
8. Manufacturer Certificates of Compliance for the soil nail ultimate strength, nail bar steel, Portland cement, centralizers, bearing plates, epoxy coating, and encapsulation.

omtsp 05-03-2016

MEASUREMENT AND PAYMENT

The soil nail system measured for payment will be the nearest whole number of square feet of treated slope face between within the limits shown on the plans or as determined by the Engineer. Payment will be full compensation for design, working drawings, on-site representation, preparation of the site, mobilization, geotechnical investigation, supply and installation of strip drains, soil nails, shotcrete and welded wire fabric, bearing plates, grout, and for all other material, labor, equipment, tools, and incidentals necessary to complete the work.

omtsp 05-03-2016

CATEGORY 200
GRADING

SECTION 201-ROADWAY EXCAVATION
(CLASS 1, CLASS 1-A, CLASS 2)

201.01 DESCRIPTION.
ADD: The following.

217 **201.01.03 Rock.** The Contractor shall note if there is potential of encountering rocks in excavation for roadway, structures, pipe culverts, utilities, and other features on this project.

If boring logs indicate that there is potential of encountering bedrocks within the proposed excavating depth, the contractor shall need to consider the presence of rock when developing his unit prices for excavation, structures, pipe culverts, utilities, and related items. No additional compensation will be allowed for rock excavation on the project.

201.03 CONSTRUCTION

201.03.04 Rock Excavation.

218 **INSERT**: The Following:

(b) Blasting. If blasting is the proposed method for rock excavation, then the contractor shall employ the following additional safety measures for blasting:

1. No blasting is allowed if any structure is within 300 linear feet from the proposed blasting zone;
2. Use of double layer blasting mats; and,
3. Temporary all lane closures on North and South bound lanes for the actual blast when blasting takes place.

Temporary lane closures will be determined upon review of the submitted blasting plan for the locations.

omtsp 05-17-2016

CATEGORY 200
GRADING

SECTION 203 — BORROW EXCAVATION

203.01.02 Notice to Contractor —Borrow Pits.

225 **ADD:** After the first paragraph.

This project is located in Howard County. The following conditions applicable to the county or city shall be complied with and documented.

DISTRICT 1

Dorchester (DO) County
Site plan approved by Soil Conservation District.
Grading permit from County Highway Department (except City of Cambridge).
Planning and Zoning approval for use.
Critical Areas approval (if applicable).
Inspection by County.

Somerset (SO) County
Site plan approved by Soil Conservation District.
Grading Permit from the County.
Land Use permit.
Critical Areas approval by Planning and Zoning (if applicable).
Inspection by SHA.

Wicomico (WI) County
Site plan approved by Soil Conservation District.
Certificate of compliance with Planning and Zoning if located in Critical Area.
Inspection by SHA.

Worcester (WO) County
Site plan approved by Soil Conservation District.
Critical areas approved by Planning and Zoning (if applicable).
Inspection by SHA.

DISTRICT 2

Caroline (CO), Cecil (CE), Queen Anne's (QA) and
Talbot (TA) Counties
Site plan approved by Soil Conservation District.
Planning and Zoning approval.
Critical Areas approval (if applicable).
Inspection by SHA.

Kent (KE) County
Site plan approved by Soil Conservation District.
Grading permit.
Planning and Zoning approval.
Critical Areas approval (if applicable).
Inspection by SHA.

DISTRICT 3

Montgomery (MO) County
Sediment control permit and plan approval by County Department of Environmental Protection, Division of Water Resources Management, Storm Water Management Section/Sediment Control.
Approval by Maryland National Capital Park and Planning Commission (if applicable).
Inspection by County.

Prince Georges (PG) County
Site Plan approved by Soil Conservation District.
County Grading Permit.
Tree conservation plan approval by Maryland National Capital Park and Planning Commission (if applicable).
Critical Areas approval (if applicable).
Payment of all pertinent county fees and/or securing of county required bonding.
Inspection by SHA with oversight by County.

DISTRICT 4

Baltimore (BA) County
Site Plan approved by the Department of Environmental Protection and the Soil Conservation District.
County Grading Permit.
Critical Areas approval by the Department of Environmental Protection and Resource Management (if applicable).
Inspection by County.

Harford (HA) County
Site Plan approved by Soil Conservation District.
County Grading Permit.
Critical Areas approval (if applicable).
Inspection by County.

DISTRICT 5

Anne Arundel (AA) County
Site Plan approved by Soil Conservation District.
Planning and zoning approval - special exception required.
Grading plan issued by the County Department of Inspections and Permits.
Critical Areas approval (if applicable).
Inspection by County and SHA.

Calvert (CA) County
Site Plan approved by Soil Conservation District.
Grading plan issued by the County after a mining permit or exemption is issued.
Critical Areas approval (if applicable).
Inspection by SHA.

Charles (CH) County
Site Plan approved by Soil Conservation District.
Special exception granted by the County.
Critical Areas approval (if applicable).
Inspection by SHA.

St. Marys (SM) County
Site Plan approved by Soil Conservation District.
County Grading Permit.
Critical Areas approval (if applicable).
Inspection by SHA.

DISTRICT 6

Allegany (AL) County
Site plan approved by Soil Conservation District.
Informational copy of plans to County Planning and Zoning Commission.
Inspection by SHA.

Garrett (GA) and Washington (WA) Counties
Site plan approval by Soil Conservation District.
Inspection by SHA.

DISTRICT 7

Carroll (CL) County
Site plan approved by County Planning Commission.
Sediment control plan approval by Soil Conservation District.
County Grading Permit.
Inspection by County.

Frederick (FR) County
Site plan approved by Soil Conservation District.
County Grading Permit.
Inspection by SHA.

Howard (HO) County
Site Plan approved by Soil Conservation District.
County Grading Permit.
Inspection by County.

BALTIMORE CITY (BC)

Site plan approved Baltimore City Department of Public Works (BCDPW).
Inspection by BCDPW.

STATE AND FEDERAL PROPERTY

Borrow pits located on state and federal property are subject to Maryland Department of the Environment approval.
Inspection by SHA.

CATEGORY 200
GRADING

SECTION 204 — EMBANKMENT AND SUBGRADE

204.02. MATERIALS.

227 **ADD:** The following at the end of the section.

204.02.04 Embankment for Stormwater Management (SWM) Facilities. Do not use rock or soil or soil-aggregate borrow that lacks cohesion or meets A-2 and A-3.

204.03 CONSTRUCTION.

204.03.01 Embankment Foundation.

ADD: The following at the end of the section.

(d) SWM Pond Facility Embankments. Remove topsoil, root mat, and unsuitable material to the depth specified, including embedded stumps, roots, logs, rubbish and other objectionable material. When a cut off trench that extends below the subgrade is specified, excavate the cut off trench to a depth at least as deep as specified.

228 **204.03.02 Placing and Spreading.**

ADD: The following at the end of the section.

(d) Stormwater Management (SWM) Pond Facility Embankments. Scarify soil of the subgrade and then place material in horizontal layers across the full width and length of the embankment. Do not place layers exceeding 8 in. uncompacted depth. When a principal spillway is noted on the plans, install it concurrently with the fill placement and not excavate into the completed embankment. Use fill material meeting the criteria specified for common borrow.

When a cut off trench and clay core are specified, use fill material meeting the criteria specified for SWM facility embankment clay core borrow. Place material in horizontal layers not to exceed 8 in. uncompacted depth continuous across the entire width and length of the clay core and place layers concurrently with the common borrow layers. Do excavate into the completed embankment to place the clay core. Ensure the clay core extends to at least the elevation specified.

When pipe culverts and drainage structures are installed in or through SWM facility embankments, build layers of material concurrently with their installation. Refer to Sections 303 and 305.

204.03.04 Compaction.

ADD: The following at the end of the section.

For SWM pond facility embankments, immediately after spreading each layer of fill, compact the material with approved equipment. Perform all rolling in a longitudinal direction along the embankment. Begin at the outer edges and progress towards the center. Control the movement of hauling and spreading equipment over fill so that the entire surface of each lift is traversed by at least one tread track of heavy equipment. Achieve compaction by a minimum of 4 complete passes of a sheepsfoot, rubber tired, or vibratory roller. Vary the travel paths of traffic and equipment over the width of the embankment to aid on obtaining uniform compaction. Ensure the material contains sufficient moisture such that the compaction will be obtained with the equipment used. Ensure the fill material contains enough moisture so that if it is formed into a ball, it will not quickly crumble and will not be so wet that water can be squeezed out.

Compact the material that is at least 16 in. below the top of subgrade to at least 95% of the maximum dry density with a moisture content within 2% of optimum when using T 99. When necessary, add water or dry the layer in order to compact to the required density. Compact each layer of fill to obtain the density and is certified by the AB Inspector at the time of construction.

For clay cores, compact material with approved construction equipment, rollers, or hand tampers to ensure maximum density and minimum permeability.

When pipe culverts and drainage structures are installed in or through SWM facility embankments, compact material as specified in Sections 303 and 305.

204.03.05 Stability of Embankments.

229 **ADD:** The following at the end of the section.

In the reservoir areas of SWM pond facilities, proof roll the bottom. If this causes the underlying soil to compact and drop in elevation, add additional fill material and proof roll until the necessary elevation is achieved.

CATEGORY 200
GRADING

SECTION 204 — EMBANKMENT AND SUBGRADE

204.03 CONSTRUCTION.

204.03.01 Embankment Foundation

227 **DELETE: (c) Test Rolling.** in its entirety.

INSERT: The following:

(c) Test Rolling. Test roll embankment foundation on this project with a 35 ton pneumatic tired roller, unless exempted by the Engineer.

204.03.05 Stability of Embankments

229 **INSERT**: The following after 204.03.05:

Treat unstable embankment foundations by undercutting and backfilling with Geosynthetic Stabilized Subgrade using Graded Aggregate Base, Select Borrow or Capping Borrow; bridging with a thick embankment lift; providing drainage; or other suitable treatment as determined by the Engineer at the time of construction.

CATEGORY 300
DRAINAGE

STORMWATER MANAGEMENT (SWM) FACILITY
AS-BUILT (AB) CERTIFICATION

DESCRIPTION. Inspect stormwater management facilities during specified stages of construction, and furnish a completed (SWM) Facility AB Certification Package to the Administration certifying that the SWM facilities have been constructed as specified in the Contract Documents.

As-Built (AB) Inspector. Furnish an approved AB Inspector to complete the AB Certification. AB Inspectors require licensure in the State of Maryland as a Professional Engineer or Professional Land Surveyor, experienced in SWM design and construction.

To request approval, furnish a one-page resume for the AB Inspector at least two weeks prior to the start of construction of any SWM facility. Include the AB Inspector's name, contact information, relevant professional license(s), employer's name, and relevant work history. Failure to receive approval for the AB Inspector or to monitor the specified construction stages will be grounds for replacement.

SWM Facility As-Built Certification Package. The SWM Facility AB Certification Package certifies that the SWM Facilities have been constructed as specified. Include with the submitted package, photographs with written descriptions of specified stages of construction, completed tabulations and checklists, completed certification forms, material testing reports, turf/vegetation establishment report, and green-line revision plans for each facility.

MATERIALS. Not applicable.

CONSTRUCTION. Inspect and complete the appropriate Tabulations and Construction Checklist for each facility to ensure that facility features are constructed as designed.

Stages of Construction for AB Inspections by the AB Inspector. Perform minimum inspections for the following SWM Facilities as applicable:

(a) Ponds.

(1) Upon completion of excavation to sub-foundation and when required, installation of structural supports or reinforcement for structures, including, but not limited to:

(a) Core trenches for structural embankments.

(b) Inlet and outlet structures, anti-seep collars or diaphragms, and watertight connections on pipes.

(c) Trenches for enclosed storm drainage facilities.

(2) During placement of structural fill, concrete, and installation of piping and catch basins.

(a) During backfill of foundations and trenches.

(b) During embankment construction.

(c) Upon completion of final grading and establishment of permanent stabilization.

(b) Wetlands. Refer to stages specified for pond construction. Additional inspections include:

(1) During and after wetland area planting.

(2) During the second growing season to verify a vegetation survival rate of no less than 50 percent.

(c) Infiltration Trenches.

(1) During excavation to subgrade.

(2) During placement and backfill of sudrain systems and observations wells.

(3) During placement of geotextile and all filter media.

(4) During construction of appurtenant conveyance systems such as diversion structures, pre-filters and filters, inlets, outlets, and flow distribution structures.

(5) Upon completion of final grading and establishment of permanent stabilization.

(d) Infiltration Basins. Refer to stages specified for pond construction and add:

(1) During placement and backfill of subdrain systems.

(e) Filtering Systems. Filtering systems include bioretention, micro- bioretention, sand filters, organic filters, bio-filters, and dry swales.

(1) During excavation to subgrade.

(2) During placement and backfill of subdrain systems.

(3) During placement of geotextile and all filter media.

(4) During construction of appurtenant conveyance systems such as flow diversion structures, pre-filters and filters, inlets, outlets, orifices, and flow distribution structures.

(5) Upon completion of final grading and establishment of permanent stabilization.

(f) Open Channel Systems. Open channel systems include wet swales and grass channels.

(1) During excavation to subgrade.

(2) During installation of diaphragms, check dams, or weirs.

(3) Upon completion of final grading and establishment of permanent stabilization.

(g) Non-Structural Practices. Upon completion of final grading and after establishment of permanent stabilization.

(a) Surveys, Computations, and Green-Line Revision Requirements. Upon completion of each SWM facility, survey and provide green-line revisions. Adhere to CAD Standards established by the Administration. MicroStation CAD files will be provided for use as references to the green-line revisions. Include the following items in the survey and green-line revisions: Core trench location, dimensions, material and compaction.

(b) Contours. Indicate grading of the SWM facility using one foot contour intervals.

(c) Inflow and outflow ditches.

(d) Riprap. Indicate the locations dimensions of riprap within SWM facilities and immediately outside of SWM footprints.

(e) Emergency spillways. Indicate locations of emergency spillways for SWM facilities.

(f) Outfall structures. Indicate locations of outfall structures, such as risers and weirs, and include all relevant information such as elevations, dimensions at top, orifice elevations, weir lengths and elevations, and openings.

(g) Miscellaneous Features. Include all other pertinent features in and around the SWM facility, such as freeboard, water surface elevations, and setbacks.

Tolerances. Tolerance limits for green-line as-built information is as follows:

(a) Earthwork Tolerance. Elevations must be within 3 in. of elevations specified in the Contract Documents.

(b) Structures. Elevations must be within 1.2 in. (0.1 ft) for spillways, pipe inverts, orifices, and weirs.

(c) Freeboard. Freeboard must be no less than specified in the Contract Documents.

When tolerances are exceeded, furnish computations for the storage volumes, discharge rates, detention times, and other applicable documentation to demonstrate that the SWM facilities meet all of the designed parameters. An approved SWM Report including design computations will be provided to facilitate the requirements of the AB Inspector.

When SWM facilities do not meet the designed parameters, reconstruct, re-inspect, resurvey and resubmit the SWM Facility AB Certification Package.

Submission Requirements. Furnish two hard-copies and one digital copy in PDF format of the SWM Facility AB Certification Package. Incomplete SWM Facility ABCertification Packages will not be accepted. Upon acceptance of the SWM AB Certification Package as complete, one copy will be submitted to the SWM/ESD Approval Authorityfor review and approval.

MEASUREMENT AND PAYMENT. Stormwater Management (SWM) Facility AB Certification will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for inspection, photographs, documentation, surveys, computations, green-line revisions, completion and submission of the SWM Facility As-Built Certification Package, and for all material, labor, equipment, tools, and incidentals necessary to complete the work therein. Modifications to unacceptable SWM Facility AB Certification Packages including any associated corrective construction, reconstruction, grading, inspection, planting, stabilization, surveying, engineering analysis and services, and resubmittals will be at no additional cost to the Administration.

Payment Schedule. Payments will be made according to the following schedule when requirements are met:

STORMWATER MANAGEMENT (SWM) FACILITY AS-BUILT CERTIFICATION PAYMENT SCHEDULE		
REQUIREMENTS	**PERCENT OF TOTAL CONTRACT PRICE**	**PAYMENT FOR COMPLETED WORK**
Furnish completed SWM Facility As-Built Certification Package	50	Upon submission
Receive approval from the the SWM/ESC Approval Authority	50	At project close-out

CATEGORY 300
DRAINAGE

COMPOST BLANKET

DESCRIPTION. A stabilization technique that includes the application of a thick layer of compost applied directly to the prepared soil surface and is used for the purpose of runoff reduction and slope stabilization. Use Compost Blankets only in areas receiving sheetflow drainage patterns.

MATERIALS.

Compost , Type B	920.02.05
Soil Stabilization Matting	920.05
Turfgrass	920.06
Turfgrass Sod	920.06
Plant Materials	920.07
Water	920.09.01

The particle sizing for compost blanket should be:

Mesh size	Percent Passing selected Mesh Size (dry weight basis)
3 in. (75mm)	100%
1 in. (25 mm)	90% to 100%
¾ in. (19 mm)	65% to 100%
¼ in. (6.4 mm)	0% to 75%

The maximum particle size shall be 6 in.

CONSTRUCTION. Construct compost blankets on properly prepared soil surface. Slightly scarify and remove large clods, rocks, stumps, roots larger than 2 in. in diameter, and debris.

Uniformly apply compost to the specified depth using an approved spreader unit, such as a pneumatic blower unit or side discharge manure spreader.

Track perpendicular to contours on the slopes before applying compost blanket. Watering should be used to improve settling of the compost.

Uniformly apply compost 1-2 in. thick using an approved spreader unit, such as a bulldozer, pneumatic (blower) unit or side discharge manure spreader and cover 100 percent of the bare soil. After placement, do not operate heavy equipment over the compost blanket.

On slopes steeper than 2:1 or when called for in plans, install Type ‘D’ matting beneath the compost application.

Seeding may be premixed into the compost application or injected at time of application when using a pneumatic blower system. Place dry or hydraulic seeding within 3 days following the application of the compost.

01-05-15

MEASUREMENT AND PAYMENT. Compost Blanket will be measured and paid for at the Contract unit price per square yards. This will be full compensation for all applicable excavation, hauling, storing, rehandling of material, removal and disposal of excess and unsuitable material, rototilling, soil preparation, soil stabilization matting, grading and slope adjustments, placement of new material and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 300
DRAINAGE

ACCESS ROAD WITH DRIVABLE CONCRETE MAT SYSTEM

DESCRIPTION. Construct an access road using drivable permeable, flexible, plantable, concrete pavement system that is installed as mats as specified in the contract documents or as directed by the engineer.

MATERIALS.

Concrete Mix #6	920.10
Compost, Type B	920.02.05
No. 7 Stone Aggregate	901.01
Topsoil	920.01
SHA Turfgrass Seed Mix	920.06.07
Geotextile, Class SE	921.09
Coarse Sand	920.01.05

The particle sizing for compost should be:

Mesh size	Percent Passing selected Mesh Size (dry weight basis)
3 in. (75mm)	100%
1 in. (25 mm)	90% to 100%
¾ in. (19 mm)	65% to 100%
¼ in. (6.4 mm)	0% to 75%

The maximum particle size shall be 6 in.

Drivable Concrete Mat System. Each mat will have the dimensions 24(L) X 24(W) X 1.5(D) in. and be produced using an engineered plastic grid reinforcement with a 12 in. minimum radius of curvature flexibility and concrete compressive strength of 5000 psi at 28 days.

CONSTRUCTION. Install systems on flat to 12 percent slopes. Store materials for construction in a clean, dry area. Do not use frozen materials or materials coated with ice or frost. Do not construct on a frozen, wet, or muddy subgrade.

Subgrade Preparation. Clear and grub according to 211.03.02, compact per soils engineer specifications. The subgrade will be free of debris.

Geotextile Placement. Place according to 211.03.03 as called for in plans.

Base Placement. Based on the plans, lay No. 7 aggregate stone base at design depth and compact.

Bedding Course Placement. Install, level, and compact a minimum 2 in. nominal of 75 percent clean coarse sand/25 percent granular compost for planting applications.

02-05-15

Drivable Concrete Mat System Installation. Install mats in accordance with manufacturer's guidelines in one axial direction using an experienced installer of pavers or other pavement systems, butting mats against one another leaving no significant gaps. Adjust to maintain good grid pattern alignment. If matting needs to be cut, this can be done using a utility knife along the internal grid or using a concrete saw blade.

Infill Placement. Spread infill material uniformly across mats using a push broom and leave 0.25 in. of space below the pad surface using the same material as the bedding course. For sod planting with approved sod, infill should be placed 0.25 in. above mat surface.

Vegetation Establishment. Install planting materials as specified in the construction plans and cover with an appropriate layer of seed cover to promote growth (excluding sod application). Protect from significant run on during planting establishment.

Field Quality Control. Observe construction for compliance with the drawings and quality assurance testing should include subgrade soil inspection, aggregate base and bedding type, quality, thickness, and compaction.

MEASUREMENT AND PAYMENT. Access Road with Drivable Concrete Mat System will be measured and paid for at the Contract unit price per square yard. Payment will be full compensation for all excavation, geotextile, mats, staples, fasteners, aggregate, subgrade preparation, hauling, removal and disposal of unsuitable material, anchoring, grading, compacting, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Topsoil will be measured and paid for as specified in Section 701.

Turfgrass Establishment will be measured and paid for as specified in Section 705.

CATEGORY 300
DRAINAGE

FILTER SOCK

DESCRIPTION. A tubular casement filled with compost to reduce erosion of soil from construction sites.

MATERIALS.

Compost, Type B 920.02.05

Casing shall be 12, 18 or 24 in. diameter and produced from 5-mil thick continuous high-density polyethylene or polypropylene, woven into a tubular mesh netting material with openings in the knitted mesh 1/8 - 3/8 in.

The particle sizing for filter socks using compost should be:

Compost Particle Size	Percent Passing selected Compost Particle Size (dry weight basis)
2 in. (50mm)	99 to 100
$^{3}/_{8}$ in. (10 mm)	30 to 50

CONSTRUCTION. Install filter socks parallel to contours and perpendicular to sheet flow from disturbed areas.

Where a connection is needed, there are two options based on whether the sock is being filled on or offsite. Overlap prefilled socks by 1 ft minimum and stake where they connect. Sleeve socks that are filled onsite. After one sock section is filled and tied off (knotted), pull the second sock section over the first 2 ft and "sleeve," creating an overlap.

Remove sediment when it has accumulated to a depth of half the exposed height of the sock. Replace the filter sock if torn or damaged. Reinstall the filter sock if undermining or dislodging occurs.

Drive stakes perpendicular to water flow at a maximum of 8 ft intervals. Do not permit traffic to cross filter socks.

Upon stabilization of the area tributary to the sock and approval, remove stakes. The sock may be left in place and vegetated or removed. In the former case, cut the mesh open, remove all non-biodegradable material, spread the compost as a soil supplement, and seed as specified.

MEASUREMENT AND PAYMENT. Filter Socks will be measured and paid for at the Contract unit price per linear foot. This will be full compensation for all applicable excavation, hauling, storing, rehandling of material, removal and disposal of excess and unsuitable material, rototilling, soil preparation, soil stabilization matting, grading and slope adjustments, placement

of new material and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 300
DRAINAGE

ACCESS ROAD WITH CELLULAR CONFINEMENT LOAD SUPPORT SYSTEM

DESCRIPTION. Construct an access road with a cellular confinement load support system as specified in the Contract Documents or as directed by the Engineer.

MATERIALS.

No. 7 Stone Aggregate	901.01
Topsoil	920.01
SHA Turfgrass Seed Mix	920.06.07
Miscellaneous	920.08
Geotextile, Class SE	921.09

Cellular Structure. Fabricate using sheet strips of perforated, textured, high-density polyethylene (HDPE) conforming to the following:

PROPERTY	METHOD	REQUIREMENT
Density, lb/ft^3	D 1505	58.4 - 60.2
Environmental Stress Crack Resistance, hr min	D 1693	3000
Carbon Black, % by weight	—	1.5 - 2
Thickness before Texturing, mil	D 5199	50 (+5, -10 %)
Thickness after Texturing, mil	D 5199	60 (±10 %)

Each strip shall have a length of 12 ft and a width of 6 in. The surface texturing shall be diamond shape indentations at the rate of 140 to 200 indentations/in. The perforations shall consist of horizontal rows of 0.4 in. diameter holes on 0.75 in. centers. Horizontal rows of perforations shall be staggered and separated by 0.5 in relative to the hole centers. The dimension from the edge of the strip to the nearest edge of perforation shall be 0.3 in.

Connect the HDPE strips in series to form a honeycomb like cellular structure, using full depth ultrasonic spot welded seams, aligned perpendicular to the longitudinal axis of the strips. Weld spacing shall be 14 in. The ultrasonic weld melt pool width shall not exceed 1 in.

When expanded, the interconnected strips shall form the walls of a flexible, three-dimensional cellular confinement structure into which aggregate can be placed. HDPE cell dimensions shall have an expanded length ranging from 8.02 to 9.65 in. and an expanded width ranging from 9.20 to 11.07 in. The number of cells in a manufactured section may vary according to site conditions. Each expanded section shall have a minimum width of 9.2 ft and minimum length of 12 ft.

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

The cellular confinement load support system shall include stake anchors in the form of steel J pin stakes fabricated as specified in the Contract Documents and ½ in. staples. Steel for J pin stakes shall conform to 909.02.

CONSTRUCTION.

Subgrade Preparation. Clear and grub according to 211.03.02.

Geotextile Placement. Place according to 211.03.03.

Cellular Structure Placement. Place HDPE cells within three working days of geotextile placement. Expand sections into position and anchor with steel J pins prior to placing the No. 7 stone aggregate. Install the minimum number and layout of the J pins as specified with additional pins as needed to hold the shape and specified dimensions of the expanded cell sections. Ensure J pin diameter and length are suitable to hold the expanded cell sections in tension for the subgrade conditions at the site.

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

Ensure the upper surfaces of adjoining cell sections are flush at the joint. Interleaf sides and abut the ends of adjoining cell sections. Staple adjoining sections staple to each other. Align welded edge seams when stapling sides of adjoining sections. Align abutting sections at longitudinal center lines and staple at the cell wall contact point.

Placement of Infill. Place No. 7 stone aggregate into the expanded HDPE cells to a level at least 2 in. above the top of the cell walls. Limit the drop height of infill to 3 ft. using equipment operating adjacent to the cell sections. Equipment operating on the cell sections is only allowed on cell sections that have been filled and covered with the minimum 2 in. of additional material. Compact infill material to a minimum density of 95 percent of the standard proctor dry density. Grade compacted aggregate surface to a level 1 ± 1/2 in. above top of the cell walls.

Placement of Topsoil. Place topsoil on the aggregate infill material to a minimum depth of 4 in. according to 701.03. Apply according to 705.03.

Turfgrass Establishment. Prepare soil and **e**stablish turfgrass according to 705.

MEASUREMENT AND PAYMENT. Access Road with Cellular Confinement Load Support System will be measured and paid for at the Contract unit price per square yard. Payment will be full compensation for all excavation, geotextile, cellular structure, J pins, staples, fasteners, aggregate, subgrade preparation, hauling, removal and disposal of unsuitable material, anchoring, grading, compacting, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Topsoil will be measured and paid for as specified in Section 701.

Turfgrass Establishment will be measured and paid for as specified in Section 705.

CATEGORY 300
DRAINAGE

STORMWATER MANAGEMENT WEIR STRUCTURE

DESCRIPTION. Construct reinforced concrete weir structure to serve as spillway for a stormwater management pond. Weir Structure also includes draw down device which allows for the slow release of filtered stormwater.

MATERIALS.

No. 2 Aggregate	M-43, No. 2
Mortar Sand	901.01
Curing Material	902.07
Concrete Mix No. 3	902.10
Grout	902.11
Reinforcement Steel	908
Geotextile	921.09

Low flow Pipe, Cleanouts, and Fittings. 6 inch diameter thermoplastic pipe. Polyvinyl chloride Profile Wall Drain Pipe (PPWP) meeting F 949 or Corrugated Polyethylene Drainage Pipe (CPP-S) meeting M 252, Type S and Type SP. Perforated pipe shall have slotted perforations with an opening area of 1 in^2/ft to 1.5 in^2/ft.

CONSTRUCTION. Refer to Section 305. Insert subdrain stub into framework for concrete structure prior to poring concrete. After the stormwater management pond is final graded and stabilized, construct the remainder of draw down device in accordance with below.

Geotextile. Eliminate any voids between the geotextile and the soil and avoid wrinkling and folding the geotextile. Maintain a minimum 6 in. overlap at the geotextile joint ends or breaks and pin joints and overlaps securely.

Low flow Pipe. Cap the ends of all pipes not terminating in a cleanout, vent, or drainage structure unless otherwise specified.

MEASUREMENT AND PAYMENT. Stormwater Management Weir Structure will be measured and paid for at the Contract unit price per each The payment will be full compensation for all applicable excavation, sheeting, shoring, dewatering, hauling, storing, rehandling of material, removal and disposal of excess and unsuitable material, rototilling, grading and slope adjustments, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 300
DRAINAGE

SECTION 303 – PIPE CULVERTS

303.03 CONSTRUCTION.

303.03.04 Joints.

Reinforced Concrete Pipe.

240 **DELETE:** The second paragraph Reinforced Concrete Pipe in its entirety.

INSERT: The following.

Seal circular pipe joints using rubber gaskets meeting C 433. Seal elliptical pipe joints using preformed flexible joint sealants meeting C 990.

Plastic Pipe.

DELETE: In its entirety.

INSERT: The following.

Use intregal bell and spigot joints with flexible elastomeric seals meeting D 3212.

CATEGORY 300
DRAINAGE

305 – MISCELLANEOUS STRUCTURES

305.01 DESCRIPTION.

ADD: To the end of the paragraph.

Apply integral color admixture to the concrete mixture for drainage structures as specified in the contract documents. Apply sandblast finish to the completed, colored drainage structures.

305.02 MATERIALS.

ADD: The following after the list of materials.

Common Borrow	916.01.04
Stormwater Management (SWM) Facility Embankment Clay Core Borrow	916.01.05

ADD: After the last paragraph.

Integral Concrete Color Pigment Admixture. A colored, water reducing, admixture containing no calcium chloride with coloring agents that are limeproof and UV resistant according to C979, C494 and M194.

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

305.03 CONSTRUCTION.

305.03.05 Drainage Structures.

247 **ADD:** The following after the last paragraph.

For structures installed in SWM pond facility embankments, backfill with material matching the type and quality conforming to that specified for adjoining fill material for a width of 1.5 ft outside of the structure and extended from the bottom of the

structure. Large lumps, clods, frozen material, rocks and other objectionable materials are unacceptable. Place backfill concurrently with core and embankment material. Place backfill in layers not exceeding an uncompacted depth of 4 in. Compact each layer simultaneously on all sides of the pipe and concurrently with core and embankment materials. Compact material around the structure using hand tampers or approved mechanical tampers. Continue this method of filling and compacting to the depths as specified or until the backfill is completed to at least 8 in. above the top of structures that are entirely underground. Protect all structures from damage due to construction. Do not drive equipment within 4 ft when measured horizontally from the structure nor drive equipment over structures that are entirely underground until at least at least 24 in. of compacted fill is over the structure.

305.03.06 Precast Drainage Structures.

247 **DELETE:** The third paragraph "Do not ship…….untested precast unit" in its entirety.

INSERT: The following.

Do not ship any precast unit without complete documentation showing that all materials meet specifications per 305.02 or the Contract Documents; or without complete identification markings per Sections 440, 905 and 915.

ADD: After the last paragraph.

Integral Colored Concrete Structures. Where specified, cast storm water management structures using integral concrete color pigment admixture. Add pigment admixture to the concrete as specified by the manufacturer. Ensure uniform coloration throughout the structure.

Sandblasted Finish. Apply sandblast finish to colored drainage structures Allow concrete to cure to sufficient strength so that is will not be damaged by blasting but not less than seven days. Apply Class 1 (Brush) finish involving a one pass brush blast which will remove the cement matrix and expose the fine aggregates only. No exposed coarse aggregate is allowed.

Meet all local air pollution regulations. Ensure the safety of the workers. Equip each blaster with an air-fed helmet.

Ensure that areas immediately adjacent to the sand-blasting operation are cleaned-up.

Sample Panel. **P**rior to casting drainage structures with integral concrete color pigment admixture, provide a sandblasted 2 ft. by 2 ft. by 4 in. sample panel at the construction site for color and finish approval. Ensure subsequent structures requiring integral color match the sample panel. Maintain the sample at the construction site as a basis for comparison with the structures.

305.04. MEASUREMENT AND PAYMENT.

237 **ADD:** After the last paragraph.

305.04.08 Integral colored concrete will not be measured but will be incidental to the applicable precast or cast in place concrete item. The payment will include integral concrete color pigment admixture, sandblast finish, clean-up and all material, labor, equipment, tools and incidentals necessary to complete the work.

248 **ADD:** The following at the end of the section.

305.04.08. Abrasive blasting will not be measured but the cost will be incidental to the concrete structure item.

CATEGORY 300
DRAINAGE

SECTION 308 — EROSION AND SEDIMENT CONTROL

253 **DELETE:** In its entirety.

INSERT: The following.

SECTION 308 — EROSION AND SEDIMENT CONTROL

308.01 DESCRIPTION. Apply and maintain erosion and sediment control measures to disturbed areas throughout the life of the project to control erosion and to minimize sedimentation in rivers, streams, lakes, reservoirs, bays, and coastal waters. Implement the approved Erosion and Sediment Control Plan and any approved modifications to the plan. Identify staging and stockpile areas, and apply erosion and sediment controls measures as approved.

308.01.01 Erosion and Sediment Control Manager (ESCM). Provide an Erosion and Sediment Control Manager to implement the Erosion and Sediment Control (ESC) Plan and to oversee the installation, maintenance and inspection of the ESC controls.

308.01.02 Severe Weather Event. A severe weather event occurs when rainfall exceeds 3 in. over a 24-hr period based upon rainfall data obtained from the nearest official National Weather Service (NWS) gauge station to the Site.

308.02 MATERIALS.

Riprap	901.03
4 to 7 in. Stone	901.05
Asphalt Mixes	904
Pipe	905
Gabion Wire	906
Steel Plate	909.02
Welding Material	909.03
Fence Fabric for Super Silt Fence	914.01.01
Compost	920.02.05
Soil Amendments	920.02
Fertilizer	920.03
Mulch	920.04
Soil Stabilization Matting	920.05
Seed	920.06
Straw Bales	921.08
Geotextile, Woven and Non-Woven	921.09, Class E

01-5-16

Geotextile, Woven Slit Film	921.09, Class F
2 to 3 in. Stone	M 43, No. 2
3/4 to 1-1/2 in. Stone	M 43, No. 4
No. 57 Stone	M 43, No. 57

308.02.01 Filter Log Casing. Casing shall be 12 in., 18 in. or 24 in. diameter and produced from 5 mil thick continuous high-density polyethylene or polypropylene, woven into a tubular mesh netting material with openings in the knitted mesh 1/8 in. - 3/8 in.

Compost shall have a soluble salt concentration less than 5.0 mmhos/cm.

308.03 CONSTRUCTION.

308.03.01 Contractor Responsibilities. Prior to beginning any earth disturbing activity, complete the following:

(a) Demarcate all wetlands, wetland buffers, floodplains, waters of the United States, tree protection areas, and the Limit of Disturbance (LOD) according to Section 107. Ensure the demarcations are inspected and approved.

(b) Construct erosion and sediment control measures according to 308.01.02. Ensure that controls are inspected and approved.

(c) Ensure that all runoff is directed from disturbed areas to the sediment control measures.

(d) Do not remove any erosion or sediment control measure without approval from the REC. Refer to GP-7.12 for unforeseen conditions.

(e) Ensure that dewatering practices do not cause any visible change to stream clarity.

308.03.02 Schedule. Within 14 days after the Notice of Award, submit an Erosion and Sediment Control Schedule to implement the ESC Plan. Ensure the schedule indicates the sequence of construction, implementation and maintenance of controls, temporary and permanent stabilization, and the various stages of earth disturbance. Changes to the Plan must be approved prior to implementation. Include the following on the submitted plans:

(a) Demarcation of all wetlands, wetland buffers, jurisdictional waters, floodplains, tree protection areas, and the LOD prior to any earth disturbing activity.

(b) Clearing and grubbing of areas necessary for installation of perimeter controls specified in the Contract Documents.

(c) Construction of perimeter controls specified in the Contract Documents.

(d) Remaining clearing and grubbing.

(e) Roadway grading including off-site work.

(f) If applicable, utility installation and whether storm drains will be used or blocked during construction.

(g) Final grading, landscaping, and stabilization.

(h) Removal of perimeter controls.

Work is prohibited on-site and off-site until the Erosion and Sediment Control schedules and methods of operation have been accepted by the Administration.

308.03.03 Standards and Specifications. Construct and maintain the erosion and sediment control measures and devices in accordance with the latest Maryland Department of the Environment (MDE) Erosion and Sediment Control and Stormwater Management regulations, "Maryland Standards and Specifications for Soil Erosion and Sediment Control", "Maryland Stormwater Design Manual, Volumes I and II", "SHA Field Guide for Erosion and Sediment Control", and as specified in the Contract Documents. Keep a copy of the latest "Maryland Standards and Specifications for Soil Erosion and Sediment Control" on the site at all times.

308.03.04 Erosion and Sediment Control Plan (ESC Plan) and Sequence of Construction. Implement the Administration's approved ESC Plan and Sequence of Construction. Minor adjustments to the sediment control locations may be made in the field with the approval of the Engineer and the REC. Major revisions, deletions, or substitutions to the ESC Plan require a formal review and written approval. Submit changes to the approved ESC Plan to the Administration in writing at least 14 days prior to implementing the change. Ensure that any changes to the ESC Plan or Sequence of Construction are approved prior to implementing the change.

308.03.05 Erosion and Sediment Control Manager. At least 10 days prior to beginning any work, assign and submit the name and credentials for approval an Erosion and Sediment Control Manager (ESCM). Ensure that the ESCM and the superintendent have successfully completed the MDE "Responsible Personnel Training for Erosion and Sediment Control" and the Administration's "Erosion and Sediment Control Certification Training for Contractors and Inspectors'. The certifications must be current at all times. If the certification expires or is revoked for either person, immediately replace the person with an appropriately certified person acceptable to the Administration. No work may proceed without the appropriate certified personnel in place. Any substitutes for the

ESCM will be subject to approval. The Administration reserves the right to require a reassignment of the ESCM duties to another individual for any reason.

Ensure that the ESCM is thoroughly experienced in all aspects of construction and has the required certifications. The ESCM is primarily responsible for and has the authority to implement the approved erosion and sediment control plans, schedules and methods of operation for both on-site and off-site activities. The ESCM's duties include:

(a) Attend the Pre-Construction Erosion and Sediment Control Field Meeting and periodic field Erosion and Sediment Control Meetings to evaluate the effectiveness of measures already installed, and to plan for the implementation of necessary controls proposed for succeeding areas of soil disturbance.

(b) Inspection of the erosion and sediment controls on a daily basis to ensure that all controls are in place at all times and to develop a list of activities and schedules to ensure compliance with the Contract Documents.

(c) Maintenance of a daily log of these inspections, including actions taken, and submit a written report at the end of the work day.

(d) Accompanied by the Engineer, conducting after storm inspections both during and beyond normal working hours and submitting a written report.

(e) Having the authority to mobilize crews to make immediate repairs to the controls during working and nonworking hours.

(f) When requested, accompanying the Engineer during REC Inspections and inspections made by the regulating agencies.

(g) Coordination with the Engineer to ensure that all corrections are made immediately and that the project is in compliance with the approved plan at all times.

308.03.06 Quality Assurance Ratings. A Regional Environmental Coordinator (REC) will frequently inspect each project to ensure compliance with the approved Erosion and Sediment Control and Stormwater Management Plans. The scores will be reported on Form No. OOC61/QA-1, Erosion/Sediment Control and Stormwater Management Field Investigation Report. The REC will use the scores to determine the following ratings.

Quality Assurance Ratings

SCORE	RATING
≥90.0	A
80.0 - 89.9	B
70.0 - 79.9	C
60.0 - 69.9	D
< 60.0	F

(a) Rating A. The project is in compliance. Minor corrective action may be necessary.

(b) Rating B. The project is in compliance; however, corrective action is necessary.

(c) Rating C. The project is in compliance; however, deficiencies noted require corrections. Shutdown conditions could arise quickly. Project will be reinspected within 72 hours.

(d) Rating D. The project is in non-compliance. The Administration will shut down earthwork operations. Focus work efforts on correcting erosion and sediment control deficiencies. The project will be reinspected within 72 hours. Complete all required corrective actions within the 72 hour period for the project to be upgraded to a 'B' rating. Failure to upgrade the project from a 'D' rating to a 'B' or A will result in the project being rated an 'F'. Liquidated damages will be imposed for each day the project has a 'D' rating.

(e) Rating F. The project is in non-compliance. An 'F' rating indicates a score less than 60 or the appropriate permits and approvals have not been obtained; or that the limit of disturbance has been exceeded, or that wetlands, wetland buffers, Waters of the United States (WUS), floodplains, and tree preservation areas as specified in Section 107 have been encroached upon; or that work is not proceeding according to the approved Erosion and Sediment Control Plan and schedules. The Administration will shut down the entire project until the project receives a 'B' or better rating. Focus all work efforts on correcting erosion and sediment control deficiencies. Liquidated damages will be imposed for each day the project has an 'F' rating.

308.03.07 Shutdowns. If a project is rated 'C', correct all deficiencies within 72 hours. The project will be reinspected at the end of this period. If the deficiencies have not been satisfactorily corrected, the project will be rated 'D' and all earthwork operations will be shut down until the project is rated 'B' or better.

01-5-16

If consecutive 'C' ratings are received, the Contractor will be alerted that their overall effort is marginal and a shutdown of all earthwork operations is imminent if erosion and sediment control efforts do not substantially improve within the next 72 hours. The project will be reinspected at the end of this period. If the deficiencies are not satisfactorily corrected or other deficiencies are identified that result in less than a 'B' rating on Form No. OOC61/QA-1, a 'D' rating will be given and all earthwork operations will be shut down.

If these deficiencies are not corrected, an 'F' rating will be given, and the entire project will be shut down until the project receives a 'B' or 'A' rating. When degradation to a resource could occur, or if the Contractor is unresponsive, the Administration may elect to have these corrective actions performed by another contractor or by Administration maintenance staff. All costs associated with this work will be billed to the original Contractor in addition to liquidated damages.

The second time that a project is rated 'F', the Erosion and Sediment Control Training Certificate issued by the Administration will be immediately revoked from the project superintendent and the Erosion and Sediment Control Manager for at least a six month period and until successful completion of the Administration's Erosion and Sediment Control Certification Program.

308.03.08 Incentive Payments. When specified in the Contract Documents, a project may include incentive payments. Starting at the Notice to Proceed, an Incentive Payment will be made for a rating quarter consisting of 3 months when at least four inspections were performed by the REC and an average score equal to or greater than 85.0 for the entire rating quarter is received. The quarterly incentive payment will be made within 60 days after the end of the rating quarter. No incentive will be paid for partial quarters or for quarters with less than four inspections. No incentives will be paid for any quarter in which a 'D' or 'F' rating is received. When a project receives no 'D' or 'F' ratings and the overall average score is equal to or greater than 85.0, the final incentive payment will be made at final project closeout. If a time extension is granted, additional quarterly incentive payments will be drawn from the final incentive payment.

308.03.09 Liquidated Damages. Whenever a project is rated 'D' or 'F', the Liquidated Damages will be assessed. Liquidated Damages must be paid within 30 days from the date of notification.

308.03.10 Severe Weather Event. Maintain, repair, or replace any damaged erosion and sediment control devices within 48 hours of a severe weather event occurrence.

308.03.11 Preconstruction Conference. Present a general overview at the Preconstruction Conference of how erosion and sediment control measures will be implemented on the project.

308.03.12 Initial Controls. Install all perimeter controls such as silt fence, earth dikes/swales, check dams, traps, and basins, prior to the grubbing operation.

If it is determined that the clearing area has been disturbed and a potential for sediment runoff or erosion exists, install the controls at that time as directed.

308.03.13 Maintenance. Maintain erosion and sediment control devices at all times whether the project is active or inactive. Maintain access to all erosion and sediment controls until the controls are removed. Lack of this maintenance will affect the Quality Assurance Rating.

Inspect controls immediately following storm events. Clean out as necessary and repair all damage as the first order of business after the storm event.

308.03.14 Stabilization Requirements. Following initial soil disturbance, complete permanent or temporary stabilization within:

(a) Three calendar days for the surface of all perimeter dikes, swales, ditches, perimeter slopes, and all slopes steeper than 3 horizontal to 1 vertical (3:1); and

(b) Seven calendar days as to all other disturbed or graded areas on the project site not under active grading.

When the excavation or embankment reaches the bottom of the subgrade, those areas in which paving will be placed are exempt from the stabilization requirements. Areas between temporary berms, except median areas, need not be stabilized during incremental stabilization.

Sensitive areas may require less than three or seven day stabilization. Maintain as necessary to ensure continued stabilization.

Track slopes within two days of establishment according to 701.03.

308.03.15 Waste Areas. Off-site waste areas on State or Federal property require MDE approval. All other off-site waste areas must be approved by the appropriate Soil Conservation District for each county or the Baltimore City Department of Public Works. Protect waste areas and stockpile areas with erosion and sediment control measures within the three or seven day stabilization requirement.

308.03.16 MDE Inspections. Work is subject to field inspections by MDE. If noncompliance with erosion and sediment control provisions is determined, their representative will immediately notify the Engineer relative to corrective action. This corrective action may require a shutdown of construction activities until the

noncompliance is satisfactorily corrected.

308.03.17 Stabilized Construction Entrance. Construct stabilized construction entrances at the specified locations.

Rehabilitate stabilized construction entrance consists of periodic top dressing with additional aggregate, replacement of pipe, or other repairs to the entrance and sediment trapping devices.

Place wash racks as directed to prevent tracking of mud and sediment from disturbed areas.

308.03.18 Side or Berm Ditches and Culverts. Construct side ditches in fill areas and berm ditches in cuts, including lining. Protect these linings from sediment deposits. Place silt fence along the banks of existing streams as shown in the Contract Documents prior to placing any culverts. To avoid sedimentation during construction, divert the streams around the location of the culvert until the proposed culvert and channel are stabilized.

308.03.19 Erosion and Sediment Control Original Excavation. Excavate, construct embankments, grade, and backfill for sediment traps, sediment basins, and other sediment controls.

Ensure that excavation and embankments meet the dimensions for each sediment control as specified. Stockpile excavated material and use for backfill when the sediment controls are removed.

308.03.20 Erosion and Sediment Control Cleanout Excavation. Remove accumulated sediment from sediment controls or other areas during routine maintenance of sediment controls, or as directed.

Clean out sediment traps as necessary to ensure that at least 50 percent of the wet storage capacity is available at all times. Ensure that riprap outlet sediment traps have at least 75 percent of the wet storage capacity available at all times. Remove sediment from silt fence, super silt fence, stone outlet structures, stone check dams, and straw bales when it reaches 50 percent of the height of the device.

Place removed sediment in an approved waste site. Material stored on-site may be reused once it is dried and it meets embankment requirements.

308.03.21 Heavy Use Areas. Locate and size Heavy Use Areas used for activities such as staging and storage. Obtain any necessary permits or modifications for non-specified areas.

308.03.22 Stockpile Areas. Locate and size Stockpile Areas. Obtain any necessary permits or modifications for non-specified stockpile areas.

308.03.23 Earth Dike. Do not use sod as stabilization unless specifically approved.

308.03.24 Temporary Swale. Do not use sod as stabilization unless specifically approved.

308.03.25 Perimeter Dike Swale. Do not use sod as stabilization unless specifically approved.

308.03.26 Pipe Slope Drain. When slope drains are placed on grade, construct interceptor berms to direct flow into the flared end section.

308.03.27 Gabion Inflow Protection. Construct according to Section 313.

308.03.28 Rock Outlet Protection. Construct according to Section 312.

308.03.29 Gabion Outlet Protection. Construct according to Section 313.

308.03.30 Plunge Pool. Construct according to Section 312.

308.03.31 Super Silt Fence. Construct as specified with the following exception:

Run a 7 gage top tension wire continuously between posts.

308.03.32 Filter Berms. Construct berms of wood chips and up to 50 percent Compost.

308.03.33 Filter Log. Use Compost for the filter media. Install Filter logs parallel to contours and perpendicular to sheet flow from disturbed areas.

Where a connection is needed, there are two options based on whether the sock is being filled on or offsite. Overlap prefilled socks by 1-ft minimum and staked where they connect. Sleeve socks that are filled onsite. After one log section is filled and tied off (knotted), pull the second log section over the first (2-ft) and "sleeve," creating an overlap.

Remove sediment when it has accumulated to a depth of half the exposed height of the sock. Replace the filter sock if torn or damaged. Reinstall the filter sock if undermining or dislodging occurs.

Drive stakes perpendicular to water flow at a maximum of 8 ft intervals. Do not permit traffic to cross filter socks.

Upon stabilization of the area tributary to the sock and approval, remove stakes. The sock may be left in place and vegetated or removed. In the former case, cut the mesh open, remove all non-biodegradable material, spread the compost as a soil supplement, and seed as specified.

308.03.34 Filter Bag. Determine the bag dimensions necessary to provide the required storage volume. Determine pump and hose sizes.

308.03.35 Straw Bales for Sediment Control. Embed the bales to a depth of at least 4 in., and anchor in place with two No. 4 reinforcement bars, steel pickets, or 2 x 2 in. wood stakes, 36 in. length. Locate the anchoring devices at approximate third points along the longitudinal center line of each bale, driven through the bale and into the ground to a depth of 12 to 18 in.

308.03.36 Stone Outlet Structure. Stabilize the area immediately after removal of the structure.

308.03.37 Temporary Gabion Outlet Structure. As specified in Section 313. Grade and stabilize the area beneath the structure, immediately upon removal.

308.03.38 Portable Sediment Tank. Determine the dimensions necessary to provide the required storage volume.

308.03.39 Dewatering. Dewater only when conditions allow. Ensure that dewatering activities do not cause any visible change to stream clarity. If a sediment plume is visible, immediately cease the dewatering activity. Direct any pumping activity, including dewatering sediment traps and basins, through an approved dewatering device.

308.03.40 Sediment Traps. Excavate sediment traps to the specified length, width, and depth.

At sites where filtration or infiltration devices are used for the control of storm water, prevent runoff from unstabilized areas from entering the infiltration devices. Ensure that bottom elevations of sediment control devices are at least 2 ft higher than the finish grade bottom elevation of the filtration or infiltration device. When converting a sediment trap to a permanent stormwater facility, remove and dispose of all accumulated sediment prior to final grading of the device.

When grading and paving operations are complete and vegetation is established on the slopes and channels to the satisfaction of the Engineer, refill the sediment traps with suitable materials, and shape and treat them as specified.

308.03.41 Stone for Sediment Control. Place No. 57 stone, 3/4 to 1-1/2 in. stone, 2 to 3 in. stone, 4 to 7 in. stone, and riprap for sediment control as specified.

308.03.42 Maintenance of Stream Flow. Maintain the continuous flow of waterways during operations as specified or directed.

(a) Implement the approved plan included in the Contract Documents. Any changes to the approved plan require approval from the appropriate regulatory authorities.

(b) A different plan for maintenance of stream flow may be submitted, but approval from the Engineer and the appropriate approval authority will be required.

(c) If the stream diversion system as shown is not capable of blocking the flow of water through the soil beneath the system, design and provide an effective means of diverting the water away from the designated areas.

(d) Ensure that all excavation performed within the diverted stream is performed in a dewatered condition, which may require additional pumps, sheeting, shoring, cofferdams, etc.

(e) If the proposed system does not perform satisfactorily or additional material and equipment is required to dewater the site and excavated areas, adjust the stream diversion system and obtain approvals.

(f) Securely anchor the stream diversion system in place to prevent movement during high water events. Submit the proposed method of anchoring for approval. Do not install anchors beyond the limits of disturbance or infringe on the channel area available for stream flow.

(g) Upon completion of construction and after temporary drainage devices have served their purpose, remove and dispose of the devices in an acceptable manner.

308.03.43 Removal of Controls. Do not remove erosion and sediment control measures until all previously disturbed areas are vegetated with at least a 3 in. growth of grass, and the removal has been approved. Backfill, grade, and stabilize.

308.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work. The maintenance, repair, resetting, and final removal of all erosion and sediment control devices will not be measured, but the cost will be incidental to the Contract price to construct the device unless otherwise specified in the Contract Documents.

308.04.01 Erosion and sediment control manager will not be measured but the cost will be incidental to Erosion and Sediment Control items specified in the Contract Documents.

308.04.02 Implementation of the Erosion and Sediment Control Plan will not be measured but the cost will be incidental to the Erosion and Sediment Control items specified in the Contract Documents.

308.04.03 No claims against the Administration will be considered due to a shutdown of the grading operations or the entire project.

308.04.04 Incentive Payments and Liquidated Damages**.** The Contract Documents will specify the amounts of incentive payments and liquidated damages that apply if applicable.

308.04.05 Erosion and Sediment Controls that are damaged and replaced as a result of a Severe Weather Event will be measured and paid for at the Contract unit price applicable to the pertinent items.

308.04.06 Stabilized Construction Entrance will be measured and paid for per each and includes all excavation, geotextile, aggregate, pipe, rehabilitation, relocation and incidentals to complete the work.

308.04.07 Wash Racks for Stabilized Construction Entrance will be measured and paid for per each and includes racks, excavation, wash water and incidentals to complete the work.

308.04.08 Erosion and Sediment Control Original Excavation will be measured and paid for at the Contract unit price per cubic yard. The payment will include excavation, backfill, grading and disposal.

308.04.09 Erosion and Sediment Control Cleanout Excavation will be measured and paid for at the Contract unit price per cubic yard. The payment will also include excavation and disposal.

308.04.10 Temporary Mulch will be measured and paid for as specified in 704.04.01.

308.04.11 Temporary Seed will be measured and paid for as specified in 704.04.02.

308.04.12 Turfgrass Sod will be measured and paid for as specified in 708.04.01.

308.04.13 Soil Stabilization Matting will be measured and paid for as specified in 709.04.

308.04.14 Temporary earth berms and interceptor berms for incremental stabilization will not be measured, but the cost will be incidental to the excavation items specified in the Contract Documents.

308.04.15 Heavy Use Areas will not be measured but will be incidental to the pertinent items.

308.04.16 Stockpile Areas will not be measured but will be incidental to the pertinent items.

308.04.17 Earth Dikes will be measured and paid for at the Contract unit price per linear foot. 4 to 7 in. stone, temporary seeding, and soil stabilization will be measured and paid for as specified in 308.04.58, 704.04, and 709.04, respectively.

308.04.18 Temporary Swales will be measured and paid for at the Contract unit price per linear foot. 4 to 7 in. stone, temporary seeding, and soil stabilization matting will be measured and paid for as specified in 308.04.58, 704.04, and 709.04, respectively.

308.04.19 Perimeter Dike/Swales will be measured and paid for at the Contract unit price per linear foot. Temporary seeding and soil stabilization matting will be measured and paid for as specified in 704.04 and 709.04, respectively.

308.04.20 Temporary storm drain diversions will be measured and paid for at the Contract unit price per linear foot of the size specified and will include all grading, pipe, connections and any incidentals necessary to complete the work.

308.04.21 Temporary Asphalt Berm will be measured and paid for at the Contract unit price per linear foot. The removal of the temporary asphalt berm will not be measured but the cost will be incidental to the Contract price.

308.04.22 Clear Water Diversions will be measured and paid for at the Contract unit price per linear foot of the size specified and will include all pipe, connections, anchors, sandbags, sheeting, dewatering and any incidentals necessary to complete the work.

308.04.23 Temporary Barrier Diversions will be measured and paid for at the Contract unit price per linear foot and will include all barrier, sandbags, sheeting, dewatering and any incidentals necessary to complete the work.

308.04.24 Mountable Berms will be measured and paid for at the Contract unit price per each and will include all earthwork, stone, geotextile, and any incidentals necessary to complete the work.

308.04.25 Diversion Fence will be measured and paid for at the Contract unit price per linear foot.

308.04.26 Pipe Slope Drain will be measured and paid for at the Contract unit price per linear foot. The payment will also include excavation, backfill, flared end section, geotextile, anchors, coupling bands, and pipe elbows.

308.04.27 Stone Check Dam will be measured and paid for as specified in 308.04.17.

308.04.28 Riprap Inflow Protection will be measured and paid for as specified in 308.04.17.

308.04.29 Gabion Inflow Protection will be measured and paid for as specified in 313.04.

308.04.30 Rock Outlet Protection will be measured and paid for at the Contract unit price per square yard of Riprap Slope and Channel Protection.

308.04.31 Plunge Pool will be measured and paid for at the Contract unit price per square yard of Riprap Slope and Channel Protection.

308.04.32 Silt Fence will be measured and paid for at the Contract unit price per linear foot.

308.04.33 Silt Fence on Pavement will be measured and paid for at the Contract unit price per linear foot of Silt Fence.

308.04.34 Super Silt Fence will be measured and paid for at the Contract unit price per linear foot.

308.04.35 Clear Water Pipes through Silt Fence or Super Silt Fence will not be measured but will be incidental to the pipe and silt fence items.

308.04.36 Filter Berms will be measured and paid for at the Contract unit price per linear foot.

308.04.37 Filter Logs will be measured and paid for at the Contract unit price per linear foot for the size specified.

308.04.38 Temporary Stone Outlet Structures will be measured and paid for as specified in 308.04.58. The baffle board and stakes will not be measured but the cost will be incidental to the Contract price.

308.04.39 Temporary Gabion Outlet Structures will be measured and paid for at the Contract unit price per each.

308.04.40 Standard Inlet Protection will be measured and paid for at the Contract unit price per each for Inlet Protection.

308.04.41 At Grade Inlet Protection will be measured and paid for at the Contract unit price per each for Inlet Protection.

308.04.42 Curb Inlet Protection will be measured and paid for at the Contract unit per each for Inlet Protection.

308.04.43 Median Inlet Protection will be measured and paid for at the Contract unit per each for Inlet Protection.

308.04.44 Median Sump Inlet Protection will be measured and paid for at the Contract unit per each for Inlet Protection.

308.04.45 Combination Inlet Protection will be measured and paid for at the Contract unit per each for Inlet Protection.

308.04.46 Gabion Inlet Protection will be measured and paid for at the Contract unit per each for Inlet Protection.

308.04.47 Catch Basin Insert will be measured and paid for at the Contract unit price per each for Inlet Protection.

308.04.48 Removable Pumping Station will be measured and paid for at the Contract unit price per each. The payment will also include excavation, pipe, geotextile, wire mesh, steel plate, hose, pump, and connections.

Stone will be measured and paid for as specified in 308.04.58.

308.04.49 Sump Pit will be measured and paid for at the Contract unit price per each. The payment will also include excavation, pipe, geotextile, wire mesh, steel plate, hose, pump, and connections.

Stone will be measured and paid for as specified in 308.04.58.

308.04.50 Portable Sediment Tank will be measured and paid for at the Contract unit price per each. The payment will also include pipe, geotextile, wire mesh, steel plate, hose, pump, and connections. No adjustments will be made for resizing or relocating portable sediment tanks to meet stream clarity discharge requirements.

308.04.51 Filter Bags will be measured and paid for at the Contract unit price per each and will include pump, hoses, connections, straw bales, sizing, locating, relocating, disposal and any other incidentals necessary. No adjustments will be made for resizing or relocating to meet Permit conditions or turbidity requirements.

308.04.52 Sediment traps will be measured and paid for at the Contract unit price for one or more of the items listed below:

(a) Erosion and Sediment Control Original Excavation as specified in 308.04.03.

(b) Pipe as specified in 303.04.

(c) Stone as specified in 308.04.58.

(d) Inflow protection as specified in 308.04.09 and 308.04.10.

(e) Baffle board and stakes will not be measured but the cost will be incidental to the other items.

(f) Temporary risers will be measured and paid for at the Contract unit price per each.

(g) Anti-seep collars will be measured and paid for at the Contract unit price per each.

(h) Geotextile will not be measured but the cost will be incidental to the stone.

308.04.53 Sediment Basins will be measured and paid for at the Contract unit price for one or more of the following items:

(a) Earthwork as specified in 201.04.

(b) Pipe as specified in 303.04.

(c) Stone as specified in 308.04.58.

(d) Baffle board and stakes will not be measured but the cost will be incidental to the other items.

(e) Temporary risers will be measured and paid for at the Contract unit price per each and include trash racks, draw down devices, concrete bases, projection collars, riser connectors and any other incidentals.

(f) Modifying Stormwater Management Riser Structures and installing dewatering pipe systems will be measured and paid for at the Contract unit price per each for Convert Stormwater Management Riser for Sediment Control. Converting the risers back to their permanent state will be incidental to pipe.

(g) Anti-seep collars will be measured and paid for at the Contract unit price per each.

(h) Geotextile will not be measured but the cost will be incidental to the stone.

308.04.54 Temporary Access Bridge will be measured and paid for at the Contract Lump Sum price.

308.04.55 Temporary Access Culvert will be measured and paid for at the Contract unit price per linear foot.

308.04.56 Onsite Concrete Washout Structures will not be measured but will be incidental to the various concrete mixes.

308.04.57 Restabilization will not be measured when permanently stabilized areas are disturbed by grading operations or other activities not specifically approved.

308.04.58 Stone for sediment control will be measured and paid for at the Contract unit price per ton for the pertinent Stone for Sediment Control item. Geotextile, excavation, and backfill will not be measured but the cost will be incidental to the Contract price.

308.04.59 Straw Bales will be measured and paid for at the Contract unit price per linear foot measured along the approximate center line of the row of bales. Excavation and anchoring the straw bales will not be measured but the cost will be incidental to the Contract price.

308.04.60 Maintenance of Stream Flow will not be measured but will be paid for at the Contract lump sum price. The payment includes design, redesign providing diversion structures regardless of the type required to satisfactorily divert the stream flow, anchoring of the system, excavation, backfill, dewatering the site and excavation within the stream diversion area, maintenance of the diversion system, sandbags, polyethylene sheeting, diversion pipes, pumps, hoses, connections, portable sediment tanks and obtaining any necessary permits. Payment will not be adjusted for alternative stream diversion systems regardless of any changes in quantities from that shown in the Contract Documents. The provisions of GP-4.05 will not apply to this work.

CATEGORY 300
DRAINAGE

SECTION 308 – EROSION AND SEDIMENT CONTROL

308.01 DESCRIPTION.

256 **ADD**: After the last paragraph of 308.01.04.

308.01.05 Severe Weather Event. A severe weather event occurs when rainfall exceeds 3 in. over a 24-hr period based upon rainfall data obtained from the nearest official National Weather Service (NWS) gauge station to the Project.

308.03 CONSTRUCTION.

265 **ADD**: After the last paragraph of 308.03.39.

308.03.40 Severe Weather Event. Maintain, repair, or replace any damaged erosion and sediment control devices within 48 hours of a severe weather event occurrence. During severe weather events, be on site regularly cleaning all E&S controls to mitigate erosion. Record all controls that fail and all controls that remain stable during this time.

308.04 MEASUREMENT AND PAYMENT.

268 **ADD**: After the last paragraph of 308.04.35.

308.04.36. A lump sum payment of **$ 57,920.00** will be paid for each Severe Weather Event that occurs between the start of grading operations and removal of all erosion and sediment controls for which the Contractor is eligible. The payment will be full compensation for the maintenance, repair and replacement of any and all erosion and sediment control devices damaged during the severe weather event and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Payment for each severe weather event will only be made if the Project has maintained a minimum Quality Assurance rating of "B" immediately before and within the 48 hrs. following the severe weather event and has official weather records documenting the occurrence of the severe weather event have been provided to the Administration.

CATEGORY 300
DRAINAGE

SECTION 308 — EROSION AND SEDIMENT CONTROL

308.01 DESCRIPTION.

256 **DELETE: 308.01.04 Incentive Payments and Liquidated Damages.** in its entirety.

INSERT: The following.

308.01.04 Incentive/Liquidated Damages Payments.

The total incentive awarded for this Contract will not exceed $134,200.00. The rating quarter incentive payment for this contract is $6,710.00. A final incentive payment for this contract is $67,100.00 less the total quarterly incentives paid during a contract extension.

For each day that the project has a 'D' rating, liquidated damages will be imposed in the amount of $2,489.00 per day. Failure to upgrade the project to the minimum of a 'B' rating within 72 hours will result in the project being rated 'F'.

For each day that the project has an 'F' rating, liquidated damages will be imposed in the amount of $4,444.00 per day.

CATEGORY 300
DRAINAGE

SECTION 314 – FLOWABLE BACKFILL

314.02 MATERIALS.

276 **DELETE:** 314.02 Materials in its entirety.

INSERT: The following.

314.02 MATERIALS.

Controlled Low Strength Material	902.16

CATEGORY 300
DRAINAGE

SECTION 316 — STORMWATER MANAGEMENT (SWM) FILTRATION FACILITIES

316.01 DESCRIPTION. Construct stormwater management (SWM) filtration facilities as specified.

SWM Filtration Facilities Identification. SWM filtration facilities are identified by unique six-digit inventory numbers and include the following designations.

(a) Bioretention.

(b) Micro-Bioretention.

(c) Organic Filters.

(d) Surface Sand Filters.

(e) Submerged Gravel Wetlands.

(f) Landscape Infiltration.

(g) Rain Gardens.

(h) Infiltration Berms.

(i) Bio-swales.

316.02 MATERIALS.

No. 57 Aggregate	901.01
No. 7 Aggregate	901.01
No. 2 Aggregate	M-43, No. 2
Concrete	902.10
Topsoil	920.01.01 and 920.01.02
Bioretention Soil Mix (BSM)	920.01.05
Coarse Sand	920.01.05(a) (1)
Fertilizer	920.03.01
Shredded Hardwood Bark (SHB) Mulch	920.04.03
Soil Stabilization Matting (SSM)	920.05
Seed and Turfgrass Sod	920.06

Plant Materials	920.07
Water	920.09.01
Geotextile, Class PE, Type III	921.09
Securing Pins or Staples	921.09

Aggregate. Ensure aggregate has been adequately washed and is free of soil and fines.

Subdrain Pipe, Fittings and Geotextile Sock. Perforated and solid-wall polyvinyl chloride profile wall drain pipe (PPWP) meeting M-304 or corrugated polyethylene drainage pipe (CPP) meeting M-252, Type S and Type SP. Perforated pipe shall have two rows of slotted perforations with an opening area of 20 cm^2/m to 21 cm^2/m. When specified, use the geotextile sock recommended and supplied by the subdrain pipe manufacturer.

316.03 CONSTRUCTION.

316.03.01 Site Protection. Prior to constructing SWM filtration facilities, ensure that the SWM facility site areas are protected from vehicular traffic and is not used for erosion and sediment controls, stockpiles or equipment storage.

316.03.02 Site Preparation. Unless facilities are off-line and will receive no runoff, construct facilities only after all surrounding and adjacent areas are permanently stabilized. Divert flow from entering the SWM filtration facility areas unless same-day stabilization is specified for the SWM filtration facility location. Prevent trash, debris and sediment from entering SWM filtration facilities during construction.

316.03.03 Schedule. Perform SWM filtration facility activities during dry weather and when soil moisture conditions are suitable and unless the facility is off-line or flow diversions are in place. Only work with soil that is friable and not in a muddy or frozen condition. Cease operations when soil and overall conditions are otherwise unsuitable.

316.03.04 Excavation. Use methods of excavation that minimize compaction of the underlying soils. Where feasible, operate equipment from locations adjacent to SWM filtration facilities rather than within the facility area. Use only wide-track or marsh-track equipment, or light equipment with turf-type tires to excavate, grade, and place materials. Do not use equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high-pressure tires.

310.03.05 Excavation Area Bottom Preparation. Only work with soil that is friable and not in a muddy or frozen condition. When present, remove any standing water from the excavation area. Prepare the bottom of the excavated area as follows.

(a) Submerged Gravel Wetlands. Rake surface to loosen soil.

(b) All Other SWM Filtration Facilities. Till to a minimum depth of 8 in. to loosen soil.

316.04.06 Geotextile. Place tightly against the vertical sides of the excavation area, pulling tight to eliminate wrinkles and folds and pin securely. Eliminate any voids between the geotextile and the underlying soil and avoid wrinkling and folding the geotextile. Maintain a minimum 12 in. overlap at the geotextile joint ends or breaks. Pin longitudinal joints, overlaps and edges securely with pins spaced no greater than 10 ft on center. Do not place geotextile on the bottom of the excavated area.

316.03.07 Miscellaneous Structures. Furnish and install according to Section 305.

316.03.08 Aggregate. Place aggregate in layers as specified. Prevent soil, fines, and other debris from contaminating the aggregate. Remove contaminated aggregate and replace with clean aggregate.

316.03.09 Subdrain Pipe. Cap the ends of all subdrain pipe not terminating in a cleanout, vent, or drainage structure unless otherwise specified. Ensure perforations are placed on the bottom of the horizontal subdrain pipe runs.

(a) Cleanouts. Install solid-wall pipe vertically and connect to horizontal subdrain with approved manufactured connections. Provide a counter-sunk screw cap on the exposed ends.

(b) Vents. Install solid-wall pipe vertically and connect to the horizontal subdrain with approved manufactured connections. Provide a ventilated screw cap on the exposed ends. Ventilation holes or slots shall be no larger than 1/4 in. in diameter or width. The sum total area of the openings shall be no less than 1 in^2. Ensure that the ventilation openings are above the maximum specified water surface elevation.

(c) Observation Wells. Use perforated and solid-wall pipe. Place the geotextile sock over the perforated pipe portion and secure at both ends. Provide a screw cap on the exposed end extending 2 in. above the surface. When a concrete collar is specified, ensure the top of the well is flush with the surface of the concrete collar.

316.03.10 Coarse Sand. Place coarse sand in horizontal layers not exceeding 12 in. After each lift, spread the course sand to provide a uniform surface then spray or sprinkle water to saturate the lift until water flows from the subdrain outlet. Use an appropriate sediment control device to capture any discharged sediment-laden water from the subdrain outlet. Place, spread, and water course sand to uniform surface true to depth, line, cross section and elevation to ensure the completed work is as specified after settlement. Prevent soil, fines and other debris from contaminating the coarse sand. Remove contaminated coarse sand and replace with clean coarse sand.

316.03.11 Bioretention Soil Mix (BSM). Place BSM in horizontal layers not exceeding 12 in. After each lift, spread the BSM to provide a uniform surface and spray or sprinkle water to saturate the entire area of BSM until water flows from the subdrain outlet. Use an approved sediment control device to capture any discharge sediment-laden water. Place, spread, and water BSM to uniform surface true to depth, line, cross section and elevation to ensure the completed work is as specified after settlement. Prevent soil, fines, and other debris from contaminating the BSM. Remove contaminated BSM and replace with uncontaminated BSM.

316.03.12 Topsoil. Place topsoil as specified. Do not blend topsoil into BSM when topsoil is placed on top of BSM.

316.03.13 Check Dams.

(a) Topsoil Check Dams. Construct topsoil check dams to the dimensions, grades, and depths specified.

(b) Concrete Check Dams. Furnish and install concrete check dams as specified and according to Section 305.

316.03.14 Soil Stabilization Matting (SSM). As specified in Section 709.

316.03.15 Vegetation Installation and Establishment. Unless facilities are off-line or flow diversions are in place, , install seed, sod, trees, shrubs, perennials, and annuals within SWM filtration facility areas immediately after final grading. In the event that vegetation cannot be installed and established due to time-of-year or weather restrictions, keep diversion controls in place until such time that permanent vegetation may be established. Do not use machinery other than hand held within the BSM footprint.

(a) Turfgrass Establishment. As specified in Section 705.

(b) Meadow Establishment and Wildflower Seeding. As specified in Section 707.

(c) Turfgrass Sod Establishment. As specified in Section 708.

(d) Tree, Shrubs and Perennial Installation and Establishment. As specified in Section 710.

(e) Annuals & Bulb Installation and Establishment. As specified in Section 711.

316.03.16 Soil Amendments and Fertilizer. Apply according to Section 705, 706, 707, 708, 710, or as specified. Use the following for plant materials installed in BSM.

(a) Non-Vegetated BSM. Do not apply compost, other soil amendments, or fertilizer to non-vegetated BSM.

(b) Trees, Shrub, and Perennials in BSM. Do not apply compost or other soil amendments to backfill soil or to planting beds.

Apply fertilizer to each planting pit per 710.03.04 when trees, shrubs, perennials, perennial plugs, or other plant materials are installed in BSM per Section 710.

(c) Seeded or Sodded BSM. Do not apply compost or other soil amendments.

Uniformly apply either of the fertilizers in Table 1 at the rate specified over the installed surface of the BSM when BSM will be permanently vegetated with Turfgrass Establishment, Shrub Seeding Establishment, Meadow Establishment, Turfgrass Sod Establishment, or other seeded or sodded vegetation establishment as specified.

BIORETENTION SOIL MIX TABLE 1 - FERTILIZER APPLICATION RATES		
FERTILIZER	**LB PER SY**	**LB PER ACRE**
20-16-12 (83% UF with MAP and SOP)	0.052	200
14-14-14 polymer coated or granular	0.062	275

(d) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

(e) Fertilizer. Refer to (b). Rake fertilizer that is broadcast over the surface of the BSM for seeding or sodding to a depth of 1/8 to 1/2 in. Raking may be performed as part of seeding or sodding operations. Complete raking before soil stabilization matting or sod is installed.

316.03.17 Shredded Hardwood Bark (SHB) Mulch. As specified in 710.03.13.

316.03.18 Inspection and SWM Facility As-Built Certification. Inspect and document each step of construction of SWM filtration facilities and complete the applicable checklists and furnish the SWM facility as-built certification as specified.

316.04 MEASUREMENT AND PAYMENT. Payment will be full compensation for all control of discharge from subdrain pipe, geotextile, watering, sheeting, shoring, dewatering, hauling, storing, re-handling of material, removal and disposal of excess and unsuitable material, tilling, grading and slope adjustments and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

10-03-14

Excavation. Excavation will be measured and paid for as specified in Section 201.

Miscellaneous Structures. Miscellaneous Structures will be measured and paid for per cubic yard of the specified mix concrete.

Aggregate. Aggregate will be measured and paid for at the Contract unit price for one or more of the following.

(a) No. 2 Aggregate for Stormwater Management Facilities per cubic yard.

(b) No. 7 Aggregate for Stormwater Management Facilities per cubic yard.

(c) No. 57 Aggregate for Stormwater Management Facilities per cubic yard.

Removal of contaminated aggregate and replacement with clean aggregate will be at no additional cost to the Administration.

Geotextile. Geotextile will not be measured but the cost will be incidental to the excavation.

Subdrain Pipe. Perforated and solid-wall subdrain pipe will be measured and paid for at the Contract unit price per linear foot for the specified size of subdrain pipe. Fittings, caps, geotextile sock, cleanouts, vents, observation wells, and other incidentals will not be measured but the cost will be incidental to the subdrain pipe.

Coarse Sand. Coarse Sand will be measured and paid for at the Contract unit price per cubic yard for Coarse Sand for Stormwater Management Facilities.

Removal of contaminated coarse sand and replacement with uncontaminated coarse sand will be at no additional cost to the Administration.

Check Dams. Check dams will be measured and paid for at the Contract unit price for one or more of the following.

(a) Topsoil Check Dams per each.

(b) Concrete Check Dams per each.

Bioretention Soil Mixture (BSM). BSM will be measured and paid for at the Contract unit price per cubic yard.

Removal of contaminated BSM and replacement with clean BSM will be at no additional cost to the Administration.

Water. Water used for saturation of coarse sand and BSM will not be measured but the cost will be incidental to the pertinent items.

Shredded Hardwood Bark (SHB) Mulch. SHB Mulch will be measured and paid for at the Contract unit price per square yard for Shredded Hardwood Bark Mulching, 3 in. depth.

Sediment Control for Discharge from Subdrain Pipe Outlets. Control for any sediment-laden discharge from subdrain pipe outlets will not be measured but will be incidental to the pertinent Erosion and Sediment Control items.

Topsoil. As specified in 701.04.

Vegetation Installation and Establishment. Vegetation installation and establishment will be measured and paid for at the Contact unit price for the pertinent landscaping items as specified in 705.04, 707.04, 708.04, 710.04 and 711.04.

Soil Stabilization Matting. As specified in 709.04.

Stormwater Management (SWM) Facility As-Built Certification. As specified.

CATEGORY 400
STRUCTURES

DYNAMIC PILE MONITORING - STEEL PILES

DESCRIPTION. Secure and provide the services of an independent testing firm to furnish and operate all equipment necessary to perform dynamic Pile Driving Analyzer (PDA) tests. These tests shall be performed on all piles indicated in the plans as a test pile or on production piles designated by the Engineer. The independent testing firm shall be experienced in the use of the test equipment described herein and shall be subject to approval. All incidental labor and material necessary to make the work area accessible and to operate the equipment shall be supplied by the Contractor.

The independent testing firm shall direct the progress of the testing work, obtain and record the test data, perform monitoring of the stresses on the tested piles during initial driving and restrike (if required), and evaluate the driven pile capacity. The independent testing firm shall be responsible for conducting the actual tests of the test piles.

All tested piles shall be driven to the Minimum Penetration Elevation and Minimum Driving Load indicated on the Plans.

Dynamic PDA testing shall only be required on tested piles during initial driving, unless a restrike of the pile is required.

All test and production piles shall be driven by impact hammers. Vibratory hammers are prohibited.

Dynamic testing involves attaching two strain transducers and two accelerometers near the pile head. The dynamically tested piles shall be of sufficient length so that gauges are not driven below the water surface, pile template, or into the ground. Cables connecting the gauges near the pile head with the PDA located at the ground or water level shall be of sufficient length to reach 50 to 100 ft from the pile.

All dynamically tested piles shall be evaluated using the Case Pile Wave Analysis Program (CAPWAP).

MATERIALS. The dynamic monitoring shall be performed using a GC, GCPC, or PAK Model PDA. All equipment necessary for the dynamic monitoring such as gauges, cables, etc., shall be furnished by the independent testing firm. The equipment shall conform to the requirements of D 4945.

Provide the power supply to the tested pile locations for the dynamic testing duration. The power supply shall consist of a regular power source providing 110 volt AC power with a frequency of 60 Hz. Direct current welders or nonconstant power sources are unacceptable.

Maintain a stock of at least four working accelerometers and strain transducers at the job site whenever dynamic testing is being performed.

All repair or replacement costs shall be performed at no additional cost to the Administration.

CONSTRUCTION. Submit the Pile and Driving Equipment Data and a Wave Equation Analysis of Pile driving (WEAP) for the tested piles at least one month prior to pile driving as specified elsewhere in the Contract Documents.

Driving and Testing Procedures. Drive the pile based on the recommendations provided in the WEAP Approval Letter.

Prior to lifting the pile to be dynamically tested, provide a 3 ft minimum clear envelope around the pile so the dynamic testing consultant can access and prepare the pile for testing. Holes shall then be drilled and prepared for gauge attachment.

Propose a new pile driving system, modifications to the existing system, or new pile installation procedures if the pile installation stresses predicted by the WEAP or calculated by the PDA exceed the following maximum values:

Compression Stresses	0.9 Fy
Tension Stresses	0.9 Fy

where Fy = steel yield strength in ksi.

Dynamic testing shall be conducted during initial driving and restrike, if required. Piles shall be driven to achieve the Minimum Driving Load and the Minimum Penetration Elevation as shown on the plans. If the estimated tip elevation is reached and the Minimum Driving Load is not achieved, the pile driving should stop and pile restrike shall be required. Pile restrike shall occur no sooner than three days (72 hours) after the tested pile, or any pile within a 25 ft radius, has been driven and approved.

If the tested pile fails to achieve the required capacity on restrike, pile driving shall be stopped and the Office of Structures consulted for further direction.

The independent testing firm shall direct the progress of the testing work and shall obtain and record the test data. The independent testing firm shall prepare a hand written daily field report summarizing the dynamic testing results. As a minimum, the daily reports shall include the calculated driving stresses, transferred energy, and estimated pile capacity at the time of testing. Variations from previous trends in the dynamic test data shall also be noted. Daily field reports shall be faxed to the Engineer.

Impact Driving Method. Use this dynamic load testing procedure consisting of the following:

(a) Prior to being driven with the pile-driving hammer, each pile to be tested shall be instrumented with force and acceleration transducers by the independent testing firm with the aid of the Contractor's personnel.

(b) Dynamic measurements resulting from the pile hammer blows shall be automatically recorded

electronically. The independent testing firm shall operate all the equipment that analyzes the data from the sensors installed on the piles to capture pile stresses, pile-soil capacity, and the hammer efficiency.

The results of the dynamic testing shall be printed by the pile driving analyzer and shall include, for each blow count selected by the Engineer, a combination of the following quantities:

(1) Bearing capacity for the Case Goble method.

(2) Input and reflected values of force and velocity.

(3) Maximum transferred energy.

(4) Maximum compression force.

(5) Velocity and displacement.

(6) Blows per minute.

(7) Value of upward and downward traveling force wave.

(8) Ram stroke and corresponding blow sequence.

All of the above information shall be supplied to the Engineer within one day (24 hours) of the testing. All recorded signals from the pile sensors captured electronically shall be stored and shall be made available upon request by the Engineer at a later date for additional analysis. Within three days (72 hours) of completion of testing, the Contractor shall furnish the Engineer with a written report summarizing the generated data and computed bearing capacities. A copy of the written report shall be furnished to the Office of Structures.

(c) Upon determination by the independent testing firm that valid data have been secured, the independent testing firm with the assistance of the Contractor's crew shall remove the instrumentation from the piles.

Pile Analyses. All dynamically tested piles shall receive a CAPWAP. Each CAPWAP analysis shall include the following information:

(a) Graph showing the bearing capacity versus blow count and pile stress versus blow count.

(b) Simulated static load test curves for the tip and the top of the pile.

(c) Evaluation of the soil parameters based on the matching of the measured and computed values of forces, velocities and displacements.

(d) Static resistance distribution along the length of the pile.

Within three days (72 hours) of completion of CAPWAP, furnish the Engineer with a written report containing all computer print-outs and graphs from the CAPWAP. A copy of the written report shall be furnished to the Office of Structures and shall be approved in writing prior to driving the remaining test pile(s) and production piles at other locations within the project site.

MEASUREMENT AND PAYMENT. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Dynamic Pile Monitoring will be measured and paid for at the Contract unit price per each. The payment will be full compensation for preparing the preconstruction wave equation analysis and for the preparation of reports.

CAPWAP analysis will be measured and paid for at the Contract unit price per each. The payment will be full compensation for performing the analysis and preparation of reports.

CATEGORY 400
STRUCTURES

SECTION 405 — REMOVAL OF EXISTING STRUCTURE

284 **DELETE:** 405.01 DESCRIPTION in its entirety.

INSERT: The following.

405.01 DESCRIPTION. Remove and dispose of or recycle, reclaim, reuse, wholly or in part, designated structures.

The Contractor is advised that prints of plans of the existing pertinent structure(s) may be included in the Contract Documents. No responsibility for their accuracy or completeness is assumed by the Administration. Dimensions, details, etc. as shown thereon may not be as built.

405.03 CONSTRUCTION.

DELETE: The first paragraph, "Before removal operations…method for approval." in its entirety.

INSERT: The following.

Protect from any damage all portions of the existing structure scheduled to remain in the rehabilitated structure, and the remaining portions of the existing structure used to maintain traffic, and are scheduled to be removed at a later stage, including brick deck, the beams, abutments, piers, or any other structure members.

Prior to the start of removal operations, submit a list of the proposed equipment and removal methods for approval. Approval does not relieve the Contractor of responsibility for preserving those portions of the structure designated to remain and be incorporated into the rehabilitated structure, or used to maintain traffic.

Immediately halt removal operations if any of these existing elements that are to remain permanently or temporarily are damaged by the Contractor's operation. Submit the material and work methods proposed to be used to repair or replace the damaged elements to the Office of Structures for approval. Perform the approved method of repair or replacement of the damaged elements to the full satisfaction of the Engineer and the Office of Structures at no additional cost to the Administration. Any delays due to the required repair or replacement shall not be a cause for any claim.

During construction only approved equipment and material (for maximum weight, size, and location) required for a particular operation will be allowed on the existing or newly constructed portion of new bridge. Refer to TC-6.14 and 420.03.15 for additional requirements.

When a structure contains existing protective shields (sheeting or planking) that have been previously placed to contain debris from a deteriorating deck, the Contractor shall remove and dispose of the debris and shields at no additional cost to the Administration.

286 **ADD:** The following after 405.03.03.

405.03.04 Reporting Requirements. Recycle, reuse, reclaim as much of the removed structure material (structural steel, rebar, concrete, asphalt, bearings, fencing, etc.) as practical. Report the disposition of all removed structure components to the Project Engineer. Indicate the item description, amount (by weight, linear feet, cubic yard, or each), disposition (recycled, reused, reclaimed, disposed of, stockpiled for future recycling or use), place where material was taken (company name, phone number and address), and date. Report all like items using the same unit of measurement.

405.04 MEASUREMENT AND PAYMENT.

DELETE: the first paragraph, "The removal of…..data for review." in its entirety.

INSERT: The following.

The removal of existing bridges and structures or portions thereof will be measured and paid for as specified. The payment will be full compensation for all excavation, backfill, saw cuts, professional engineer services, removal of existing shields and debris, temporary protective shields, temporary sheeting and shoring, hauling, recycling, reuse, reclamation, storage or disposal, reporting and for all material, labor, equipment, tools, and incidentals necessary to complete the work. On deck replacement projects, payment also includes outlining the locations of the flange and floor beams, obtaining all deck elevations specified to determine rebound, computations necessary to place the new deck at the required elevation, and submitting all data for review.

CATEGORY 400
STRUCTURES

SECTION 410 — PILING

410.01 DESCRIPTION.

287 **ADD:** The following after the first paragraph.

Perform Dynamic Pile Monitoring when required as specified.

410.03 CONSTRUCTION.

289 **DELETE:** 410.03.05 Test Piling in its entirety.

INSERT: The following.

410.03.05 Test Piling. Furnish a Wave Equation Analysis Program (WEAP) of pile driveability for each test pile. The analysis shall be sealed and signed by a professional engineer registered in the State of Maryland and experienced in such work. The analysis shall demonstrate that the pile hammer proposed for use has sufficient power to drive the piles to the Driving Load and Estimated Minimum Penetration as shown without overstressing or damaging the piles. The analysis shall include the following:

(a) Analysis methodology.

(1) The ultimate soil resistance used in the analysis shall be not less than 225 percent of the required minimum driving load. For a structure where at least 2 percent of the piles will be dynamically monitored, an ultimate soil resistance not less than 155 percent of the required minimum driving load may be used. The proportioning of the tip resistance and the distribution of the side resistance shall be based on the soil boring data using either static analysis or other strength correlations.

(2) For hammers with an adjustable energy range, analysis shall demonstrate that minimum energy used within the range can mobilize the ultimate soil resistance, and that the maximum energy used within the range will not overstress the pile during driving operations based on allowable stresses in the AASHTO LRFD Bridge Design Specifications (current edition and all interims).

(3) The analysis shall demonstrate that with the hammer used, the required ultimate soil resistance shall be attained using hammer blows in the range of 2 to 10 blows per in.

(b) Interpretation of Soil Boring Data necessary to determine the resistance the pile will develop during driving to the estimated pile tip elevation.

(c) Computer input and output sheets and graphs showing soil resistance versus blow counts, and maximum tensile and compressive stresses in the pile versus blow counts.

(d) Provide for each hammer, at each test pile, charts of LRFD Driving Load (Pu) versus Energy (blow/minute) and Pile Set (blow/in.) using the formula shown on the plans for the End of Driving (EOD) condition.

(e) Test pile driving operations shall not commence until approval for the WEAP has been received.

(f) Drive test piles to determine the depth of penetration and the length of piling for structures.

Acceptance of the pile hammer and driving equipment will not relieve the Contractor's responsibility for properly driving piles, in satisfactory condition, to the driving resistance and tip elevations indicated or directed.

Drive test piles in permanent vertical position. Test piles found to be satisfactory shall be utilized as permanent piles.

410.03.06 Pile Driving.

DELETE: The first paragraph, "Submit a plan…driving any piling."

INSERT: The following.

Submit to the Director, Office of Structures, the hammer name, model, and manufacturer's data for each pile hammer proposed for use at least one month prior to the start of pile driving operations Include the Manufacturer's Catalog Information and a completed Pile and Driving Equipment Data Form provided elsewhere in this Invitation for Bids.

290 **DELETE:** The fourth, fifth and sixth paragraph "Hammer energy, for…of the hammer."

INSERT: The following.

Use pile-driving equipment of an acceptable type, weight, and capacity. Use air compressors of sufficient capacity to provide 25 percent more air than shown in the manufacturer's specifications for air-driven hammers. Do not use capblocks or cushions containing asbestos.

Use either drop-steam, air, diesel, or hydraulic actuated pile-driving hammers. Hammers shall be capable of developing at least the energy shown on the plans.

Equip hammers with a suitable drive head that accurately and securely holds the top of the pile in correct position, with reference to the hammer, and that distributes the blows from the ram over the entire top area of the pile or mandrel.

Use the optimum type and size of hammer for the indicated pile and subsurface conditions at the structure site. Use a hammer of a type and size that enables piles to be driven to any driving resistance without pile damage due to driving stresses, as indicated by the Wave Equation Analysis. Acceptance of a hammer relative to driving stress damage will not relieve the Contractor of responsibility for piles damaged because of misalignment of the leads, failure of capblock or cushion material, failure of splices, malfunctioning of the hammer, or other improper construction methods.

Construct pile driver leads to allow free movement of the hammer. Hold the leads in true vertical or inclined positions, as required, by guys or stiff braces to ensure support of the pile during driving. Provide leads of sufficient length so a follower will not be necessary under normal conditions.

291 **DELETE:** 410.03.09 in its entirety.

INSERT: The following.

410.03.09 Unanticipated Driving Conditions. Should unanticipated driving conditions occur such as when resistance on the pile results in hammer blows per inch in excess of 20 with the hammer operated at its maximum fuel or energy setting, or at a reduced fuel or energy setting based on pile installation stress control then the Contractor may elect to stop driving and contact the Office of Structures for further guidance.

410.04 MEASUREMENT AND PAYMENT.

295 **ADD:** The following after 410.04.06.

410.04.07 WEAP analysis will not be measured, but the cost will be incidental to the Contract unit price for the pertinent Pile item.

CATEGORY 400
STRUCTURES

SECTION 420 ─ PORTLAND CEMENT CONCRETE STRUCTURES

420.04 MEASUREMENT AND PAYMENT.

334 **DELETE:** 420.04.06 in its entirety.

INSERT: The following.

420.04.06 Floodlighting for placement of concrete (including superstructure concrete and concrete overlays) will not be measured but the cost will be incidental to the pertinent Concrete item. The payment will also be full compensation for fuel, backup generator, setup, relocation, and removal.

CATEGORY 400
STRUCTURES

SECTION 421 — REINFORCING STEEL

421.03 CONSTRUCTION.

337 **DELETE:** 421.03.06 Splicing in its entirety.

INSERT: The following.

421.03.06 Splicing. Furnish bars in the lengths and spliced as specified and as approved in the working drawings. Do not perform additional splicing without approval. Make lap splices with the bars in contact and wired together. Do not weld reinforcing steel or weld attachments to reinforcing steel without approval. Perform welding per AWS D1.4.

CATEGORY 400
STRUCTURES

SECTION 430 — METAL STRUCTURES

430.03 CONSTRUCTION.

356 **INSERT:** The following after the third sentence in 430.03.02.

Provide weekly work schedules prior to and during fabrication as directed.

362 **DELETE:** The first sentence in 430.03.17 (e) Turn of Nut Method.

INSERT: The following.

Provide a calibrated, dial torque wrench to be used as the inspection wrench and a calibrated bolt tension calibrator. Calibrate both devices annually or as necessary.

363 **DELETE:** 430.03.19 Welding in its entirety.

INSERT: The following.

430.03.19 Welding. Provide welding of structures and welding qualifications as specified and per American Welding Society (AWS) Bridge Welding Code D1.5 (AWS D1.5) unless otherwise directed. These provisions apply to both shop and field welding.

Ensure that all welders, welding machine operators, and tackers employed to work on Administration projects are qualified as follows:

(a) AWS Qualifications. Welders shall take tests approved by the Structure Committee for Economic Fabrication (SCEF) per AWS D1.5 as administered by an AWS Accredited Test Facility (ATF).

(b) Fabricator Qualifications. Fabricators performing work for Administration projects shall be qualified under the American Institute of Steel Construction (AISC) Certification Program for Steel Bridge Fabricators or Bridge and Highway Metal Component Manufacturers and the following:

(1) Meet certification requirements of the Standard for Steel Bridges and Bridge and Highway Metal Components and,

(2) Possess certification in either Simple, Intermediate or Advanced Bridges or as a Manufacturer of Components, depending on type of structural item required.

(3) Fabricators producing fracture-critical members or intermediate or advanced bridges shall meet specific supplemental requirements as determined.

(4) Approved fabricators may issue in-house welder qualifications for shop and field welding.

(c) Steel Stud Shear Developer Qualifications. Steel Stud Shear Developer welders will be inspected and approved at the time of installation per above.

All field welders shall possess a current AWS welder's qualification card or a fabrication facility qualification card approved by the Office of Materials Technology (OMT). This card shall be available for inspection at all times.

Welding members carrying primary stress shall be by the submerged arc method (SAW) unless otherwise specified. For material thickness 2 in. and greater, the narrow gap electro slag welding process (ESW) may be substituted. Members carrying primary stress are specified in 909.01.

After fabrication, welding will not be permitted on tension flanges for attachments (e.g, metal forms, ty screws) except for steel stud shear developers. Welding transversely across tension flanges of beams or girders will be cause for rejection, unless otherwise specified.

When field welds area required, mask 1-1/2 in. back from the weld area and do not paint.

364 **DELETE:** 430.03.20 in its entirety.

INSERT: The following.

430.03.20 Inspection of Fabricated Metal Structures. Meet AWS D1.5 and the following:

An approved Quality Control Plan (QCP) must be on file with OMT prior to receiving source approval. The Administration requires 30 days to review quality control plans not previously on file. The QCP shall include:

(a) Method for providing documentation.

(b) Method and frequency of performing quality control inspections.

(c) Qualifications of personnel performing quality control inspections.

Ensure that the inspection frequency is at least the minimum specified. Keep complete and current records and make available for inspection at all times.

06-02-15

CATEGORY 400
STRUCTURES

SECTION 432 — BEARINGS

432.01 DESCRIPTION.

370 **DELETE:** 432.01 DESCRIPTION in its entirety.

INSERT: The following.

432.01 DESCRIPTION. Furnish and install bearings fabricated per Section 430. Perform welding per AWS D1.5.

CATEGORY 400
STRUCTURES

425 **DELETE**: SECTION 450 – RETAINING WALLS in its entirety.

INSERT: The following.

SECTION 450 – RETAINING WALLS

DESCRIPTION. Construct cast-in-place (CIP) reinforced concrete footings and stems conforming to the AASHTO definitions of rigid retaining walls at the locations shown on the Plans and as discussed below in conformance with the Contract Documents and these Special Provisions and as directed by the Engineer. All components shall be as specified unless prior approval for alternatives is obtained from the Administration.

The Contractor has the option of selecting from the alternate retaining wall systems that are approved for use on this project as shown on the list below:

Firm: Big R Bridge Wall Name: Vistawall
Contact: Jeff Stone
Phone: 770-277-6242
Address: PO Box 1290; Greeley, CO 80632-1290

Firm: Earthtec, Inc. Wall Name: EarthTrac HA
Contact: Mat Klucina
Phone: 703-771-7306
Address: 413 Browning Court; Purcellville, VA 20132

Firm: Reinforced Earth Wall Company Wall Name: Reinforced Earth
Contact: Keith Brabant
Phone: 703-547-8797 x-1131
Address: 12001 Sunrise Valley Drive; Reston, VA 20191

Firm: Sine Wall, LLC Wall Name: Sine Wall
Contact: David Brodowski
Phone: 919-453-2011
Address: PO Box 1781; Wake Forest, NC 27588

Firm: Tensar International Wall Name: ARES
Contact: Peter Larkin
Phone: 910-579-7296
Address: 453 Lake Shore Drive; Sunset Beach, NC 28468

Firm: Tricon Precast LTD Wall Name: Tricon Retained Soil Wall System
Contact: Bryan Jennings, TEG Engineering
Phone: 616-261-8630
Address: 1505 44th Street, Suite B, Wyoming, Michigan

Firm: Maccaferri Wall Name: Macres Wall System
Contact: Giulia Lugli
Phone: 301-223-6910 ext. 232
Address: 10303 Governor Lane Blvd., Williamsport, Maryland

Walls must meet the aesthetic and height requirements shown in the Contract Documents. The Contractor shall use only one type of Mechanically Stabilized Earth wall system on this project.

Construct Mechanically Stabilized Earth (MSE) retaining walls at the locations shown on the Plans and as discussed below in conformance with the Contract Documents and these Special Provisions and as directed by the Engineer. Only those retaining walls specified will be permitted.

All components shall be as specified unless prior approval for alternatives is obtained from the Administration.

MATERIALS. Refer to 420.02

MSE Retaining Wall Backfill. Use size No. 57 stone as backfill for all MSE retaining walls, regardless of the type backfill recommended or specified by the retaining wall manufacturer. Slag or No. 57 stone containing slag shall not be used. The MSE retaining wall backfill material shall also meet the following requirements:

(a) Electrochemical Requirements:

Requirement	**Test Method**
Resistivity greater than 3000 ohm-cm	AASHTO T-288-91
pH range between 5.0 and 10.0	AASHTO T-289-91
Chlorides less than 100 ppm†	AASHTO T-291-91
Sulfates less than 200 ppm†	AASHTO T-290-91
Sulfides less than 300 ppm	AASHTO T-260-97
Organic Content <1%	AASHTO T-267-86

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

The Contractor shall furnish the Engineer a Certificate of Compliance certifying that the above materials comply with the applicable contract specifications. A copy of all test results performed by the Contractor or his supplier necessary to assure contract compliance shall also be furnished to the Engineer. Backfill not conforming to this specification shall not be used without the written consent of both the Engineer and the wall manufacturer.

For on-site excavated rock that is processed in conformance with Special Provision 402, the Contractor shall submit to the Engineer for review and approval a copy of certified test results and a certificate of compliance for every 50 cubic yards of processed material certifying that the newly processed material meets the above requirements prior to delivering the material to the site. All testing shall be performed by a testing laboratory preapproved by the Administration's Office of Materials.

Sample Panel. A sample retaining wall panel measuring 4 ft by 4 ft shall be prepared and delivered to the construction site. The panel shall be accompanied by the Administration's Office of Structures' letter approving the MSE retaining wall system selected. The panel shall be typical of the architectural finish to be used on the project. The submittal shall include a copy of the manufacturer's quality control plan for panel manufacturing. The sample panel shall remain on the project site and all subsequent retaining wall sections shall be equal in appearance to the approved sample panel.

Backfill Reinforcement. Backfill reinforcement shall consist of steel wire mesh, metal strips, or structural geosynthetics.

Steel wire mesh and embedded loops shall be shop fabricated from cold drawn steel wire meeting the minimum requirements of ASTM A82, and welded into the finished mesh fabric in accordance with ASTM A185.

Steel strips shall be hot rolled from bars to the required shape and dimensions with physical and mechanical properties meeting ASTM A572 Grade 65 or as shown in the Contract Documents. Shop-fabricated hot rolled steel tie straps shall meet the minimum requirements of ASTM A1011, Grade 50, or as shown in the Contract Documents.

Steel reinforcing strips, tie strips, reinforcing mesh and connectors used in permanent walls shall be galvanized in accordance with ASTM A123 or ASTM A153 as applicable.

Structural geosynthetics shall be made of polypropylene, select high density polyethylene, or high-tenacity polyester fibers having cross-sections sufficient to permit significant mechanical interlock with the backfill. Geosynthetics shall have high resistance to deformation under sustained long term load while in service and shall be resistant to ultraviolet degradation, all forms of biological or chemical degradation normally encountered in the material being reinforced, and damage under normal construction practices. Store the geosynthetics in conditions above 20 F and not greater than 140 F. Prevent mud, wet cement, epoxy, and like materials from coming into contact with and affixing to the geosynthetic material. Rolled

geosynthetic shall be laid flat or stood on end for storage. Cover the geosynthetic and protect from sunlight prior to placement in the wall system.

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

Joint Covers. Cover joints and other wall openings with a geotextile fabric Class PE, Type I meeting the requirements of Section 921.09. Apply an approved adhesive to the back of the precast component for attachment of the fabric material. The minimum width of the fabric sheets shall be 18 inches. All fabric laps shall be at least 4 inches long.

Horizontal Joint Filler. All horizontal joints shall have elastomeric or polymeric pads or fillers between precast components as recommended by the wall manufacturer. The pads or fillers shall be of sufficient size and hardness to limit vertical stresses on the pad and concrete surface and to prevent concrete to concrete contact at the joints.

Alignment Pins. Ensure that pins used to align the precast components during construction are of the size, shape and material required for the wall system selected.

CONSTRUCTION. Retaining walls shall be constructed as shown on the approved Working Drawings in conjunction with the Contract Documents and as specified herein.

Submittals. At least 30 calendar days prior to commencing work on any retaining wall, submit to the Engineer for approval Working Drawings and design calculations signed and sealed by a professional engineer registered in the State of Maryland. No work or ordering of materials shall commence until the Engineer has accepted the Working Drawings. Refer to TC-4.01 for additional information.

MSE retaining walls shall be designed in accordance with the current edition of the AASHTO LRFD Bridge Design Specifications including any interim revisions. All MSE retaining wall components including reinforcement and connection hardware shall be designed for a minimum service life of 75 years.

Working drawings shall show plan views, elevation or profile views, typical sections, details, and notes for the retaining walls. Working Drawings and design calculations shall include the following as applicable.

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

(b) Proposed ground elevations along the retaining wall in accordance with the Plans.

(c) Wall layout that will effectively retain the earth but not be less in height or length than that shown for the retaining wall in the Plans.

(d) Details depicting the shape, dimensions and locations of each individual wall unit, corner panels, and slip joint panels. No field cutting of any panels will be allowed. Wall panels adjacent to the wall coping shall be fabricated to match the proposed grade of the wall coping. No change in wall coping dimensions will be allowed.

(e) The typical lengths and spacing of the backfill reinforcement in the vertical and horizontal directions and any changes in length and spacing along the entire length of the wall.

(f) Method for interlocking adjacent wall units and backfill reinforcement to provide adequate strength and consistent alignment.

(g) Modifications and subsequent details to accommodate obstructions e.g. catch basins, drainage inlets, etc. located within the backfill reinforcement zone. The plan details shall also show the location of any proposed obstruction.

(h) Design calculations shall substantiate that the proposed MSE retaining wall system satisfies the design parameters provided in the Contract Documents.

(i) Complete list and details of all elements required for the proper construction of the system, including complete material specifications, required certifications and testing reports, recommended method of installation and sequence of construction.

(j) A checklist form indicating items **(a)** thru **(i)** have been incorporated in the submittal package.

All Working Drawings shall conform to Section 499. All pertinent retaining wall information, e.g. backfill parameters, wall alignment, utility locations, adjacent structures, etc., shall be checked prior to finalizing Working Drawings and design calculations. The Contractor shall bring any potential conflicts or issues to the Engineer's attention.

Concrete Face Panels. Each precast concrete panel delivered to the site shall be free of defects including stains, cracks, spalling corners, etc. The Contractor shall provide a certificate of material compliance from the panel manufacturer indicating that the delivered panels were manufactured following an approved industry quality control plan for precast concrete plants meeting the guidelines from the National Precast Concrete Association latest Quality Control Manual for Precast and Prestressed Concrete Plants, and that the panels meet the minimum material concrete requirements indicated in the Plans. The results from concrete compression tests shall also be included with the certificate for each lot delivered to the site.

(a) Concrete Finish. Panel front and rear surfaces shall comply with the specifications provided herein.

Front: Form liner finish as specified on the plans and in the special provisions.

Rear: Unformed surface, roughly screeded to eliminate open pockets of aggregate and surface distortions in excess of ¼ inch.

(b) Tolerances. Manufactured precast panels delivered to the site shall meet the following requirements.

(1) Panel dimensions shall be within 3/16 in. except that the lateral position of tie strips shall be within 1 in.

(2) Panel squareness shall not exceed ½ in. as determined by the difference between the two diagonals.

(3) Panel surface defects on smooth formed surfaces shall not exceed 1/8 in. per 5 ft length. Surface defects on textured-finished surfaces shall not exceed 5/16 in. per 5 ft length.

(c) Rejection. The units will be subject to rejection because of failure to meet any of the requirements specified above. Any or all of the following defects will also be sufficient cause for rejection.

(1) Indications of imperfect molding

(2) Indications of honeycombed or open texture concrete

(3) Physical defects of the concrete, such as broken or chipped concrete

(4) Stained form face due to excessive form oil, etc.

(5) Signs of aggregate segregation

(6) Bent or damaged attachment device for backfill reinforcement

(7) Unusable lifting inserts

(8) Exposed reinforcing steel

(9) Cracks at the PVC pipe or pin

Marking. Mark each panel permanently and legibly by etching on the rear face with the panel identification, project number, date cast, production lot number, and manufacturer's name or symbol.

Handling, Storage & Shipping. All units shall be handled, stored, and shipped in a manner to minimize the danger of chipping, discoloration, cracks, fractures and excessive bending stresses. Panels in storage shall be supported on firm blocking to protect the exposed exterior finish.

Wall Excavation. Excavate within the limits shown in the Contract Documents for an MSE retaining wall to the extent required to accommodate the maximum backfill reinforcement length through the entire wall height as determined from wall calculations and shown on approved Working Drawing plus 1 ft beyond the end of the backfill reinforcement. All excavation shall be in conformance with Section 402.

Foundation Preparation. The foundation for the retaining wall shall be graded level for a minimum width of 1 ft beyond the length of the reinforcement elements or as shown on the Plans. The foundation shall be test rolled as directed by the Engineer prior to wall construction with the same compaction equipment to be used for the wall construction. Any foundation soils found to be unsuitable shall be removed to the determined depth, replaced with graded aggregate base, and compacted in accordance with the Specifications.

Leveling Pad. At each panel foundation level, an unreinforced concrete leveling pad shall be provided as shown on the Plans. The leveling pad shall be cured a minimum of 12 hours before placement of wall panels. The concrete finish must be smooth and flat and not vary from the design elevation by more than 0.01 ft or less than 0.02 ft.

Wall Erection. All wall components shall be assembled, connected, and supported as recommended by the Wall manufacturer and as indicated in the approved Working Drawings. Precast concrete panels shall be placed with the aid of a light crane. Panels shall be handled by means of a lifting device set into the upper edge of the panels, and shall be placed in successive horizontal lifts in the sequence shown on the Plans as backfill placement proceeds. As backfill material is placed behind the panels, the panels shall be maintained in vertical or slightly battered position into the backfill by means of temporary wooden wedges placed in the joint at the junction of the two adjacent panels on the external side of the wall. All wooden wedges shall be removed as soon as the precast component above the wedged precast component is completely erected and backfilled. External bracing is required for the initial lift.

Vertical plumbness tolerances and horizontal alignment tolerances shall not exceed ¾ in. when measured along a 10 ft straight edge. The maximum allowable offset in any panel joint shall be ¾ in. The overall vertical plumbness tolerance of the wall from top to bottom shall not exceed ½ in. per 10 ft of wall height.

Installation of backfill reinforcement shall take place after backfill compaction is complete. Soil reinforcement shall be placed normal to the face of the wall, unless otherwise shown on the

Plans or as directed by the Engineer. Prior to placement of the backfill reinforcement, the backfill shall be compacted as specified herein.

Recesses at lifting devices in tops of topmost panels shall be grouted flush with an approved grout as directed by the Engineer except where there is a poured concrete coping or parapet.

The Contractor shall follow the recommended method of installation and sequence of construction from the wall manufacturer. Should field conditions require any deviation from the approved methods of installation, the Contractor shall notify the Engineer and the wall manufacturer prior to proceeding with the construction of the wall. The wall manufacturer shall submit for approval by the Engineer an addendum to the method of wall installation in which an alternative procedure is recommended to account for the encountered field condition.

The final wall dimensions shall be coordinated with the Manufacturer and the site-specific geometric constraints. Modifications to the wall dimensions from those shown on the Plans shall be brought to the attention of the Engineer prior to proceeding with construction of the wall. The color and final finish of the concrete panels shall match the adjacent concrete structures and in accordance with the applicable aesthetic guidelines for the Project. Panels shall be in a stacked bond pattern with horizontal joints staggered one-half the height of the panel.

Backfill Placement. Place MSE retaining wall backfill within the zone of the backfill reinforcements and surrounding embankment. Backfill shall be placed closely following the erection of each course of precast panel or backfill reinforcement layer and spread by moving the machinery parallel to the wall face. Backfill shall be compacted by at least seven (7) passes of a heavy vibratory roller, weighting a minimum of 8 tons.

The surrounding earth embankment shall be constructed simultaneously with and compacted in lifts at the same elevation as the MSE retaining wall backfill. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the facing. Any wall material that becomes damaged or disturbed during backfill placement shall be removed and replaced or corrected as recommended by the wall manufacturer to the satisfaction of the Engineer at no additional cost to the Administration.

The maximum lift thickness after compaction shall not exceed 8 in. regardless of the vertical spacing between the layers of backfill reinforcements. The Contractor shall decrease this lift thickness when, in the opinion of the Engineer, compaction is not attained.

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

Compaction within 3 ft of the facing shall be achieved by at least three (3) passes of a lightweight roller or vibratory system, weighting less than 1,000 lbs. Care shall be exercised in the compaction process to avoid misalignment of the facing. Heavy compaction equipment with

a weight greater than 1,000 lbs. shall not be used to compact backfill within 3 feet of the wall face.

At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing to direct runoff of rainwater away from the wall face. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

MEASUREMENT AND PAYMENT. Retaining walls will not be measured but will be paid for at the Contract lump sum price for the for the overall Design-Build Contract. The payment will be full compensation for all design, submittals, footings, leveling pads, forms and form removal, architectural treatment, reinforcement steel, concrete, concrete facing panels, curing, stains and coatings, excavation, drainage systems, backfill, geotextiles, fabrication, furnishing, erection, coping, backfill reinforcing elements, attachment devices, joint covers, joint fillers, alignment pins, adhesives, fasteners, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 400
STRUCTURES

450 **DELETE:** SECTION 465 — FUSION BONDED POWDER COATINGS FOR METAL in its entirety.

INSERT: The following.

SECTION 465 — MISCELLANEOUS COATINGS FOR METAL (STEEL)

465.01 DESCRIPTION. Furnish and apply various coatings to metal surfaces as specified. Refer to Sections 435 and 436 for cleaning and painting new and existing bridge structural steel, respectively.

465.02 MATERIALS.

Paint System C	912.05
Fusion Bonded Epoxy Powder Coating for Steel	917.02
Fusion Bonded Polyester Powder	917.03
Hot Dip Galvanized Zinc	A 123, A 153, and 465.03.05(c)
Galvanizing Repair	A 780 and 465.03.05(c)

Use paint and powder coating material selected from the Administration's approved vendors list.

465.03 CONSTRUCTION. Perform cleaning and coating in an approved, environmentally controlled plant. The Administration shall have access to each part of the process and reserves the right to witness or perform any Quality Control testing on a random basis.

Use polyester powder coating when coatings other than paint are specified for steel, or as directed.

The powder coating applicator shall have demonstrated the ability to properly apply and cure the materials of the system and shall be on the Administration's Approved List of Applicators prior to application of any coatings. Galvanizers shall be on the Administration's Approved List of Galvanizers.

465.03.01 Nongalvanized Carbon Steel. Prepare steel metal surfaces as specified in 436.03.10(h). Clean all items to be coated of any oil or grease; and abrasive blast to Near White in accordance with SSPC SP-10. Remove weld spatter, slivers, hackles, or other defects. Protect

cleaned surfaces from high humidity, rainfall, and surface moisture; and do not allow to flash-rust. Ensure that the blast profile is 2 to 3 mils as per D 4417, Method C.

(a) Epoxy Powder Coating System. The system consists of a single coat of epoxy powder coating. Ensure that the thickness of the cured coating is 7 ± 2 mils when measured as specified in SSPC PA2.

(b) Polyester Powder System. The system consists of Coat I of System C and a TGIC (Triglycidyl Isocyanurate) polyester powder finish coat. Apply the polyester powder in accordance with the manufacturer's recommendation and in an operation that immediately applies the powder after the organic zinc rich primer has fully cured. Ensure that the dry film thickness of the organic zinc rich paint is 3 to 5 mils and the thickness of the cured polyester coating is 5 to 9 mils as specified in SSPC PA2.

465.03.02 Hot Dip Galvanized Carbon Steel. Metals that have reactive steel chemistry require the galvanizer to reflect the steps to be taken to ensure proper adhesion in their quality control plan as per B 571.

Ensure that the finished galvanized product is free of excessive zinc areas, weld spatter, slivers, ash, and dross or other detriments. Paint or powder coat hot dip galvanized steel as specified. Use an anti-out-gassing type powder coating material for galvanized items. Galvanized items shall not have been galvanized more than one month prior to coating and shall not have been water or chromate quenched.

Clean and smooth surfaces to be coated by sweep blasting as per D 6386. Store items to be coated in an environment free of moisture and dust for a period of 12 hours maximum, when coating application does not immediately follow the sweep blast surface preparation.

(a) Paint System. Ensure that all paint within the paint system is from the same manufacturer and that intermediate and finish coats conform to Coats II and III of System C, respectively. Apply all coatings using methods and under conditions recommended by the paint manufacturer. Measure the thickness of the coating as specified in SSPC PA2.

(b) Polyester Powder Coating System. Place prepared surfaces in a preheated oven and heat for the necessary amount of time. Out-gas galvanized metal surfaces by preheating the surfaces to a temperature 50 F greater than the cure temperature; but not exceeding a surface temperature of 390 F.

Follow the powder coating manufacturer's' instructions in regards to the metal surface temperature, applying the coating material, and maintaining the cure parameters.

Apply the powder electrostatically and cure at a temperature not to exceed 50 F less than the out-gas temperature immediately after out-gassing, then cool the preheated piece to 50 F less than the out-gas temperature. Galvanized surfaces for items with different

thicknesses shall be allowed to cool to at least 50 F below the out-gas temperature prior to the application of the powder. The thickness of the polyester coating shall be 5 to 9 mils when measured in accordance with SSPC PA2.

465.03.03 Adhesion. Adhesion of the paint or powder coating system to either bare or galvanized metal shall be at least 4 A when tested in accordance with D 3359, Method A.

465.03.04 Testing. MSMT 615. The paint and powder coat finished surfaces shall be holiday and pinhole free when tested with a low voltage holiday detector (minimum 67 1/2 volts) in conformance with D 5162. There shall be no more than one deficiency per 5 square feet. Repair all holidays detected with additional coating.

Visually inspect all items for blisters, sags, and other deficiencies and repair in conformance with 465.03.05, if required. Damaged or deficient areas shall not exceed ½ of 1 percent of the surface area of the item. Items requiring repairs exceeding 1 in. in the narrowest dimension shall be rejected.

465.03.05 Touch Up System. 436.03.24. Provide a compatible touch up system to repair defects, areas damaged during erection, and all visible open areas. Prepare areas to be repaired and apply touch up systems in accordance with the coating manufacturer's recommendations.

(a) Select the **e**poxy powder touch up material to be used from the Administration's Approved List.

(b) Polyester powder touch up system shall be a two component aliphatic polyurethane meeting 912.04.02. The coating thickness of the touch up material for powder coating may be applied in multiple coats and shall be the same thickness as the powder coating. Use Coat I of System C to repair damage to the coating that penetrates to the metal surface; followed by the polyurethane.

(c) Make any necessary repairs to the galvanizing in accordance with A 780, using the hot stick or metalizing method. Use Coat I of System C for repairing the galvanizing if it is to be powder coated.

465.03.06 Color. The color of all coatings and touch up systems shall match Federal Standard 595 and the following as specified:

COLOR	COLOR NO.
Brown	20040
Black	27038
Green	24108

465.03.07 Certification. Paint shall meet 912.01.03, epoxy powder coating shall meet 917.02.02, and polyester powder coating shall meet 917.03.04.

02-07-11

The acceptance of hot dip galvanized zinc will be based on inspection and shall meet A 123, A 153, and the Contract Documents.

465.04 MEASUREMENT AND PAYMENT. Coatings for metal will not be measured but the cost will be incidental to the pertinent items specified.

CATEGORY 400
STRUCTURES

SECTION 499 — WORKING DRAWINGS

499.03 CONSTRUCTION.

499.03.02 Consultant Engineering Firm.

454 **ADD:** The following after the first paragraph, "When the Contract...to that firm."

Working drawings for structure in this Contract shall be sent to:

Home Office of the Design/Build Team

455 **499.03.03 Office of Bridge Development.**

DELETE: The first paragraph, "When no consultant...of Bridge Development." in its entirety.

INSERT: The following.

Working drawings shall be sent to the Director - Office of Structures.

CATEGORY 500
PAVING

PORTLAND CEMENT CONCRETE SPALL REPAIR

DESCRIPTION. Repair spalled areas at various locations within the limits of the project as shown or as directed. Spalling consists of small areas of cracking, breaking, chipping, or fraying of portland cement concrete (PCC) slabs that typically occur within 2' of the edge of joints. Some spalling may occur in the middle of the slab away from the joints.

MATERIALS.

Rapid Hardening Cementitious Materials for Concrete Pavement Repair	902.14
Portland Cement Concrete Mix # 9 using No 7 aggregate	902.10
Epoxy Adhesive	921.04

CONSTRUCTION. Repair spalled areas per the following:

Repair Guidelines:

(a) Rapid Hardening Cementitious material or Portland Cement Concrete Mix # 9 may be used in spalled areas that are less than 4 ft^2 and less than 1.5 in. deep

(b) Use Portland Cement Concrete Mix # 9 only in spalled areas are 4 ft^2 or greater or that are 1.5 in. deep or deeper.

(c) The maximum repair width shall not be greater the one third of the travel lane.

(d) Repair areas greater in width than one-third of the travel lane, deeper than one-third of the slab thickness, or where reinforcing steel is exposed as a Type I or II full-depth patch per Section 522. .

Repair Procedure: Refer to Section 522 and the following:

(a) Sound the area around the spalling with a light hammer to locate the extent of the repair. Mark the perimeter 3 inches beyond the delamination marks.

(b) Do not make repairs on spalls less than 6 in. long and less than 1.5 in. wide.

(c) Combine any two spalled areas less than 2 ft apart into one area of repair.

(d) Make a vertical saw cut along the outside perimeter of the repair area using a diamond-bladed saw set to a depth of approximately 2 in.

(e) Use a chipping hammer fitted with a spade bit having a maximum weight of 30 lbs. to remove the unsound concrete until sound and clean concrete is exposed along the entire bottom of the repair area. Expose the area to a depth of no more than 1/3 the slab thickness. When more chipping is required, or when any reinforcing steel is exposed, repair the area per Section 522.

(f) Removal of spalled or delaminated concrete may be performed by carbide milling rather than sawing and chipping to a depth of no more than 1/3 the slab thickness. When any reinforcing steel is exposed, repair the area per Section 522.

(g) Sound the bottom of the repair area with a light hammer to locate any remaining weak spots.

(h) Clean the repair area thoroughly of all loose and foreign material by abrasive blasting.

(i) Coat the repair area with an epoxy bonding compound per C881 Type II.

(j) Place the repair material in one continuous operation. Consolidate the concrete using spud vibrators or as recommended by the manufacturer. Finish the repair per 522.03. Trowel the repair outward to push the repair material against the walls of the repair.

(k) Cure the repair per 522.03.11.

MEASUREMENT AND PAYMENT. Portland Cement Concrete Spall Repair will be measured and paid for at the Contract unit price per square yard or by the bag for the pertinent Portland Cement Concrete Pavement item. The payment will be full compensation for all saw cutting, carbide milling, chipping, concrete, rapid harding cementitious materials, epoxy bonding compound, clean up of the patched areas, forms, reinforcement steel, chairs, epoxy coating, finishing, curing, joints, joint construction, joint saw cutting, joint sealing, tack coat, all hauling of materials, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 500
PAVING

SECTION 504 — HOT MIX ASPHALT PAVEMENT

466 **DELETE:** SECTION 504 — HOT MIX ASPHALT PAVEMENT in its entirety.

INSERT: The following.

SECTION 504 — ASPHALT PAVEMENT

504.01 DESCRIPTION. Construct Asphalt Pavement.

504.02 MATERIALS.

Performance Graded Asphalt Binders	904.02
Tack Coat	904.03
Asphalt Mixes	904.04
Crack Filler	911.01
Production Plants	915

504.03 CONSTRUCTION.

Quality Control Plan. **S**ubmit a Plant Quality Control Plan and a Field Quality Control Plan (QCP) at least 30 days prior to placement of any asphalt pavement. Submit the Plant QCP to the Office of Materials Technology (OMT) for approval. Submit the Field QCP to the District Engineer for approval. The Plans shall contain a statistically based procedure of random sampling and show methods proposed to control the equipment, materials, production, and paving operations. Discuss the QCP requirements in the pre-construction, pre-pave and progress meetings.

The Plant and Field QCP shall contain:

(a) Name and location of asphalt production plants,

(b) Laboratory and field personnel qualifications,

(c) Inspection and record keeping methods, and

(d) Minimum frequencies of sampling and testing.

Use the Quality Control Plant Template (www.roads.maryland.gov) to address all requirements necessary for plant quality control and plant approval.

Corrective actions will be taken for unsatisfactory construction practices and deviations from the Contract Documents.

Plan Administrator and Certified Technicians. The QCPs shall designate a Plan Administrator who shall have full authority to institute any action necessary for the successful implementation of the Plan. The Plan Administrator may supervise the QCP on more than one project if that person can contact the job site within one hour after being notified.

The QCP shall also designate a Certified Asphalt Plant Technician – Level 2, a Certified Asphalt Field Technician, a Certified Inertial Profiler Operator, a Certified Asphalt Plant Technician – Level 1, or Trainee Technicians per the Mid-Atlantic Region Technician Certification Program (MARTCP) and the Maryland Technician Certification Program.

A Certified Plant Technician shall be present at the plant during asphalt production and shipment unless otherwise approved in the Plant QCP. The technician shall perform quality control sampling, testing and documentation as specified.

A Certified Field Technician shall be present at the job site unless otherwise approved in the Field QCP. The technician shall be responsible for the required field quality control sampling and testing. Deviations from the QCP shall be cause for immediate suspension of production and paving operations.

The Certified Technicians shall perform sampling for quality control, quality assurance, acceptance, split sampling, and verification. Submit quality control test results to the Engineer.

MARTCP-Certified Technicians found deficient in their duties will have their certification(s) rescinded, as determined. Replace the deficient technician with a certified technician before resuming production and paving operations.

Records. Maintain complete records of sampling, testing, corrective actions and quality control inspection results. Provide copies of the reports upon request.

Maintain linear control charts or use other types of control charts (such as standard deviation or range), as approved. Control charts may be maintained by production, by mix, or by mix per project. Maintain the control charts in the quality control laboratory per the QCP. The control charts shall identify the mix design number, each test result, and the upper and lower limits specified for each test. Retain all original Quality Control worksheets for five years.

Quality Assurance (QA). The Administration will perform independent QA sampling, testing and inspections. QA consists of the following:

(a) Periodically observe the performance of Quality Control (QC) or QA testing,

(b) Monitoring control charts,

(c) Directing the sampling of mixes behind the paver prior to compaction,

(d) Directing the sampling of mixes at the plant site,

(e) Directing the sampling of cores taken from the compacted pavement,

(f) Monitoring conformance with the approved QCP(s), and

(g) Quality control sampling and testing procedures and quality control sampling and testing equipment will be evaluated per the Independent Assurance (IA) program.

504.03.01 Equipment. All production and paving equipment will subject to approval. Ensure the plant is ready for inspection per 915.01.02.

Hauling Units. Refer to 915.02(f).

Pavers. Pavers shall be equipped with a means of preventing the segregation of the coarse aggregate particles when moving the mix to the paver augers. The means and methods used may consist of chain curtains, deflector plates, or other such devices, or any combination of these per the manufacturer's recommendations. Demonstrate that modifications to the paving equipment have been implemented on all pavers prior to use on the project.

Use a self-contained, self-propelled unit for mainline paving. Inspection and approval will be based upon the manufacturer's recommendations. The paver shall:

(a) Produce a finished surface of the required smoothness and texture without tearing, shoving, or gouging the mix.

(b) Be operated in a manner which delivers a homogeneous mix the full width of the pavement.

(c) Have automatic controls capable of maintaining the grade and transverse slope within the required tolerances set forth in the contract documents.

(d) Use auger extensions to maintain a distance no greater than 18 in. from the end of the auger to the end gate when screed extensions are used.

Provide reference lines or other approved markings to control the horizontal alignment.

Manual operation will be permitted to make grade changes for constructing irregularly shaped and minor areas.

The equipment may be operated manually for the remainder of the workday if a malfunction of any automatic control occurs, as directed.

Rollers. Rollers shall be self-propelled, reversible, and steel wheeled or pneumatic tired. Inspect all rollers and present them for approval before use. Rollers shall be operated:

(a) In conformance with the manufacturer's recommendations.

(b) In a manner that does not damage the pavement.

(c) In a manner that delivers the optimal combination of density and ride requirements.

(d) In a manner that protects bridge decks. Do not use rollers in vibratory mode when paving bridge decks.

504.03.02 Weather Restrictions. Place mixes used as the final surface when the ambient air and surface temperatures are at least 40 F. Ensure that surfaces to be paved are clean and dry before paving, as approved.

(a) Place mixes used as intermediate and base layers when the ambient air and surface temperatures are at least 32 F.

(b) Place polymer-modified surface mixes when the ambient air and surface temperatures are at least 50 F.

(c) When it begins raining while the work is underway, material en route from the plant may be used at risk.

(d) The Administration reserves the right to perform any testing necessary to ensure the quality of the pavement.

(e) All additional testing and associated costs, including maintenance of traffic, will be at no cost.

If material placement is halted due to weather conditions, waste all material en route at no additional cost.

Do not place asphalt on a frozen graded aggregate base.

504.03.03 Foundation Preparation. Construct the foundation as specified prior to paving. Remove all excess crack filler and patch material before paving over existing pavement. All spalls and potholes shall be cleaned, tack coated, filled with asphalt, and tamped before paving. Adjust to grade manholes, valve boxes, inlets, and other construction appurtenances within the area to be paved as directed.

504.03.04 Tack Coat. Ensure the surface is dry and clear of all loose and foreign materials prior to application. Apply the tack coat uniformly across the surface using an application rate of 0.01 to 0.05 gal/yd^2 as directed.

504.03.05 Non-Tracking Tack Coat (NTTC). The Manufacturer shall supply a QCP for the NTTC detailing the handling and application procedures per PP71-11, and test results from an independent, accredited laboratory for shear and tensile strength.

(a) Sample the NTTC as directed and submit to OMT's Asphalt Technology Division. All samples will be tested against the manufacturer's specifications. Material out of compliance will not be accepted for use.

(b) Use equipment to heat and apply the NTTC at an application temperature range that conforms to the manufacturer's recommendations. Apply the NTTC in accordance with 504.03.02 and as directed.

(c) Apply the NTTC uniformly with a pressure distributor. Use hand spraying equipment only in areas inaccessible to the pressure distributor. Apply the NTTC using an application rate of 0.05 to 0.10 gal/yd^2 and do not dilute with water. The quantity, rate of application, temperature, and areas to be tacked shall be approved prior to application.

(d) Do not clean or discharge the tack coat distributor into ditches, onto shoulders or along the right of way. Park the distributor so the spray bar will not drip NTTC onto the surface of the traveled pavement.

(e) Exclude all traffic from sections treated with NTTC until the tack has cured and will no longer track onto adjacent non-treated areas. Adjacent pavement surfaces shall show minimal visible evidence and pavement markings shall show no visible evidence of tracking.

504.03.06 Asphalt Placement. Delivery and placement of the asphalt should be continuous. Place the asphalt while the temperature is at least 225 F, or as specified in the Field QCP. Place the asphalt with a paver used that conforms to 504.03.01. Do not broadcast loose mix over the new surface.

504.03.07 Compaction. Roll the asphalt immediately after placement and compact to the proper in-place density and ride smoothness. Incentive or disincentive price adjustment for density will be as specified in 504.04.02. Use steel wheel rollers for the first rolling of all joints and edges, the initial breakdown rolling, and the finish rolling. Use a power driven trench roller when base widening is too narrow to permit the use of conventional rollers.

Construct an earth berm or shoulder against the loose asphalt as soon as it is placed. The trench must be excavated wider than the proposed width. Roll and compact the two materials simultaneously.

No traffic is permitted on the pavement after rolling until it has cooled to less than 140 F. Roller marks shall not be visible after rolling operations.

504.03.08 Joints. Construct joints as directed and as follows:

(a) Stagger longitudinal and transverse joints in successive courses so that one is not directly above the other.

(b) Stagger transverse joints by the length of the paver.

(c) Stagger longitudinal joints at least 6 in. and arrange so that the longitudinal joint in the top course is within 6 in. of the line dividing the traffic lanes.

(d) Construct joints in a manner that provides a continuous bond between the old and new surfaces.

(e) Overlap the existing pavement 1 to 1.5 in. when constructing longitudinal joints adjacent to existing asphalt pavements.

(f) The initial longitudinal roller pass shall be on the uncompacted hot mat and 6 in. to 1 ft from the joint. The successive roller pass shall compact the overlapped material and the 6 in. to 1 ft material simultaneously.

(g) Apply tack coat to joints as directed. Cut back the edge of the existing pavement for its full depth at transverse joints when placing a surface course, and apply tack coat material as directed.

(h) Apply tack coat to all contact surfaces before placing the mix against curbs, gutters, headers, manholes, etc.

504.03.09 Edge Drop-off. When paving highways carrying traffic:

(a) Match all compacted pavement courses exceeding 2-1/2 in. in depth with the abutting lane or shoulder on the same working day.

(b) For compacted pavement courses of 2-1/2 in. or less are placed, use the option of paving the abutting lane or shoulder on alternate days.

(c) Pave all abutting lanes or shoulders prior to weekends and temporary shutdowns.

(d) Place advance warning traffic control devices per Section 104 where uneven pavement joints.

504.03.10 Tie-In. When paving highways carrying traffic:

(a) Construct a temporary tie-in at least 4 ft in length for each 1 in. of pavement depth when the posted speed $\leq$ 40 mph.

(b) Construct a temporary tie-in at least 10 ft in length for each 1 in. of pavement depth when the posted speed >40 mph.

(c) Construct temporary tie-ins before traffic is allowed to cross the transverse joint.

(d) Construct temporary tie-ins 10 ft or greater using a paver meeting 504.03.01.

(e) Remove a transverse portion of the existing pavement at the final tie-in point to maintain the design thickness of the final surface course.

(f) Construct the final tie-in to a length equal to the posted speed per 1 in. depth of the design thickness of the final course, with a length of at least 25 ft per 1 in. depth and a maximum length of 50 ft per 1 in. depth.

504.03.11 Mix Sampling & Testing. Mix sampling and testing for Quality Control (QC) is the responsibility of the Producer or Contractor. Identify the QC sampling locations in the Field QC Plan (plant or project site). Perform Quality Assurance (QA) sampling as directed and witnessed by the Administration. Obtain QA samples from behind the paver prior to compaction. The Administration will perform all QA testing.

(a) QC Sampling at the Plant. Refer to MSMT 457. The Engineer will retain all random sampling documentation. The producer shall sample the mix at the plant. The sample shall be obtained or witnessed by the certified technician. QC plant mix sample results shall not be used in the pay factor calculation. Submit the results to the Administration and identify as Plant samples.

(b) QC Sampling at the Project Site. Refer to MSMT 457. QC and QA samples shall not be split samples. The certified technician shall sample the mix at the project site. Sampling will be witnessed by the Administration.

(1) A mix lot constitutes all sublots of a mix created during the production of required tonnage for a lot.

(2) A mix sublot size should not exceed 1 000 tons.

(3) A sublot size up to 200 tons can be combined with the previous 1 000 ton sublot placed on the same day.

(4) A new lot number for a mix will be given when there is a change in the approved job mix formula.

(5) QC project site mix sample results may be used in the pay factor calculation.

(c) QA Sampling at the Project Site. Refer to MSMT 457. Sample mixes at the project site as specified.

(1) Obtain the samples from behind the paver prior to compaction. Documentation of random sampling shall be retained by the Engineer.

(2) The Contractor's Certified Technician shall sample the mix at the project site as witnessed by the Administration.

(3) The Administration will take possession of the QA samples and deliver to the Laboratory for testing.

(4) A mix sublot size should not exceed 1 000 tons. A sublot size up to 200 tons can be combined with the previous 1 000 ton sublot placed on the same day. A mix lot constitutes all sublots of a mix created during the production of required tonnage for a lot. A new lot number for a mix will be given when there is a change in the approved job mix formula.

(d) Mix Acceptance Determination. Obtain at least three behind the paver mix samples per acceptance lot for mix acceptance determination. An acceptance lot size is approximately equal to 6 000 tons of mix per project. A mix acceptance lot ends on the day when 6 000 tons is reached.

(1) QC and QA results from behind the paver will be compared based on the F test and t test methods per MSMT 733 for each pay factor property.

(2) When F test and t test method results indicate a QC and QA pay factor property is not from different populations, QC and QA results will be combined to calculate the mix pay factor property per MSMT 735 and 504.04.02.

(3) When F test and t test method indicate a QC and QA pay factor property is from different populations, the pay factor property will be determined using QA results only.

(4) The Administration will determine the acceptance evaluation procedure when less than three QA samples are obtained for an acceptance lot. The results will be made available within five working days.

504.03.12 Sampling & Testing for Density Determination. Refer to MSMT 457. Random core sampling locations will be selected for each sublot as specified. Sample the QC and QA cores in the presence of the Engineer. Cut four or six inch cores for mixes smaller than 25 mm and 6 in. cores for mixes 25 mm and larger.

A density lot is defined as a day's paving per mix. A sublot shall not exceed 500 tons. A paving day shall begin with a new lot and sublots. The Engineer shall witness the random

location coring. At the end of the day's paving, the Engineer will designate one randomly selected core sublot set for QC and one for QA. The Engineer will note specific reasons for any density waivers and submit the proper forms to the Administration.

(a) Quality Control for Density. The density of the core samples will be expressed as a percentage of the maximum specific gravity of the mixture for each lot's placement. The maximum specific gravity will be determined in accordance with T 209 and the core's percent density will be expressed to the nearest 0.1 percent.

If more than one mix sample is obtained per day's placement, an average of all maximum specific gravity tests for the day will be used for the determination of percent density of each core sample. The QC Laboratory will make results of individual days paving available to the Engineer and the Contractor no later than the next working day. Retain core samples until notified of the results of the F& t test.

(b) Quality Assurance for Density. The Engineer will take possession of the core samples and deliver the cores to the Administration's Laboratory for testing. The density of the core samples will be expressed as a percentage of the maximum specific gravity of the mixture for each lot's placement. The maximum specific gravity will be determined in accordance with T 209 and the core's percent density will be expressed to the nearest 0.1 percent.

(c) If more than one mix sample is obtained per day's placement, an average of all maximum specific gravity tests for the day will be used for the determination of percent density of each core sample. The Laboratory will make results of individual days paving available to the Engineer and the asphalt Producer within five working days.

(d) Acceptance. Each asphalt density lot will be evaluated for compliance using the Engineer's quality assurance **te**st data and the Contractor's QC data. The QC and QA core specific gravity data will be analyzed in conformance with MSMT 733 (F test and t test method).

(1) If test results are determined to be from the same population, QC and QA sublot results will be averaged to calculate the density pay factor in accordance with 504.04.02.

(2) If results are determined not to be from the same population, the pay factor will be calculated using QA sublot results only. The average QC maximum specific gravity test results and the average project site behind the paver QA maximum specific gravity test results shall be compared.

(3) If QC results and QA results compare within 0.026, the average of the combined QC and QA results shall be used to calculate each core density. If they do not compare within 0.026, QA maximum specific gravity results shall be used to determine each core density.

(4) Pay reduction or incentive for the pavement compaction lot will be calculated in conformance with 504.04.02. Statistical outliers will be determined per MSMT 734.

(5) An asphalt density lot size shall equal one paving day's production per mix. A lot shall be divided into a minimum of five equal sublots. A sublot shall not be greater than 500 tons. When a paving day's production per mix is greater than 2 500 tons, then each sublot size shall be 500 tons or fraction thereof.

Acceptance on projects requiring less than 500 tons of asphalt or when asphalt is used in non-traffic areas or on bridge decks will be determined with a thin layer density gauge used per the manufacturer's recommendations.

504.03.13 Thin Lifts and Wedge/Level Courses. If an asphalt course is determined to be a thin lift in accordance with the "Thin Lift Mix Design Identification Table" in 904.04.03, construct a 400 to 500 ft control strip on the first day of paving to determine optimum pavement density.

(a) Use a thin-lift nuclear or non-nuclear asphalt density gauge in accordance with the manufacturer's recommendations to take readings from the control strip in five random locations to determine roller patterns and the number of passes needed to obtain optimum density. Optimum density is defined as when the average density does not change by more than 1.0 percent between successive roller passes and the percent density is between 90.0 and 97.0.

(b) Core the five random gauge reading locations to verify the gauge calibration and to determine the percent pavement density. The cores will be tested by the contractor's QC laboratory and results will be verified by the Office of Materials Technology. The QC/QA cores will be saved by the contractor and made available to the Administration for retesting ten days past after the paving date or as directed.

(c) On the first day of paving, the target optimum density will be determined using the density gauge readings from the control strip; verified by the core results. The lot average density from the five control strip cores will be used as the target optimum density.

(d) Take a minimum of ten QC/QA gauge readings daily from random locations per day's paving per mix or two per 500 tons of paving per mix; whichever yields the higher frequency of locations. A density lot is defined as a day's paving per mix. A sublot shall not exceed 500 tons. A paving day shall begin with a new lot and sublots.

(e) Any lot average 2.0 percent or more below optimum and below 92 percent shall require a new control strip to be constructed, tested and approved before paving continues.

(f) Take 2 QA cores daily when production is in excess of 500 tons per location, or when successive days of less than 500 tons production totals 1 000 tons or greater. If the average of the two density gauge readings and the average of the two respective QA core densities are within 3.0 lb/ft^3, the Administration will accept all the daily density gauge readings. If they do not compare within 3.0 lb/ft^3, construct a new control strip and recalibrate the density gauge.

(g) Wedge/Level courses placed at variable thicknesses and any area greater than 3/4 in. shall be tested and accepted in accordance with this Thin Lift specification. Incentives are not applicable for Thin Lift or Wedge/Level courses.

504.03.14 Control Strip. When mixes are not determined to be Thin Lifts per 504.03.12, use the option of constructing a control strip for guidance in determining roller patterns. Construct the control strip on the first workday in which asphalt is placed between 400 and 500 ft in length. Remove any control strip, if necessary and as determined at no additional cost.
The construction a control strip may be required at any time during placement of asphalt based on the evaluation of compaction results, as determined.

504.03.15 Pavement Surface Checks. Ensure an approved 10 ft straightedge is available at all times. The surface of each pavement course shall be true to the established line and grade after final compaction of each course. The surface shall also be sufficiently smooth so that the surface does not deviate more than 1/8 in. when the straightedge is placed parallel to the centerline. The transverse slope of the finished surface of each course shall not deviate more than 3/16 in. when the straightedge is placed perpendicular to the centerline.

Check transverse joints using the straightedge immediately after the initial rolling. When the surface of each course varies more than 1/8 in. from true, make immediate corrections so the finished joint surface is within tolerance.

Areas that are tested and reported in accordance with the Pavement Surface Profile Specification are not applicable to 504.03.14.

504.03.16 Curbs, Gutters, Etc. Construct permanent curbs, gutters, edges, and other supports as shown and as specified, then backfill prior to placing the asphalt.

504.03.17 Shoulders. Construct shoulders as specified. Shoulders abutting the asphalt surface course of any two-lane pavement being used by traffic shall be completed as soon as possible after placement of the surface course on that lane.

504.03.18 Pavement Profile. Refer to Section 535.

504.04 MEASUREMENT AND PAYMENT. Asphalt pavement will be measured and paid for at the Contract unit price per ton. The payment will be full compensation for furnishing, hauling, placing all materials including anti-stripping additive, tack coat, control strip, pot hole and spall

repairs, setting of lines and grades where specified, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Temporary Tie-Ins. Placement and removal of the temporary tie-in where asphalt is being applied to the traveled way carrying traffic will not be measured but the cost will be incidental to the pertinent asphalt item.

Removal of the existing pavement or structure for the final tie-in will be measured and paid for at the Contract unit price for the pertinent items used. The asphalt for the final tie-in will be measured and paid for at the Contract unit price for the pertinent Asphalt item.

Adjustments. Adjustment of existing visible manholes, valve boxes, inlets, or other structures will not be measured but the cost will be incidental to the asphalt item. Adjustment of existing manholes, valve boxes, inlets, or other structures that are encountered below the existing grade will be considered for payment in conformance with GP-4.07.

Removal of Existing Raised/Recessed Pavement Markers. Removal of existing raised/recessed pavement markers will not be measured but the cost will be incidental to the asphalt item. Removal of existing raised/recessed pavement markers that are encountered below the existing pavement will be considered for payment in conformance with GP-4.07.

504.04.01 Price Adjustment for Asphalt Binder. A Price Adjustment (PA) will be made to provide additional compensation to the Contractor or a credit to the Administration for the fluctuation in the cost of asphalt binder.

For adjustment purposes, the prevailing base index price will be the price specified for PG 64-22 (PG64S-22) at time of bid opening. Cost differentials between PG 64-22 (PG64S-22) and a binder specified shall be included in the price bid per ton for Asphalt. A historical database will be maintained by the Administration.

The PA will be made when the index price for the month of placement increases or decreases more than 5 percent of the prevailing base index price. Computations will be as follows:

$$\text{Percent Change} = ((Pp - Pb)/ Pb) \times 100$$
$$PA = T \times Q \times ((Pp - (D \times Pb))$$

Where:

PA= Price Adjustment for the current month
T = Design target asphalt content expressed as a decimal
Q = Quantity of asphalt placed for the current month
Pp = Index price for PG 64-22(PG64S-22) asphalt binder per ton for the month of placement
D = 1.05 for increases over 5 percent; 0.95 for decreases over 5 percent
Pb = Prevailing base index price for PG 64-22 (PG64S-22) asphalt binder per ton

PA resulting in increased payment to the contractor will be paid under the item Price Adjustment for Asphalt Binder. The item amount will be established by the Administration and shall not be revised by the Contractor. PA resulting in a decreased payment will be deducted from monies owed the Contractor.

504.04.02 Payment Adjustments for Asphalt Mix and Pavement Density. Payment adjustments for pavement density will be based on individual sublot core test data for a given lot and the lot average density as specified in this section and Table 504A. Payment reductions for density and for mix will be made by adjusting the payment for Asphalt. Incentive payments will be made using the Contract items for Asphalt Mix and Pavement Density. The item amounts established by the Administration shall not be revised. Payment reductions for density will be waived for portions of the pavement where a poor foundation is determined as the cause for inadequate density.

TABLE 504A

Dense Graded Asphalt Mixes – Percent of Maximum Density

Lot Average % Minimum	*No Individual Sublot Below %**	*Pay Factor (DF)*
94.0	94.0	1.050
93.8	93.7	1.045
93.6	93.4	1.040
93.4	93.1	1.035
93.2	92.8	1.030
93.0	92.5	1.025
92.8	92.2	1.020
92.6	91.9	1.015
92.4	91.6	1.010
92.2	91.3	1.005
92.0	91.0	1.000
91.8	90.8	0.990
91.6	90.6	0.980
91.4	90.4	0.970
91.2	90.2	0.960
91.0	90.0	0.950
90.8	89.8	0.940
90.6	89.6	0.930
90.4	89.4	0.920
90.2	89.2	0.910
90.0	89.0	0.900
89.8	88.8	0.890
89.6	88.6	0.880
89.4	88.4	0.870

89.2	88.2	0.860
89.0	88.0	0.850
88.8	87.8	0.840
88.6	87.6	0.830
88.4	87.4	0.820
88.2	87.2	0.810
88.0	87.0	0.800
Less than 88.0	87.0	0.750 or rejected by Engineer

Note 1: Lots with test data above 97.0 may be rejected. Lots that are accepted will receive a pay adjustment in accordance with the following:

(a) When the density lot average is above 97.5, the pay factor = 75%
(b) When 3 sublot densities are above 97.0, the pay factor = 95%
(c) When 4 or more sublot densities are above 97.5, the pay factor = 75%

Note 2: Pay incentive or pay disincentive will not be paid for placements identified as wedge/level courses or thin lift courses.

Note 3: When the Contractor's core specific gravity data does not compare with the Administration's core specific gravity data, only the Administration's single sublot values and lot average value will be used in acceptance decision.

Note 4: The average sublot values and the lot average will be used in acceptance decision.

Lots in conformance will be accepted per Sections 904, 915, and MSMT 735. A composite pay factor (CPF) for Asphalt content and gradation will be based on the total estimated percent of the lot that is within specification limits using the quality level analysis.

Payment adjustments will be computed as follows:

Density Lot Payment Adjustment = (DF – 1) x (AP) x (TL)
Mix Design Lot Payment Adjustment = (MF – 1) x (AP) x (TL)

Where:

MF = Mixture pay factor [0.55 + (0.5 x CMPWSL)]
Refer to MSMT 735 for CMPWSL.
DF = Density pay factor from Table 504A.
AP = Adjusted/applicable unit price per 504.04.01.
TL = Applicable tonnage per lot.

(a) A lot containing material with a pay factor of less than 1.000 may be accepted at the reduced pay factor if the pay factor is at least 0.800 and there are no isolated defects.

(b) A lot containing material with a pay factor of less than 1.000 may be accepted at the reduced pay factor provided the composite pay factor for asphalt content and grading is at least 0.750, and there are no isolated defects.

(c) A in-place density lot containing nonconforming material that fails to obtain at least a 0.800 pay factor and a mixture lot containing nonconforming material that fails to obtain at least a 0.750 pay factor for asphalt content and gradation will be evaluated to determine acceptance. Lots that are rejected shall be replaced.

(d) Lots with less than five Quality Control or Quality Assurance samples per in-place density lot will not be evaluated for incentive payment.

(e) When less than three mix samples have been obtained at the time of the acceptance sampling or at the time a lot is terminated, the Engineer will determine if the material in a shortened lot will be considered a part of the previous lot or whether it will be accepted based on the individual test data.

504.04.03 Dispute Resolution. Refer to 915.02.03.

CATEGORY 500
PAVING

SECTION 504 — HOT MIX ASPHALT PAVEMENT

504.03 CONSTRUCTION

470 **DELETE: 504.03.04 Tack Coat** in its entirety.

INSERT: The following.

504.03.04 Tack Coat. Dry and clean the surface of all loose and foreign materials prior to application of the tack coat. Apply the tack coat uniformly across the surface as directed using an application rate of 0.01 to 0.05 gal/yd^2.

476 **DELETE: 504.03.12 Thin Lifts and Wedge/Level Courses** in its entirety.

INSERT: The following.

504.03.12 Thin Lifts and Wedge/Level Courses. When the HMA course is determined by the Engineer to be a thin lift in accordance with the "Thin Lift Mix Design Identification Table" in Section 904.04.03, construct a 400 to 500 ft control strip on the first day of paving to determine optimum pavement density.

Using an asphalt density gauge in accordance with the manufacturer's recommendation, take readings from the control strip in 5 random locations to determine roller patterns and the number of passes needed to obtain optimum density. Optimum density is defined as when the average density does not change by more than 1.0 percent between successive roller passes and the percent density is between 90.0 and 97.0.

Core the five random gauge reading locations to verify the gauge calibration and to determine the percent pavement density. The cores will be tested by the contractor's QC laboratory and results will be verified by the Office of Materials Technology. The QA cores will be saved by the contractor and made available to the Administration for retesting until the end of the project or as otherwise determined.

On the first day of paving, the target optimum density will be determined using the density gauge readings from the control strip; verified by the core results. The lot average density from the five control strip cores will be used as the target optimum density.

Take a minimum of 10 QC/QA gauge readings daily from random locations per day's paving per mix or two per 500 tons of paving per mix; whichever yields the higher frequency of locations. A density lot is defined as a day's paving per mix. A sublot shall not exceed 500 tons. A paving day shall begin with a new lot and sublots.

For the remainder of the project, any lot average 2.0 percent or more below optimum and below 92 percent shall require a new control strip to be constructed, tested and approved before paving continues.

Take a minimum of 2 QA cores daily when production is in excess of 500 tons per location, or when successive days of less than 500 tons production totals 1000 tons or greater. If the average of the two density gauge readings and the average of the two respective QA core densities are within 3.0 lb per cubic foot, the Administration will accept all the daily density gauge readings. If they do not compare within 3.0 lb per cubic foot, a new control strip will be run and the density gauge recalibrated.

Wedge/Level courses placed at variable thicknesses shall be tested and accepted in accordance with this Thin Lift specification. Incentives are not applicable.

504.04 MEASUREMENT AND PAYMENT.

478 **DELETE: 504.04.01 Price Adjustment for Asphalt Binder** in its entirety.

INSERT: The following.

504.04.01 Price Adjustment for Asphalt Binder. A Price Adjustment (PA) will be made to provide additional compensation to the Contractor or a credit to the Administration for the fluctuation in the cost of asphalt binder.

For adjustment purposes, the prevailing base index price will be the price specified for PG 64-22 Asphalt Binder posted at www.roads.maryland.gov (Business Center /Contracts Bids and Proposals) at time of the submittal of Technical and Price Proposals as defined in TC 2.08.03.1. Cost differentials between PG 64-22 and a binder specified shall be included in the price bid per ton for Hot Mix Asphalt. A historical database will be maintained by the Administration.

The PA will be made when the index price for the month of placement increases or decreases more than 5 percent of the prevailing base index price. Computations will be as follows:

$$\text{Percent Change} = ((Pp - Pb)/ Pb) \times 100$$

$$PA = T \times Q \times ((Pp - (D \times Pb))$$

Where:

PA = Price Adjustment for the current month
T = Design target asphalt content expressed as a decimal
Q = Quantity of Hot Mix Asphalt placed for the current month
Pp = Index price for PG 64-22 Asphalt Binder per ton for the month of placement
D = 1.05 for increases over 5 percent; 0.95 for decreases over 5 percent
Pb = Prevailing base index price for PG 64-22 Asphalt Binder per ton

PA resulting in increased payment to the contractor will be paid under the item Price Adjustment for Asphalt Binder. The item amount will be established by the Administration and shall not be revised by the Contractor. PA resulting in a decreased payment will be deducted from monies owed the Contractor.

479 **DELETE: 504.04.02 Price Adjustments for Hot Mix Asphalt Mixture and Pavement Density** in its entirety.

INSERT: The following.

504.04.02 Payment Adjustments for Pavement Density and Hot Mix Asphalt Mixture. Payment adjustments for pavement density will be based on individual sublot core test data for a given lot and the lot average density as specified in this section and Table 504A. Payment reductions for density and for mixture will be made by adjusting the payment for Hot Mix Asphalt. Incentive payments will be made using the Contract items for Pavement Density and Hot Mix Asphalt Mixture. The item amounts established by the Administration shall not be revised. Payment reductions for density will be waived for portions of the pavement where a poor foundation is determined as the cause for inadequate density.

TABLE 504A		
Dense Graded HMA Mixes – Percent of Maximum Density		
Lot Average % Minimum	No Individual Sublot Below %*	Pay Factor (DF)
94.0	94.0	1.050
93.8	93.7	1.045
93.6	93.4	1.040
93.4	93.1	1.035
93.2	92.8	1.030
93.0	92.5	1.025
92.8	92.2	1.020
92.6	91.9	1.015
92.4	91.6	1.010
92.2	91.3	1.005
92.0	91.0	1.000
91.8	90.8	0.990
91.6	90.6	0.980
91.4	90.4	0.970
91.2	90.2	0.960
91.0	90.0	0.950
90.8	89.8	0.940
90.6	89.6	0.930
90.4	89.4	0.920
90.2	89.2	0.910
90.0	89.0	0.900
89.8	88.8	0.890
89.6	88.6	0.880
89.4	88.4	0.870
89.2	88.2	0.860
89.0	88.0	0.850
88.8	87.8	0.840
88.6	87.6	0.830
88.4	87.4	0.820
88.2	87.2	0.810
88.0	87.0	0.800
Less than 88.0	87.0	0.750 or rejected by Engineer

Note 1: When any test data is above 97.0, the Engineer may reject the lot. When not rejected, the lot will receive a pay adjustment in accordance with the following:
(a**)** When the density lot average is above 97.5, the pay factor = 0.750.
(b**)** When 3 sublot densities are above 97.0, the pay factor = 0.950.
(c**)** When 4 or more sublot densities are above 97.5, the pay factor = 0.750.

Note 2: Pay incentive or pay disincentive will not be paid for placements identified as wedge/level courses or thin lift courses.

*Note 3: When the Contractor's core specific gravity data does not compare with the Administration's core specific gravity data, only the Administration's single sublot values and lot average value will be used in acceptance decision.
*Note 4: The average sublot values and the lot average will be used in acceptance decision.

Acceptance of a mixture lot will be in conformance with Sections 904, 915, and MSMT 735. A composite pay factor (CPF) for asphalt content and gradation will be based on the total estimated percent of the lot that is within Specification limits as computed using the quality level analysis in conformance with MSMT 735.

Payment adjustments will be computed as follows:

Density Lot Payment Adjustment = (DF – 1) x (AP) x (TL)

Mix Design Lot Payment Adjustment = (MF – 1) x (AP) x (TL)

where:

MF = Mixture pay factor [0.55 + (0.5 x CMPWSL)]
Refer to MSMT 735 for CMPWSL.
DF = Density pay factor from Table 504A.
AP = Adjusted/applicable unit price per 504.04.01.
TL = Applicable tonnage per lot.

An in-place density lot containing material with a pay factor of less than 1.000 may be accepted at the reduced pay factor provided the pay factor for density is at least 0.800, and there are no isolated defects.

A mixture lot containing material with a pay factor of less than 1.000 may be accepted at the reduced pay factor provided the composite pay factor for asphalt content and grading is at least 0.750, and there are no isolated defects.

An in-place density lot containing nonconforming material that fails to obtain at least a 0.800 pay factor and a mixture lot containing nonconforming material that fails to obtain at least a 0.750 pay factor for asphalt content and gradation will be evaluated to determine acceptance. Lots that are rejected shall be replaced.

Lots with less than five Quality Control or Quality Assurance samples per in-place density lot will not be evaluated for incentive payment.

When less than three mix samples have been obtained at the time of the acceptance sampling or at the time a lot is terminated, the Engineer will determine if the material in a shortened lot will be considered a part of the previous lot or whether it will be accepted based on the individual test data.

CATEGORY 500
PAVING

SECTION 505 — HOT MIX ASPHALT PATCHES

483 **DELETE:** SECTION 505 — HOT MIX ASPHALT PATCHES in its entirety.

INSERT: The following.

SECTION 505 — ASPHALT PATCHES

505.01 DESCRIPTION. Repair rigid, flexible, or composite pavements by removing part or all of the section of the existing pavement and replace with asphalt paving material. The locations and extent of the repairs will be as specified or as directed.

Partial Depth Patching (PDP). PDP consists of removing areas of unsound pavement up to 50 percent of the pavement thickness and replacing with an asphalt mix. The pavement thickness is defined as the thickness of all bound materials in the pavement structure including asphalt mix, portland cement concrete (PCC), and any other asphalt or cement modified material.

Full Depth Patching (FDP). FDP consists removing the full thickness of the pavement sections to the top of the aggregate base and replacing with an asphalt mix. Perform FDP whenever more than 50 percent of the pavement thickness requires repair.

505.02 MATERIALS.

Graded Aggregate Base	901.01
Aggregates for Asphalt Mixes	901.01
Performance Graded Asphalt Binders and Asphalt Mixes	904
Crack Filler	911.01
Production Plants	915
Cold Patch Material	924

505.03 CONSTRUCTION. Keep disturbance of the base material to a minimum. The faces of the remaining pavement shall be square and vertical without ragged edges. Do not use equipment that could damage the existing pavement.

505.03.01 Weather Restrictions. Refer to 504.03.02.

505.03.02 Existing Pavement. Complete all repairs on the same day in which excavation is completed. Do not leave open excavated areas at the end of the workday.

505.03.03 Removal of Pavement for PDP. Remove existing pavement by milling, grinding, or saw cutting to the specified depth. Maintain square vertical faces after removal.

(a) If concrete is encountered during removal, limit the depth of the patch to the top elevation of the PCC.

(b) For PDP of composite pavements, protect the PCC from damage during removal of the HMA.

(c) When the material at the bottom of the PDP is determined to be unsuitable, remove the unsuitable material until sound material is encountered.

(d) When PCC present in a composite pavement is determined to be unsuitable, follow the removal and replacement procedures for a FDP.

(e) Remove all loose and foreign materials before placing the patch, then treat all spalled cracks and joints by tack coating, filling and tamping with asphalt.

505.03.04 Removal of Pavement for FDP. Make a perpendicular saw cut full depth around the perimeter and remove the existing pavement to the top of the aggregate base. Refer to 522.03.03 for the concrete portion of a composite pavement. Maintain square vertical faces after saw cutting.

505.03.05 Base and Subgrade Preparation. The aggregate base of the FDP area will be evaluated to determine its suitability.

(a) When the aggregate base is determined to be unstable, compact it as specified in 501.03.10.

(b) When no aggregate base is present, construct the subgrade foundation per Section 208 or as directed.

(c) Removal of Unsuitable Material:

(1) When the aggregate base or subgrade material is unsuitable, remove and dispose of the unsuitable material.

(2) Replace the unsuitable material with graded aggregate base conforming to Section 501.

(3) Compact the replacement material in layers no greater than 4 in. depth.

(4) Protect the aggregate base or subgrade after placement.

(5) Remove and replace any aggregate base or subgrade damaged due to lack of protection at no additional cost.

505.03.06 Subgrade Drains. Refer to Section 306. The construction of subgrade drains may be required in areas of wet underlying subgrade or in areas where future drainage problems may be a concern, as determined.

505.03.07 Emergency Filler. Have sufficient approved cold patch material readily available to fill the void of the repair area. Place and compact the material as directed. Completely remove the material at the beginning of the next workday.

505.03.08 Steel Plates. Ensure an ample supply of 12 x 14 ft by 1 in. thick steel plates are available on site to cover the emergency filler.

505.03.09 Patch Construction. Refer to Section 504. Furnish equipment and perform placement, compaction, and quality control procedures as specified. Manual placement of the asphalt patches is permissible, as directed.

505.03.10 Patch Placement. Thoroughly clean and tack the exposed vertical surface of adjacent pavement prior to placing the asphalt patch per 504.03.04. Spread the asphalt with a shovel, rake, or by other approved methods. Do not place asphalt patches on a frozen base.

Maintain lift thickness in conformance with the following:

ASPHALT LIFT THICKNESS		
MIX DESIGNATION (mm)	**MINIMUM (in.)**	**MAXIMUM (in.)**
9.5	1.0	2.0
12.5	1.5	3.0
19.0	2.0	4.0
25.0	3.0	5.0
37.5	4.0	6.0

505.03.11 Mix Sampling Requirements. One random sample per mix will be required daily for projects using more than 200 tons. Quantities of 200 tons or less of asphalt may not require daily field sampling; however, one random sample per mix for every 1 000 tons of asphalt or one sample per mix will be required for every five days of patching, whichever yields the greater frequency. Random mix samples for patching will only be required for patches placed with a paver and will not be required for patches less than 1 000 ft^2.

505.03.12 Testing and Acceptance. Acceptance of Base and/or Surface of each patch will be determined by using an asphalt density gauge with test data witnessed by the Engineer. Calibrate the density gauge to the mix in order to obtain acceptable readings.

12-03-14

505.03.13 Density Determination Requirements. On the first day of patching, the Engineer will select three test locations and witness the testing. Sample the cores and label with the date sampled. Cores will be tested and retained in the QC Laboratory until OMT verifies the results. Submit the completed core sheets to OMT.

(a) The average pcf of the three cores and the average pcf of the three corresponding gauge readings shall be within 3.0 lb/ft^3 of each other, recalibrate the density gauge according to the manufacturer's recommendation. When the difference between the gauge readings and the core tests are greater than 3.0 $lb/ft^{3,}$ verify the gauge's accuracy by reading three new random locations.

(b) Report density gauge test data as a percentage of the maximum specific gravity determined for each day's production. An in-place density of 92.0 to 97.0 percent is required for each patch. Compliance will be determined for each patch separately by averaging all density tests performed within each specific patch. Submit compaction sheets to OMT daily for all production.

505.04 MEASUREMENT AND PAYMENT. Refer to 504.03.10 and MSMT 735. Payment will be full compensation for saw cutting, milling, grinding, removal, disposal, trimming of the existing pavement, subgrade preparation, placing all materials including tack coat, steel plates, emergency filler, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. After removal, steel plates and emergency filler will remain the property of the Contractor.

505.04.01 Partial Depth Patching and Full Depth Patching. Payment will be measured and paid for at the Contract unit price per square yard or per ton as specified. The payment will be full compensation for furnishing, hauling, placing all material, additional removal of pavement above the aggregate base, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

505.04.02 Removal of Unsuitable Material. Payment will be measured and paid for at the Contract unit price per cubic yard. The payment will also include excavation and disposal of unsuitable material, backfilling with aggregate, and compaction.

505.04.03 Price Adjustment for Asphalt Binder. Refer to 504.04.01. An adjustment will be made to the final Contract unit price for asphalt mixture if the price of asphalt binder fluctuates significantly from the prevailing price on the date of placement. This includes asphalt patching material converted to tons.

505.04.04 Price Adjustment for Asphalt Mix. Payment reduction or incentive will be made using the Contract items for Asphalt Mixes. The Administration will not allow revisions to the established item amounts.

CATEGORY 500
PAVING

486 **DELETE:** SECTION 506 — HOT MIX ASPHALT GAP-GRADED in its entirety.

INSERT: The following.

SECTION 506 — GAP-GRADED STONE MATRIX ASPHALT

506.01 DESCRIPTION. Place gap-graded stone matrix asphalt surface (GGSMA) as specified. GGSMA shall conform to Section 504, except as specified herein.

506.02 MATERIALS.

Gap-Graded Stone Matrix Asphalt	904.05
Production Plant	915

506.03 CONSTRUCTION.

506.03.01 Demonstration. Before proceeding with the actual work, the Contractor shall demonstrate to the Engineer that a satisfactory mix can be produced, placed, and the compactive effort determined. A minimum of 100 tons of GGSMA shall be placed outside the project limits for the demonstration. A new strip will be required if a project carries over to a new season. Paver and rollers shall conform to 504.03.01. A material transfer vehicle may be used as part of the demonstration strip.

506.03.02 Hauling Units. Dry soap powder, as approved by the Engineer, may be used with the release agent specified in 915.02(f). Truck beds shall be raised to drain excess water before being loaded with GGSMA.

A light dusting of No. 10 aggregate coated with 1 percent asphalt may be used in lieu of the liquid release agent.

The time between plant mixing and shipment shall not exceed one hour (storage time may vary depending upon gradation, type of binder and/or stabilizer. Storage material shall consistently have results of no less quality than mixtures discharged directly into hauling vehicles). Each load shall be completely covered with a full tarp extending a minimum of 6 in. over each side of the truck body and securely fastened.

506.03.03 Weather Restrictions. Placement of GGSMA will be permitted only when the ambient and surface temperatures are at least 50 F and in accordance with 504.03.02.

506.03.04 Material Transfer Vehicle (MTV). Use a material transfer vehicle to apply the final surface course. The MTV shall perform additional mixing of the Gap-Graded SMA material and then deposit the mixture into the paver at a uniform temperature and consistency.

506.03.05 Mix Temperature. The minimum temperature of the mixture at the time of placement shall be established during the mix design procedure.

506.03.06 Pavement Thickness. The thickness of the pavement shall be as specified in the Contract Documents. Thin Lift specification 504.03.12 is not applicable to GGSMA.

506.03.07 Tack Coat. Refer to 504.03.04 except that, the resulting coating shall be residual asphalt applied at a rate of 0.03 to 0.05 gal/yd^2.

506.03.08 Compaction. Compaction shall be performed using a minimum of three steel-wheeled rollers, each weighing 10 to12 tons. The rollers shall follow the paver within 500 ft. or roll as approved in the QC Plan. Rolling shall start immediately after placement. In place density shall conform to 504.03.11 (c), except that the density shall be 94 to 97 percent of maximum density. Sampling and testing shall be performed as specified in 504.03.11.

The rollers shall be equipped with a watering or soapy watering system that prevents material from sticking to the rollers.

506.03.09 Control Strip. The Contractor may opt to construct a control strip for guidance in determining roller patterns to achieve optimum density. When a control strip is constructed, it shall be placed on the first workday in which SMA is placed and shall be between 400 and 500 ft in length. Based on the Contractor's evaluation of the initial control strip, paving may continue at the Contractor's risk.

The Contractor will not be assessed a density pay adjustment for the amount of material required for construction of the control strips. Should the removal of any control strip be necessary, the Contractor shall remove it at no additional cost to the Administration.

The Engineer may require the Contractor to construct a control strip any time during placement of SMA based on the evaluation of compaction results.

506.03.10 Pavement Profile. Refer to the Pavement Surface Profile requirements specified in the Contract Documents.

506.03.11 Sampling and Testing for Density and Mixture. For sampling and testing for density and mixture refer to 504.03.10 and 11.

506.04 MEASUREMENT AND PAYMENT. Gap-Graded Stone Matrix Asphalt will be measured and paid for at the Contract unit price per ton, complete and in place. The payment will be full compensation for furnishing, hauling, placing all materials, material transfer vehicle, antistripping additive, tack coat, control strips, setting of lines and guides where specified, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Material produced for the demonstration will not be measured but the cost will be incidental to the item GGSMA.

506.04.01 Price Adjustment for Stone Matrix Asphalt Mixture and Pavement Density. Refer to 504.04 except as follows:

GAP GRADED STONE MATRIX ASPHALT MIXES		
PERCENT OF MAXIMUM DENSITY		
LOT AVERAGE MINIMUM (%)	**NO INDIVIDUAL SUBLOT BELOW (%)**	**PAY FACTOR (%)**
95.0	95.0	105.0
94.9	94.8	104.5
94.8	94.6	104.0
94.7	94.4	103.5
94.6	94.2	103.0
94.5	94.0	102.5
94.4	93.8	102.0
94.3	93.6	101.5
94.2	93.4	101.0
94.1	93.2	100.5
94.0	93.0	100.0
93.8	92.7	99.0
93.6	92.4	98.0
93.4	92.1	97.0
93.2	91.8	96.0
93.0	91.5	95.0
92.8	91.2	94.0
92.6	90.9	93.0
92.4	90.6	92.0
92.2	90.3	91.0
92.0	90.0	90.0
91.8	89.7	89.0
91.6	89.4	88.0
91.4	89.1	87.0
91.2	88.8	86.0
91.0	88.5	85.0
Less than 91.0	—	75.0 or rejected per Engineer

Note 1: When any test data is above 97.0, the lot may be rejected per the Engineer. When not rejected, the lot will receive a pay adjustment in accordance with the following:
(a) When the density lot average is above 97.5, the pay factor = 75%.
(b) When 3 sublot densities are above 97.0, the pay factor = 95%.
(c) When 4 or more sublot densities are above 97.5, the pay factor = 75%.

Note 2: Pay incentive or pay disincentive will not be paid for placements identified as wedge/level courses or thin lift courses.

Note 3: When the Contractor's core specific gravity data does not compare with the Administration's core specific gravity data, only the Administration's single sublot values and lot average value will be used in acceptance decision.

Note 4: The average sublot values and the lot average will be used in acceptance decision.

506.04.02 Dispute Resolution. Refer to 915.02.01, Responsibilities of the Administration, (e).

CATEGORY 500
PAVING

SECTION 520 — PLAIN AND REINFORCED PORTLAND CEMENT CONCRETE PAVEMENTS

520.03 CONSTRUCTION.

503 **DELETE: 520.03.11 Texturing and Edging** in its entirety.

INSERT: The following.

520.03.11 Texturing and Edging.

Texturing. Texture the surface of the pavement with longitudinally tined grooves using a mechanical device (such as a wire comb), following concrete finishing and surface check. The device shall have a single row of tines with nominal widths of 5/64 inch to 1/8 in. each. The nominal spacing of the tines shall be 3/4 ± 1/8 in. center-to-center. The nominal depth of the tined grooves shall be 1/8 ± 1/32 in. The device shall have horizontal and vertical controls to ensure straight, tined grooves of uniform depth.

Begin texturing when the concrete is plastic enough to allow texturing to the depth specified, but dry enough to prevent the concrete from flowing back into the grooves. Avoid overlaps and tearing of the concrete. Protect a 2 to 3-in. wide strip of pavement surface from tining for the length of the pavement; centered along longitudinal joints. Extend the tining as close as possible to the edge of any adjacent pavement to be placed without damaging the edge. Do not tine areas 6 in. from the edge of pavements where adjacent pavement is not placed. Do not tine areas 1 ft from the curb in closed sections. Hand operated tining equipment that produces an equivalent texture with the specified spacing may be used on small or irregularly shaped areas. The completed textured finish shall exhibit a uniform appearance.

Edging. Edge textured transverse and longitudinal slabs using a 1/4 in. radius edging tool when the concrete has reached its initial set.

506 **ADD:** The following after 520.03.16.

520.03.17 Dowel Bar Placement Checks. After each day's placement of the PCC pavement is complete and cured, the alignment and placement of the dowel bars will be checked by the Administration using a non-destructive test method. All joints will be tested to determine conformance with the following.

(a) Vertical Skew. The vertical skew shall be no greater than 1/2 in. tolerance over a 12 in. length of dowel bar.

(b) Horizontal Skew. The horizontal skew shall be no greater than 1/2 in. tolerance over a 12 in. length of dowel bar.

(c) Depth of Dowel Bar. The dowel bar shall be located within the middle third of the slab thickness. A minimum cover depth of 3 in. is required for the top, and a minimum cover depth of 2.5 in. is required for the bottom.

(d) Joint. The joint saw cut shall be in the middle third of the dowel bar length. The minimum embedment length on either side of the joint shall be 4 in.

(e) Missing Dowel Bar. A missing dowel bar shall be considered misaligned.

A joint is in nonconformance or misaligned if any dowel bar in the wheelpaths are not in conformance.

(a) For 12 ft wide or narrower lanes, the 3 outermost bars and 3 bars under the inside wheelpath must be in conformance.

(b) For widened slabs, the 3 bars under the outside wheelpath and the 3 bars under the inside wheelpath must be in conformance.

(c) In addition, a joint is in nonconformance or misaligned if at least 3 dowel bars in non-wheelpath areas do not conform to the above.

After testing is complete, the percentage of those joints not meeting the above will be determined. Deficiency will be subject to a reduced payment as specified in 520.04. This is in addition to the reduced pay for slab thickness.

520.04 MEASUREMENT AND PAYMENT.

506 **ADD:** The following after 520.04.01.

520.04.02 Dowel Bar Misalignment Price Adjustment. Payment for the percentage of joints accepted at a reduced price for not conforming to the proper alignment will be adjusted by the factors shown in the following table. Alignment is determined by procedures specified in 520.03.17. This shall be a reduced price for the portland cement concrete pavement item in addition to any reduction due to pavement thickness.

DOWEL BAR PRICE ADJUSTMENT	
Percent of Misaligned Joints *	**Percent of Payment, Contract Unit Price ****
0 to 10	100
>10 to 15	95
>15 to 20	90
>20 to 25	85
>25 to 30	75
>30 to 50	70
Greater than 50	Corrective action***

*This is the percentage of all joints tested.

**This price adjustment is to the PCC price and not for the dowel bars or joints. This is in addition to any price adjustment for pavement thickness.

***Corrective action may include removal and replacement, dowel bar retrofit, or other method approved by the Administration.

CATEGORY 500
PAVING

509 **DELETE:** SECTION 522 — PORTLAND CEMENT CONCRETE PAVEMENT REPAIRS in its entirety.

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INSERT: The following:

SECTION 522 —PORTLAND CEMENT CONCRETE PAVEMENT REPAIRS

522.01 DESCRIPTION. Repair plain, conventionally reinforced, or continuously reinforced Portland cement concrete pavement. Repairs are either Type I, 6 ft to less than 15 ft in length; or Type II, 15 ft and greater in length.

522.02 MATERIALS. Refer to 520.02 except as follows:

Graded Aggregate for Base Course	901.01
Crusher Run Aggregate (CR-6)	901.01
Concrete Mix No. 9	902.10
Nonshrink Grout	902.11(c)
Epoxy Grout	902.11(d)
Epoxy Adhesive	921.04
Concrete Mix HE	902.10
Macro Polyolefin Fibers	902.15.01

522.02.01 Polyester Grout. A polyester grout may be used in lieu of epoxy grout, provided the grout conforms to 902.11(d). Identify cartridge type systems by batch or lot number.

522.02.02 Epoxy Adhesives. Refer to 921.04. Use water insensitive materials classified as Type IV, Grade 3, Class B and C.

522.02.03 Reinforcement. Section 908 for reinforcement, including load transfer assemblies, tie bars, deformed steel bars, and longitudinal tie devices, except all material shall be epoxy coated.

522.03 CONSTRUCTION. The Engineer will determine the areas to be repaired and the type of repair. Submit a proposed repair plan, including equipment, methods and procedures prior to the start of repairs. Make repairs in only one lane at a time for each roadway. Protect the area against damage from all causes. Repair or replace any part of the repaired pavement that is damaged.

522.03.01 Equipment. Refer to 520.03.01 and the following:

522.03.01.01 Drills. Use hydraulic gang drills with a minimum of 2 independently powered and driven drills. Use tungsten carbide drill bits. Control the forward and reverse travel of the drills by mechanically applied pressure. Mount the drill on a suitable piece of equipment such that it is quickly transported and positioned. Rest and reference the drill rig frame on and to the pavement surface such that the drilled holes are cylindrical, perpendicular to the surface being drilled, and

repeatable in terms of position and alignment on the surface being drilled. Hand-held drills are not permitted.

522.03.01.02 Match Curing Apparatus. Per PP 54.

522.03.01.03 Portable Compressive Strength Testing Machine. Refer to T 22. Provide testing machines on site for testing match cure specimens at the specified times.

522.03.02 Weather Restrictions. Refer to 520.03.02, except perform the work only during April through October. When the range in daily temperature is expected to exceed 15 F, place concrete in the late afternoon after the existing pavement has achieved its maximum expansion, unless otherwise directed.

Provide cold weather protection per 520.03.12, except use insulated blankets when the ambient air temperature is less than 70 F.

522.03.03 Saw Cuts and Removal of Existing Pavement. Make all saw cuts perpendicular using a diamond saw blade. Remove concrete slabs by the lift out method in large sections. No other method of slab removal shall be used unless approved. Repair adjacent slab damage caused by the removal operations. Repair spalls greater than ¼-inch wide and 2 inches long and more than ½-inch deep below the pavement surface using an approved epoxy mortar. Extend the patch boundary by re-sawing the limits of the patch beyond the spalled area when spalls greater than 1 inch wide and 12 inches long and more than ½-inch deep below the pavement surface are created by the pavement removal operation. Complete all repairs within the same day that the pavement is removed.

Perform saw cutting and pavement removal as follows:

(a) Plain and Conventionally Reinforced Portland Cement Concrete Pavement. Make full depth saw cuts for the full slab width. When the repair is on only one side of an existing transverse joint, extend removal into the adjacent slab a sufficient distance to remove existing dowels. Remove the concrete slab within one week after making the saw cuts.

(b) Continuously Reinforced Portland Cement Concrete Pavement. Locate the boundaries of the repair at least 12 in. from the nearest transverse tight crack. Make a full depth saw cut across the full width of the slab. Remove the concrete to its full depth within the boundaries of the repair area within 72 hours after making saw cuts.

When saw cuts close due to temperature, make narrowly spaced, full depth, and full width saw cuts to relieve the pressure, or as directed. Remove the material between the narrowly spaced saw cuts and between the longitudinal joints as specified. Remove all waste material from the repair site. Seal any saw cuts that extend into adjacent slabs, curbs, or gutters per Section 523.

522.03.04 Base, Subbase and Subgrade Preparation. Refer to 505.03.03, except moisten the subbase or subgrade for all types of repairs.

522.03.05 Subgrade Drains. Construct subgrade drains per Section 306, if directed.

522.03.06 Forms. Use the existing adjacent pavement as a form. Ensure the adjacent pavement surfaces match the existing concrete pavement surface prior to performing repairs.

If the adjacent shoulder becomes damaged during removal of existing pavement, use forms conforming to 520.03.04. Excavate the adjacent shoulder the width of the form plus 6 inches. Overlap existing pavement at least 1 ft on each side of the patch and securely fasten to prevent movement. After removing the form, repair the excavated shoulder using Shoulder Repairs for Form Placement.

522.03.07 Reinforcement. Refer to 520.03.06 and as specified. Place the doweled joint at the slab face closest to the original doweled joint location.

(a) Refer to Standard No. MD 577.08. Drill holes into the face of the existing slab at mid depth. Blowout the holes and allow to dry.

(b) Grout or epoxy the dowels and tie bars into place. Align reinforcement in the direction of the pavement and parallel to the surface.

(c) Drill 4 holes per wheel path (8 per lane) into the face of the existing slab at mid depth. Space holes 12 inches apart on center.

(d) Use a pachometer or other device to determine the location and length of longitudinal joint ties in the concrete to remain in place outside the repair area.

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(e) If a longitudinal joint tie is within 12 inches of the surface being drilled, drill the outer holes 3 – 4 inches from the end of the tie.

(f) If no ties are within 12 inches of the surface being drilled, drill the outer holes 12 inches from a longitudinal joint between 2 travel lanes and 12 inches from a longitudinal joint between a travel lane and a shoulder.

Place a plastic grout retention disk on each dowel to prevent loss of the bonding material. Coat the protruding ends of the dowel bars with an approved water insoluble lubricant.

522.03.08 Joints. Refer to 520.03.14. Seal all joints as specified in Section 523.

522.03.09 Concrete Placement. Refer to 520.03.07. Clean any adjacent vertical surfaces prior to concrete placement. Construct both plain and continuously reinforced concrete pavement repairs in one full depth operation. Construct conventionally reinforced concrete pavement repairs by placing two equal lifts with the wire mesh laid on the surface of the first lift. Vibrate all concrete.

522.03.10 Finishing. Strike off the surface of the placed concrete to the finished grade using an adjustable steel or wooden template then float the surface. Screed the repair to provide ride uniformity with the adjacent pavement, as necessary. Match the contour of the existing roadway. Perform surface checks per 520.03.10. Patches not meeting uniformity requirements shall be diamond grinded at no additional cost.

522.03.11 Curing. Cure the concrete as specified in 520.03.12, except continue curing for 12 hours after concrete placement or until the repair is put into service.

522.03.12 Emergency Filler. Provide a sufficient amount of CR-6 to fill the void of the repair area. Place and compact the material then cover it with a steel plate. Completely remove the material when proceeding with the work using procedures that will not disturb the subgrade, subbase, dowels, load transfer tie bars, load transfer assemblies, or previously placed reinforcement.

522.03.13 Steel Plates. Have an ample supply of 12 x 14 x 1 in. thick steel plates available on the project to cover emergency filler and to protect the patch area until the concrete has developed sufficient strength to carry traffic.

522.03.14 Unacceptable Repairs. Remove and replace repairs that are not in conformance and repairs damaged by traffic or other causes.

522.03.15 Opening To Traffic. When used, prepare match cure specimens per PP 54. Provide temperature readings of the test specimens and the corresponding patch after finishing at intervals of one hour or less. Test match cure specimens on site at specified ages with a portable compression testing machine certified within 12 months. The pavement may be opened to traffic after having attained a compressive strength of 2,500 psi, and as approved.

522.04 MEASUREMENT AND PAYMENT. Portland cement concrete pavement repairs will be measured in place and paid for at the Contract unit price per square yard for the pertinent type Plain Portland Cement Concrete Pavement Repair, Conventionally Reinforced Portland Cement Concrete Pavement Repair, and Continuously Reinforced Portland Cement Concrete Pavement Repair item. The payment will be full compensation for saw cuts, furnishing, hauling, placing of all materials, curing using match cure apparatus, field testing of match curing specimens, removal and disposal of old concrete, grout, drilled holes, chairs, all tie devices, reinforcement, epoxy coating, steel plates, emergency filler, joint sealing, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Emergency filler, match curing apparatus, portable compression testing device, and steel plates will remain the property of the Contractor at the completion of the project.

522.04.01 Removal of Unsuitable Material and Refill per cubic yard. The payment will also include excavation and disposal of unsuitable material, backfilling with aggregate, and compaction.

522.04.02 Subgrade drains will be measured and paid for as specified in the applicable portions of Section 306.

CATEGORY 500
PAVING

SECTION 522 — PORTLAND CEMENT CONCRETE PAVEMENT REPAIRS

522.02 MATERIALS.

509 **DELETE:** 522.02 MATERIALS in its entirety.

INSERT: The following:

522.02 MATERIALS. Refer to 520.02 except as follows:

Graded Aggregate for Base Course	901.01
Crusher Run Aggregate CR-6	901.01
Concrete Mix No. 9	902.10
Nonshrink Grout	902.11(c)
Epoxy Grout	902.11(d)
Epoxy Adhesive	921.04

522.02.01 Polyester Grout. A polyester grout may be used in lieu of epoxy grout, provided the grout conforms to 902.11(d). Identify cartridge type systems by batch or lot number.

522.02.02 Epoxy Adhesives. Refer to 921.04. Use water insensitive materials classified as Type IV, Grade 3, Class B and C.

522.02.03 Reinforcement. Section 908 for reinforcement, including load transfer assemblies, tie bars, deformed steel bars, and longitudinal tie devices, except all material shall be epoxy coated.

CATEGORY 500
PAVING

SECTION 535 — PAVEMENT SURFACE PROFILE

535.01 DESCRIPTION. This work shall consist of measuring the roughness of the final surface of Superpave Asphalt Mix (SAM) or Portland Cement Concrete (PCC) pavements. The Contractor shall use an International Roughness Index (IRI) Inertial Profiler to collect Quality Control (QC) data. The IRI Inertial Profiler shall conform to E 950 and MSMT 563 as amended in these Specifications. The Administration will use an IRI Inertial Profiler to perform all Quality Assurance (QA) testing and acceptance. All traveled roadway surfaces shall be measured unless otherwise indicated in this Specification.

535.01.01 Existing Conditions. Following are the IRI values for the existing MD 32:

IRI INDICATOR	REPORTED VALUES FOR BOTH WHEEL PATHS (in./mile)	REPORTED STATEWIDE VALUES (2014) (in./mile)
Average	62	107
Maximum	115	637
Minimum	35	27
Standard Deviation	18	70

NOTE 1: IRI is an abbreviation for the International Roughness Index developed under World Bank Technical Report No. 46.
NOTE 2: IRI values were generated from the most recent pavement longitudinal profile data available, measured in the outside travel lane.
NOTE 3: The average, maximum, minimum, and standard deviation IRI values are based on intervals of 1/10 of a mile in length.

A definition of ride quality based on IRI (as defined by The Federal Highway Administration) is given below:

IRI RANGE (in./mile)	RIDE QUALITY
< 60	Very Good
≥ 60 to < 95	Good
≥ 95 to ≤ 170	Fair
>170 to ≤ 220	Mediocre
> 220 to ≤ 640	Poor

NOTE: IRI is an abbreviation for the International Roughness Index developed under World Bank Technical Report No. 46.

535.02 MATERIALS. Not applicable.

535.03 CONSTRUCTION.

535.03.01 Equipment Standardization Testing. Standardization testing shall be completed on Administration specified sites at regular intervals in conformance with MSMT 563. Additional standardization testing may be required for a device that is potentially out of conformance between regular standardization tests. Standardization shall be completed and a copy of the results shall be on file at the Administration's Office of Materials Technology (OMT). QC test data obtained with a profiler that has not completed standardization testing in conformance with MSMT 563 will not be accepted.

535.03.02 Quality Control Testing for Pavement Profile. The finished surface of all pavements shall be measured with a profiler by the Contractor in conformance with MSMT 563 and E 950. Pavement profiles shall be measured in both wheel paths simultaneously, parallel to the right edge of the lane, and in the direction of travel for each lane. The Contractor shall establish and document in the SAM Field Quality Control Plan (504.03) or the PCC Proposed Paving Plan (520.03) a regular schedule of pavement profiling to verify conformance with these Specifications. The Contractor shall notify the Engineer prior to performing any QC testing. The Contractor's QC data shall be submitted to the Engineer, in accordance with the approved QC plan submitted to OMT, within 72 hours of completion of the paving operations.

Data Submittal. All submittals shall be sent to the Engineer and to the Administration's OMT (in electronic format) via one of the following:

(a) E-mail: ridespec@sha.state.md.us

(b) Delivered: Office of Materials Technology
7450 Traffic Drive
Hanover, MD 21076
Attention: Paving Quality Assurance Team Leader

When any profile testing and data submission has not been completed within the specified times and in conformance with MSMT 563 for all sections on the project, the tested pavement will not be eligible for incentive payment as stated in 535.04.03(a). The Contractor's QC data will still be required for material clearance per Frequency Guide.

The QC IRI shall be determined using the Contractor's Inertial Profiler and shall be reported in sections equal to 25 ft in length and one lane in width. Tested sections shorter than 25 ft due to exempt areas or the project end shall be ignored. A full 25 ft section shall be started after each exempt area. Three runs shall be made as described in MSMT 563. The coefficient of variation of the overall average IRIs shall be less than or equal to 4 percent for three runs for the data to be accepted. When the first three runs do not meet the above criteria, additional runs shall be performed until three measured runs meet the criteria. Those three runs shall be submitted to the

Administration; however, only the median run (based on average IRI) will be considered from Contractor's QC data, and will be used to compute any pay adjustments.

(a) Areas Not Profiled. The following pavement areas shall not be profiled and not reported for pay adjustment:

(1) Shoulder areas.

(2) Parking areas of ride sharing facilities or park and ride lots.

(3) Pavements of ramps, side street tie-ins, acceleration lanes, or deceleration lanes less than 1,000 ft in length.

(4) Bridge decks, railroad crossings, stop signs and pavement within 50 ft thereof.

(5) Pavement within 50 ft of transverse joints that separate it from existing pavement. This does not apply when a transverse joint is paved on both sides as part of one contract.

(6) Pavements on projects with less than 1,000 center lane feet (after elimination of areas not to be profiled under items 1, 2, 3, 4, and 5 above.)

(7) Ramps greater than 1,000 centerline feet with radius less than 2,000 feet.

Pavement Surface Checks shall be performed on areas listed above in conformance with Section 504.03.14.

(b) Defects. When any section IRI is greater than or equal to IRI_e (table in 535.04), the Contractor shall take one of the following corrective actions, as directed and approved by the Engineer, at no additional cost to the Administration:

(1) Remove and replace the pavement that is greater than or equal to IRI_e, or

(2) Grind the section to bring the section IRI into conformance with these Specifications, or

(3) Accept the Defect Cost ($P_{defect,i}$, in 535.04) for any defect section where corrective action is not performed.

Items 1, 2, or 3 above shall be applied to each defect section as directed by the Engineer. Any approval from the Engineer to waive items 1 or 2 shall not constitute a waiver of item 3 unless explicitly stated by the Engineer. The Contractor shall re-profile all affected pavement sections, including any additional transverse paving joints created, after any corrective work to determine if the sections are within Specification. The re-profiled data shall include the section prior to the corrected sections and the four sections after the corrected sections. The re-profiled data shall be used for final pay calculations; however, the minimum IRI value for any corrected section shall be limited to IRI_c (table in 535.04).

Defects not due to Contractor's Workmanship. When the Engineer determines that a defect is not the result of the Contractor's workmanship, the Engineer shall provide a written justification for removing the defect from final pay calculations to the Administration's OMT (Attention: Asphalt Technology Division). The Engineer will discuss this matter with OMT's Asphalt Technology Division before making the final determination of pay adjustment.

535.03.03 Paving Quality Assurance Testing for Pavement Profile (IRI). The Administration may test sections of the pavement to verify the Contractor's QC data. When the QA testing has not been performed within 14 calendar days from the date that the final, 100 percent QC data submittal is received by the OMT, only the QC data will be used for any pay adjustments on the project. The QA testing will follow the same procedures required in 535.03. The initial QA test will consist of one run on all 25 ft sections. The initial QA run and the median QC run will be compared to determine acceptance of QC data. The average IRI, the number of defects, and the number of tested sections will be compared as follows:

STATISTIC	UNIT	QC DATA TOLERANCE WITH RESPECT TO QA DATA
Average IRI	in./mile	± (2 % + 2)
Number of Defects	Sections	± (10 % + 2)
Number of Tested Sections	Sections	± (1 % + 1)

When the Contractor's QC data falls within the above tolerances, the Contractor's QC data will be used for all pay adjustments. When the Contractor's QC data does not agree with the initial QA data as described above, and a cause cannot be identified, the Administration will profile a minimum of two additional QA runs. The three QA runs (one initial and two retests) will then be evaluated to determine if the coefficient of variation of the overall average IRIs is less than or equal to 4 percent for all three runs. When the three QA runs do not meet the above criteria, additional runs will be performed until three measured QA runs meet the criteria. The median run (based on average IRI) of the three QA runs will then be recompared with the Contractor's QC data in conformance with the above table.

When the QC and QA data are still not within the tolerances as described above for Average IRI or Number of Defects after three QA runs, both profilers shall be retested on a standardization test site to determine if either profiler no longer conforms to MSMT 563. When either profiler is out of standardization, the equipment shall be recalibrated or repaired as necessary to bring the device back into compliance with MSMT 563. When the Contractor's profiler is not restandardized and brought into compliance with MSMT 563 within three paving days, the Contractor shall cease the paving operation or use another standardized profiler for QC data collection. Once the Contractor's profiler complies with MSMT 563, the Contractor may retest sections for comparison with the Administration's data or accept the Administration's QA data

as the basis for any pay adjustment on all sections. When the Administration's profiler is out of standardization, the Contractor's QC data for all sections will be accepted. When both profilers are found to be in noncompliance with MSMT 563, the profilers shall be repaired or recalibrated as necessary and all QC and QA testing since the previous QC/QA comparison shall be repeated.

When the QC and QA data for Number of Tested Sections are not within the tolerance as described above, the Contractor and the Administration shall recalibrate their respective Distance Measuring Instruments (DMIs), and perform additional QC testing until the QC data meets the tolerance criteria for Number of Tested Sections.

535.04 MEASUREMENT AND PAYMENT. Pavement surface profile testing costs will be incidental to the SAM surface material or PCC material as specified in the Contract Documents. Payment will be full compensation for all set up, technicians, traffic control, any type of corrective work to bring the pavement into conformance with this Specification, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. The pay adjustment numbers for the Overall IRI (535.04.01) and for Defects (535.04.02) shall be calculated first. The pay adjustment for pavement surface profile applied on the Contract shall be the Total Pay Adjustment in conformance with 535.04.03.

535.04.01 Overall IRI. The overall average IRI for the project (IRI_{AVG}) will be calculated as the average IRI value of all tested 25 ft sections on the project. The pay adjustment for Overall IRI will then be calculated based on the factors shown below. This pay adjustment applies only to the pavement within the tested sections.

Incentive. $PF = P_{max}$, when IRI_{AVG} is less than or equal to IRI_a
$PF = P_{max} \times (IRI_b - IRI_{AVG})/(IRI_b - IRI_a)$, when IRI_{AVG} is greater than IRI_a and less than IRI_b

INCENTIVE = PF x NS x (25/5280 lane miles per section)
DISINCENTIVE = 0

Full Pay. When IRI_{AVG} is greater than or equal to IRI_b and less than or equal to IRI_c

INCENTIVE = 0
DISINCENTIVE = 0

Disincentive. $PF = P_{min} \times (IRI_{AVG} - IRI_c)/(IRI_d - IRI_c)$, when IRI_{AVG} is greater than IRI_c and less than IRI_d,
$PF = P_{min}$, when IRI_{AVG} is greater than or equal to IRI_d

INCENTIVE = 0
DISINCENTIVE = PF x NS x (25/5280 lane miles per section)

535.04.02 Defects. The IRI for each individual section on the project will be used to calculate any cost to be applied for defects on the project. The pay adjustment for defects will be calculated based on the factors shown below. This pay adjustment applies only to the pavement within the tested sections.

DEFECT COST = Sum of the defect costs ($P_{defect,i}$) for all defect sections

Where:

	DESCRIPTION	VALUE Existing MD 32	UNITS
P_{max}	Maximum Incentive for Overall IRI	$7,350	Dollars per lane-mile
P_{min}	Maximum Disincentive for Overall IRI	$7,350	Dollars per lane-mile
$P_{defect,i}$	Defect Cost for a given 25' section	*	Dollars per section
PF	Pay Factor for Overall IRI	*	Dollars per lane-mile
INCENTIVE	Incentive for Overall IRI	*	Dollars
DISINCENTIVE	Disincentive for Overall IRI	*	Dollars
DEFECT COST	Sum of the defect costs ($P_{defect,i}$) for all defect sections	*	Dollars
IRI_a	IRI for Maximum Incentive	41	Inches per mile
IRI_b	Minimum IRI for Full Pay	46	Inches per mile
IRI_c	Maximum IRI for Full Pay	62	Inches per mile
IRI_d	IRI for Maximum Disincentive	70	Inches per mile
IRI_e	IRI threshold for Defects	160	Inches per mile
IRI_{AVG}	Overall average IRI for the project	*	Inches per mile
IRI_{defect}	IRI for a given 25' defect section	*	Inches per mile
NS	Number of tested 25 foot Sections	*	Sections

* Value to be determined on the project.

The defect cost ($P_{defect,i}$) for each defect section will be computed using the following formula:

$$P_{defect,\,i} = 100 + \left(\frac{190 * (IRI_{defect} - IRI_e)}{(600 - IRI_e)} \right)$$

535.04.03 Total Pay Adjustment. A total pay adjustment (TPA) will be made based on the total of any incentive and disincentive for Overall IRI minus any Defects. TPA resulting in increased payment to the Contractor will be paid under the item Pavement Surface Profile Pay Adjustment. This item amount has been established by the Administration and shall not be revised by the Contractor. TPA resulting in decreased payment will be deducted from monies owed the Contractor. The TPA shall be subject to conditions (a) and (b) below.

Total Pay Adjustment = INCENTIVE - DISINCENTIVE - DEFECT COST

(a) Regardless of the measured profile of any test section, incentive payment will not be permitted for the project when the Contractor's QC data was not submitted on time in conformance with 535.03.02. All other sections of this Specification shall still apply.

Total Pay Adjustment = 0 - DISINCENTIVE - DEFECT COST

(b) The total value of Overall IRI disincentive and Defect Cost shall not be more than the Maximum Disincentive pay adjustment for all of the profiled 25 foot sections.

If DISINCENTIVE + DEFECT COST is greater than P_{min} x NS x (25/5280 lane miles per section)
then Total Pay Adjustment = - P_{min} x NS x (25/5280 lane miles per section)

CATEGORY 500
PAVING

SECTION 550 — PAVEMENT MARKING PAINT

550.01 DESCRIPTION. Furnish and apply nontoxic lead free waterborne pavement marking paint to pavement surfaces as specified in the Contract Documents or as directed by the Engineer. These markings includes lines (striping), legends (letters and numbers) and symbols.

550.02 MATERIALS. Paint is a nontoxic lead free waterborne pavement marking and is a non-durable material. All Paint Pavement Marking material shall be selected from the Qualified Products List.

Nontoxic Lead Free Waterborne Pavement Marking Material	951.01

550.03 CONSTRUCTION.

550.03.01 Quality Control / Quality Assurance. Refer to Section 549.

550.03.02 Application. The location, width, and type of marking shall be as specified in the Contract Documents or as directed by the Engineer.

(a) Temperature. The markings shall be applied when the paint, ambient and surface temperature, and relative humidity conform to the manufacturer's recommendations.

(b) Glass Beads. The Contractor shall apply the Maryland Blend gradation of glass beads uniformly across the surface of the stripe, at the rate of 7 to 9 lb/gal of paints.

(c) Thickness. The paint shall be applied at a wet film thickness of 18 ± 1 mils.

(d) Color. The color of the dry markings shall match Federal Standard 595 (38907 - yellow or 37925 - white). The Contractor shall make available the specified color chips for the Engineer's use to visually determine that the waterborne material matches the specified color.

(e) No-Track. The paint shall conform to 60 second no-track requirements. The no-track condition shall be determined by passing over the applied line at approximately 30 degrees with a standard passenger car or pickup truck. When viewed from a distance of 50 ft, the pavement surface shall show no evidence of the paint being picked up and redeposited on the pavement by the vehicle.

(f) Retroreflectance. The minimum retroreflectance shall be 150 millicandelas/lux/square meter for yellow and 250 millicandelas/lux/square meter for white as determined in conformance with MSMT 729.

550.03.03 Application Equipment. The equipment used for application of the paint shall be approved by the Engineer prior to start of work, and shall be capable of applying waterborne traffic paint that has been approved by the Administration. The Contractor shall provide access to the paint application equipment for inspection by the Engineer.

The paint carriage on the left side of the paint truck shall have three paint and bead guns. The paint carriage on the right side of the paint truck shall have two paint and bead guns.

All 10 in. lines shall be applied using two paint and bead guns. Raising the paint carriage in order to paint these lines with one paint gun and bead gun is prohibited.

The footage counters used to measure pavement markings shall be calibrated, and a notarized certification shall be submitted to the Engineer as part of the Quality Control Plan.

Temperature gauges shall be calibrated every six months and a copy of the calibration certification shall be submitted to the Engineer as part of the Quality Control Plan.

The applicator shall apply the surface dressing beads to the wet paint marking by means of a pressurized bead dispenser or other mechanical conveying method not dependent upon gravity for uniform application. The bead dispenser shall be equipped with an automatic cutoff system that will stop the flow of the paint material whenever there is a disruption in the application of the beads so that all markings placed shall be covered with a uniform layer of surface dressing beads.

Application equipment shall be capable of applying the markings at multiple width settings ranging from 4 to 12 in.

The applicator shall provide a method for cleanly cutting off stripe ends and shall be capable of applying all longitudinal pavement markings.

The equipment shall be mobile and maneuverable to the extent that straight lines can be followed and all standard curves can be made in true arcs.

All parts of the equipment shall be thoroughly cleaned of foreign material or different colored material prior to the introduction of a new batch of material.

550.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all pavement preparation, furnishing and placing of markings, testing, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Refer to 549.04.

Pavement Marking Paint will be measured and paid for at the Contract unit price for one or more of the following items:

(a) Pavement Marking Paint lines (striping) will be measured and paid for at the Contract unit price per linear foot for the color and width specified.

(b) Pavement Marking Paint Legends (letters and numbers) and Symbols will be measured and paid for at the Contract unit price per square foot. The square foot pay quantity for Legends (letters and numbers) and Symbols will be as specified in the Administrations Standard Details.

CATEGORY 500
PAVING

SECTION 552 — EPOXY PAVEMENT MARKING

552.01 DESCRIPTION. Furnish and apply lead-free two component epoxy white or yellow pavement markings with large and standard glass beads. The locations and patterns shall be as specified in the Contract Documents or as directed by the Engineer.

552.02 MATERIALS.

Lead Free Two Component Epoxy Pavement Marking Materials	951.08

Epoxy is a durable pavement marking material.

552.03 CONSTRUCTION.

552.03.01 Quality Assurance/Quality Control. Refer to Section 549.

552.03.02 Application. The location, width, and type of marking, shall be as specified in the Contract Documents or as directed by the Engineer.

Placing pavement marking material over longitudinal joints is prohibited; they shall be offset 2 in. or as directed by the Engineer.

Epoxy pavement markings shall conform to the following:

(a) Temperature. The markings shall be applied when the epoxy, ambient, and surface temperatures, and the relative humidity conform to the manufacturer's recommendations.

(b) Thickness. The epoxy pavement marking material shall be applied at a thickness of 20 ± 1 mils.

(c) Glass Beads. The Contractor shall apply a double-drop of large and standard glass beads uniformly across the surface of the stripe, at the rate of 11 to 13 lb/gal with a maximum total application of 25 lb/gal. The bead guns shall be calibrated in conformance with MSMT 729.

(d) Color. The color of the dry markings shall match Federal Standard 595 (13538 - yellow or 17886 - white). The Contractor shall make available the specified color chips for the Engineer's use to visually determine that the epoxy material matches the specified color.

(e) Retroreflectance. The minimum retroreflectance shall be 200 millicandelas/lux/square meter for yellow and 275 millicandelas/lux/square meter for white as determined in conformance with MSMT 729.

552.03.03 Application Equipment. The equipment used for application of the epoxy shall be approved by the Engineer prior to start of work, and shall be capable of applying material that has been approved by the Administration. The Contractor shall provide access to the application equipment for inspection by the Engineer.

The gun carriage on the left side of the striping truck shall have three epoxy and bead guns. The gun carriage on the right side of the truck shall have two epoxy and bead guns.

All 10 in. lines shall be applied using two epoxy and bead guns. Raising the gun carriage in order to stripe these lines with one epoxy gun and one bead gun is prohibited.

The footage counters used to measure pavement markings shall be calibrated and a notarized certification shall be submitted to the Engineer prior to application as part of the Quality Control Plan.

Temperature gauges shall be calibrated every six months and a copy of the calibration certification shall be submitted to the Engineer, as part of the Quality Control Plan.

The applicator shall apply the surface dressing beads to the epoxy marking by means of a pressurized bead dispenser or other mechanical conveying method not dependent upon gravity for uniform application. The bead dispenser shall be equipped with an automatic cutoff system that will stop the flow of the epoxy material whenever there is a disruption in the application of the beads so that all markings placed shall be covered with a uniform layer of surface dressing beads.

Application equipment shall be capable of applying the markings at multiple width settings ranging from 4 to 12 in. as specified in the Contract Documents.

The applicator shall provide a method for cleanly cutting off stripe ends and shall be capable of applying all longitudinal pavement markings.

The equipment shall be mobile and maneuverable to the extent that straight lines can be followed and all standard curves can be made in true arcs.

All parts of the equipment shall be thoroughly cleaned of foreign material or different colored material prior to the introduction of a new batch of material.

Testing performed by the Administration will provide the basis for final acceptance.

552.04 MEASUREMENT AND PAYMENT. Epoxy Pavement Marking will be measured and paid for at the Contract unit price per linear foot for the color and width specified. The payment will be full compensation for all pavement preparation, furnishing and placing of markings, testing, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 500
PAVING

SECTION 553 — LEAD FREE REFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS

553.01 DESCRIPTION. Prepare and apply lead free reflective thermoplastic pavement markings to roadway surfaces as specified in the Contract Documents or as directed by the Engineer.

553.02 MATERIALS.

Lead Free Reflective Thermoplastic Pavement Markings	951.02

553.03 CONSTRUCTION.

553.03.01 Quality Assurance/Quality Control. Refer to 549.03.01.

553.03.02 Application Equipment. An oil or air jacketed kettle shall be utilized for uniform melting and heating of the thermoplastic material. The kettle shall provide continuous mixing and agitation of the material. The kettle and the applicator shall be equipped with an automatic thermostatic device to provide positive temperature control.

The equipment shall be constructed so that all mixing and conveying parts, up to and including the application apparatus, maintains the material at the specified temperature. Conveying parts of the applicator between the reservoir and the application apparatus shall be constructed to prevent clogging and accumulation. The applicator shall be capable of containing a minimum of 600 lb of molten thermoplastic material.

The kettle and applicator shall be constructed and arranged to conform to the requirements of the National Board of Fire Underwriters (NBFU), the National Fire Protection Association (NFPA), and State and local authorities.

Temperature gauges shall be calibrated every six months and a copy of the calibration certification shall be submitted to the Engineer.

The applicator shall apply the surface dressing beads to the molten thermoplastic marking by means of a pressurized bead dispenser or other mechanical conveying method not dependent upon gravity for uniform application. The bead dispenser shall be equipped with an automatic cutoff system that will stop the flow of the thermoplastic material whenever there is a disruption in the application of the beads so that all markings placed shall be covered with a uniform layer of surface dressing beads.

Application equipment shall be capable of applying the markings at multiple width settings ranging from 4 to 12 in. as specified in the Contract Documents.

The applicator shall provide a method for cleanly cutting off stripe ends and shall be capable of applying all longitudinal pavement markings.

The equipment shall be mobile and maneuverable to the extent that straight lines can be followed and all standard curves can be made in true arcs.

All parts of the equipment shall be thoroughly cleaned of foreign material or different colored material prior to the introduction of a new batch of thermoplastic material.

553.03.03 Cleaning Pavement Surfaces. Refer to 549.03.02.

553.03.04 Application. The ambient and surface temperatures shall be at least 50 F and rising at the time of application.

Thermoplastic pavement markings shall be sprayed onto the pavement surface. Only the spray method of application shall be permitted. Gore areas, crosswalks, small intersections, roundabouts, and other areas which preclude the application of the markings with truck mounted equipment will be exempt from the spray application requirement.

Thermoplastic pavement markings shall conform to the following:

(a) Temperature. The molten material temperature shall be between 400 and 440 F unless otherwise recommended by the manufacturer, and approved by the Engineer.

(b) Primer. A primer shall be used if thermoplastic is applied to portland cement concrete. Any primer used shall be compatible with the thermoplastic material.

(c) Thickness. The pavement markings shall yield a solid thickness range of 80 to 95 mils above the roadway surface across the middle two-thirds of the line width when tested as specified in MSMT 729. Variation from this range will be used for the price adjustment specified in 553.04.01.

(d) Glass Beads. Glass beads shall be uniformly applied to the surface of the molten thermoplastic at the minimum rate of 7 to 9 lb/100 ft^2, as specified in MSMT 729.

(e) Color. The color of the dry markings shall match Federal Standard 595 (13538 - yellow or 17886 - white). The Contractor shall supply the specified color chips for the Engineer's use to visually determine that the thermoplastic material matches the specified color.

(f) Retroreflectance. Refer to MSMT 729. The millicandellas/lux/square meter values taken anytime within the first 30 days shall conform to the following:

RETROREFLECTANCE

COLOR	RETROREFLECTIVITY	CORRECTIVE ACTION
White	equal to or greater than 250	None
Yellow	equal to or greater than 150	
White	less than 250	Necessary corrective actions, including grinding if necessary, and re-tracing
Yellow	less than 150	

(g) Width. Refer to 549.03.01(a).

(h) Alignment. Refer to 549.03.01(a).

(i) Layout Markings. Refer to 549.03.01(a).

553.03.05 Quality Control Test Strip. Refer to 549.03.03.

553.03.06 Responsibility. Refer to Section 549.

553.03.07 Observation Period. Refer to Section 549.03.06.

553.04 MEASUREMENT AND PAYMENT. Refer to 549.04. The reflectometer will become the property of the Contractor at the completion of the project.

553.04.01 Price Adjustment for Film Thickness. The unit price for Lead Free Reflective Thermoplastic Pavement Markings will be per striped linear foot based on MSMT 729 calculations for thickness, and will be adjusted in conformance with the following:

MIL THICKNESS	PERCENT OF PAYMENT - UNIT PRICE
80 – 95 (a)(b)	100
75 – 79	90
70 – 74	88
65 – 69	82
60 – 64	72
Less than 60	Retrace to achieve a thickness of 80 to 95 mils. Retrace thickness shall be 30 mils min (b).

(a) The Engineer may require the Contractor to remove excess material thickness.
(b) Removal of excess material and retracing pavement markings shall be performed at no additional cost to the Administration.

CATEGORY 500 PAVING

SECTION 556 — PREFORMED THERMOPLASTIC PAVEMENT MARKINGS

556.01 DESCRIPTION. Furnish and install heat applied preformed thermoplastic pavement marking symbols, legends, and lines as specified in the Contract Documents or as directed by the Engineer.

556.02 MATERIALS.

Preformed Thermoplastic is a durable pavement marking material. All Preformed Thermoplastic Pavement Marking material shall be selected from the Qualified Products List.

Heat Applied Permanent Preformed Thermoplastic Pavement Marking Material	951.06

556.03 CONSTRUCTION.

556.03.01 Quality Assurance/Quality Control. Refer to 549.

556.03.02 Application. The location, width, and type of marking, shall be as specified in the Contract Documents or as directed by the Engineer.

Applying pavement markings over longitudinal joints is prohibited; they shall preferably be offset 2 in. from them.

Thermoplastic Pavement Marking shall conform to the following:

(a) Temperature. The markings shall be applied when the thermoplastic, ambient, and surface temperature, and relative humidity conform to the manufacturer's recommendations.

(b) Color. The color of the dry markings shall match Federal Standard 595 (13538 - yellow or 17886 - white). The Contractor shall supply the specified color chips for the Engineer's use to visually determine that the thermoplastic material matches the specified color.

(c) Primer. When specified by the manufacturer, a primer shall be used if thermoplastic is applied to Portland cement concrete.

(d) Retroreflectance. The minimum retroreflectance shall be 150 millicandelas/lux/square meter for yellow and 250 millicandelas/lux/square meter for white as determined in conformance with MSMT 729.

556.03.05 Packaging. The material shall be handled for shipping, unloading and storage as recommended by the manufacturer. Each shipping package shall be marked with the following information:

(a) Manufacturer's name.

(b) Description of item.

(c) Date of manufacture.

(d) Contractor's name.

(e) Purchase order number.

(f) Lot number.

(g) Color.

556.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all pavement preparation, furnishing and placing of markings, testing, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Preformed Thermoplastic Pavement Marking Legends (letters and numbers) and Symbols will be measured and paid for at the Contract unit price per square foot. The square foot pay quantity for Legends (letters and numbers) and Symbols will be as specified in the Administrations Standard Details

Preformed Thermoplastic Pavement Marking lines will be measured and paid for at the Contract unit price per linear foot for the color and width specified.

CATEGORY 500
PAVING

SECTION 557 – SNOWPLOWABLE RAISED PAVEMENT MARKERS

557.01 DESCRIPTION. Furnish and install new Snowplowable Raised Pavement Markers (SRPM) and replacement components as specified in the Contract Documents or as directed by the Engineer.

557.02 MATERIALS.

Castings	Qualified Products List / 951.05
Pavement Marker Reflector Lenses	Qualified Products List / 951.05
Epoxy	951.05

Snowplowable Raised Pavement Markers are durable materials.

557.03 CONSTRUCTION.

Casting. Recycled iron castings are prohibited.

Placement. Snowplowable Raised Pavement Markers shall be installed and located as specified in the Contract Documents and in conformance with the Maryland Manual of Uniform Traffic Control Devices (MdMUTCD).

General Installation Requirements.

(a) The Contractor shall install the SRPM no later than two weeks after the completion of the final surface or as directed by the Engineer.

(b) At the time of installation, the road surface and ambient temperature shall be as specified in the manufacturers' recommendations. Installing markers on wet pavement surfaces as determined in MSMT 729 is prohibited.

(c) At the time of installation, the Contractor shall have on the jobsite all the materials necessary to complete the installation.

(d) The quality control test strip containing a minimum of 10 groove cuts spaced as specified in the Contract Document shall be constructed to verify the accuracy and ability of the equipment and personnel. The contractor shall replace at no additional cost to the Administration any incorrect groove cuts and any incorrect casting placements within the test strip.

(e) At the time of installation, SRPM castings delivered with Pavement Marker Reflector Lens affixed should be free of dirt, dust, oil, grease, rust, moisture, or any foreign matter that will impair adhesion to the pavement. Any residual material that inhibits retroreflectivity of the reflector lens shall be removed without damage to the lens surface. It shall be the contractor's responsibility to clean each contaminated casting by sand blasting, wire brushing or other procedure approved by the Engineer to remove all foreign matter prior to installation. The use of chemicals to remove rust from the castings is prohibited.

(f) The contractor shall replace at no additional cost to the Administration any incorrect groove cut and any incorrect casting placement. An additional test strip may be required by the Engineer in the event of incorrect installations. Incorrect installations, as determined by the Engineer, shall be corrected and repaired by the contractor at no additional cost to the Administration.

Pavement Marker Reflector Lens. Reflector lenses for pavement markers shall be the same color as the adjacent pavement marking except the back side shall be as follows;

(a) One-Way Applications: The backside for One-Way Markers shall be red or blank as specified in the Contract Documents or as directed by the Engineer.

(b) Two-Way Applications: The backside for Two-Way Markers shall be the same color as the adjacent pavement marking.

The pavement marker reflector lens shall be imprinted with the model/batch number and the manufacturers' name.

Castings. The casting shall be imprinted with the model number and the manufacturer's name.

New Installation.

(a) The SRPM shall be installed in accordance with manufacturer's recommendations and D 4383. The installed height shall not exceed 0.25 in. above the road surface. The surface of the keel and web shall be free of scale, dirt, oil, grease or any other contaminant which may reduce its bond to the epoxy adhesive. All requirements of the manufacturer's installation instructions shall be met.

(b) The groove cut for the casting shall be the appropriate dimensions to allow 0.125 in. movement side to side of the casting. All leveling lugs on the casting must contact the pavement. The leading and trailing edges of the casting must lie below the pavement surface and the casting properly seated. All other requirements of the manufacturer's installation instructions shall be met.

(c) Lenses used shall be of a type specifically manufactured and approved for use as SRPM reflector lenses. Lenses that are manufactured exclusively for recessed pavement markers are not permitted as substitutes for SRPM reflector lenses.

Replacement.

(a) Casting Replacement. The re-use of damaged or removed castings is prohibited.

(b) Pavement Marker Reflector Lens Replacement. The Contractor shall remove and dispose of any damaged reflector lens and replace with a new lens. Previously installed undamaged castings which are missing a reflector lens shall have a new reflector lens installed. The replacement lenses shall be installed per manufacturer's written instructions.

(c) Casting Groove Cut Replacement and Accuracy. The re-use of existing groove cuts is prohibited; castings shall only be installed in new groove cuts. Previously used groove cuts shall be permanently patched in accordance with applicable sections of 504, 505 and 522 or

as directed by the Engineer. The location of the replacement groove cut shall be within 10 percent longitudinally in front (with the direction of traffic) and no lateral deviation exceeding 1-1/2 in.

Casting Adhesive. The epoxy adhesive used to fasten the castings to the pavement surface shall conform to D 4383-05 Table X1.1.

Reflector Lens Adhesive in Casting. The adhesive used to fasten the reflector lens to the casting shall meet the manufacturers' recommendations.

Quality Assurance/Quality Control. Section 549.

Observation Period. The Contractor shall replace at no additional cost to the Administration, any SRPM or Pavement Marker Reflector Lenses found to be damaged, non-retroreflective or missing due to improper installation or manufacturing defects within 180 days after opening to traffic.

557.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all pavement preparation, furnishing and placement of SRPM's, testing, removal, groove cutting, repair and all materials, labor, equipment, tools and all incidentals necessary to complete the work.

(a) Snowplowable Raised Pavement Markers will be paid for at the Contract unit price per each. Furnishing and installing SRPM includes the casting, reflector, adhesive and grooving.

(b) Removal of existing Castings, excluding any incorrect installation by the Contractor, and repair of Groove Cuts will be paid for at the Contract unit price per each.

(c) Replacement of Pavement Marker Reflector Lenses will be paid for at the Contract unit price per each.

CATEGORY 500
PAVING

SECTION 558 – RECESSED PAVEMENT MARKERS

558.01 DESCRIPTION. Furnish and install Recessed Pavement Markers (RPM) as specified in the Contract Documents, and or as directed by the Engineer.

558.02 MATERIALS.

Pavement Marker Reflector Lens	Qualified Products List / 951.05
Epoxy Adhesive	M237 Type II / 951.05

Recessed Pavement Markers are durable materials.

558.03 CONSTRUCTION.

Placement. Recessed Pavement Markers shall be installed and located as directed by the Contract Documents and in conformance with the Maryland Manual of Uniform Traffic Control Devices (MdMUTCD).

General Installation Requirements.

(a) The Contractor shall install the Recessed Pavement Markers no later than two weeks after the completion of the final surface or as directed by the Engineer.

(b) At the time of installation, the road surface and ambient temperature shall meet the manufacturers' recommendations for installation of the markers. Installing markers on wet pavement surfaces as determined in MSMT 729 is prohibited.

(c) At the time of installation, the Contractor shall have on the jobsite all the materials necessary to complete the installation.

(d) A test strip containing a minimum of 10 groove cuts spaced as specified in the Contract Document shall be constructed to verify the accuracy and ability of the equipment and personnel. The contractor shall replace at no additional cost to the Administration any incorrect groove cut, including test strip cuts.

(e) At the time of installation, the Recessed Pavement Markers should be free of dirt, dust, oil, grease, rust, moisture, or any foreign matter that will impair adhesion to the pavement. It shall be the contractor's responsibility to clean each contaminated Recessed Pavement Marker to remove all foreign matter without damaging the reflective surface prior to installation.

Pavement Marker Reflectors. Pavement Marker Reflector lenses for pavement markers shall be the same color as the adjacent pavement marking except the back side shall be as follows;

(a) One-Way Applications: The backside for One-Way Markers shall be red or blank as specified in the Contract Documents or as directed by the Engineer.

(b) Two-Way Applications: The backside for Two-Way Markers shall be the same color as the adjacent pavement marking.

The pavement marker reflector lens shall be imprinted with the model/batch number and the manufacturers' name.

New Installation.

(a) Recessed Marker Reflector Lenses shall be installed in accordance with D 4383 (the top of the marker shall be 0.06 in. below the pavement surface) or as directed by the Engineer. Lenses used shall be of a type specifically manufactured and approved for use as Recessed Marker Reflector lenses. Lenses that are manufactured exclusively for Snow Plowable Raised Pavement Markers are not permitted as substitutes for recessed lenses.

(b) The groove cut for mono-directional recessed marker reflectors lenses shall be the appropriate dimensions to properly seat one reflector lens in conformance with the manufacturer's recommendations and D 4383.

(c) The groove cut for bi-directional recessed marker reflectors lenses shall be the appropriate dimensions to properly seat two reflectors lenses, one on each end, in conformance with the manufacturer's recommendations and D 4383.

Replacement.

(a) Reflector Lens Replacement. The Contractor shall remove and dispose of any damaged reflector lens and replace with a new lens. The replacement reflector lens shall conform to the same requirements as the original reflector lens unless specified by the Contract Documents or as directed by the Engineer. The replacement lenses shall be installed per manufacturer's recommendations.

(b) Groove Cut. Existing groove cuts may be reused when they are in compliance with D 4383.

(c) Damaged Groove Cut Repair and Accuracy. Damaged groove cuts shall be repaired in accordance with applicable Sections of 504, 505, 522, and as directed by the Engineer. The location of the replacement groove cut shall be within one foot longitudinally in front (with the direction of traffic) and no lateral deviation exceeding 1½ in.

Assurance/Quality Control. Refer to 549.

Observation Period. The Contractor shall replace at no additional cost to the Administration, any Pavement Marker Reflector Lenses found to be damaged, non-retroreflective or missing due to improper installation or manufacturing defects within 180 days after opening to traffic.

558.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all pavement preparation, furnishing and placement of pavement markers, testing, removal, groove cutting, repair and all materials, labor, equipment, tools and all incidentals necessary to complete the work.

(a) Pavement Marker Reflector Lenses will be paid for at the Contract unit price per each. Furnishing and installing the Recessed Marker includes the reflector and adhesive.

(b) Groove Cuts will be paid for at the Contract unit price per each.

(c) Repair of damaged existing groove cuts will be paid for at the Contract unit price per each.

CATEGORY 500
PAVING

SECTION 559 — PERMANENT PREFORMED PATTERNED REFLECTIVE PAVEMENT MARKINGS

559.01 DESCRIPTION. Furnish and apply permanent preformed patterned reflective pavement (PPPRP) markings as specified in the Contract Documents or as directed by the Engineer.

559.02 MATERIALS.

Permanent Preformed Patterned Reflective Pavement Marking Materials	951.07

559.03 CONSTRUCTION.

559.03.01 General. PPPRP markings shall be applied in conformance with the manufacturer's recommendations or as directed by the Engineer.

On new hot mix asphalt projects, the PPPRP markings shall be inlaid into the hot surface of the top course of pavement. No top course paving shall be permitted unless the stripping crew and marking materials are at the project site.

When the Contract Documents specifies the use of PPPRP markings on concrete pavements or existing asphalt pavements, the Contractor shall use heat, solvent, or other type of adhesive primer in conformance with the manufacturer's recommendations.

Preformed legends and symbols shall conform to the applicable shape and sizes as specified in the MdMUTCD, and Contract Documents.

PPPRP markings shall conform to pavement contours and be resistant to deformation by traffic and damage from snow removal equipment. Surface preparation, use of solvents and primers and equipment used in the application of PPPRP markings shall conform with the manufacturer's recommendations and be approved by the Engineer. After PPPRP markings are applied, they shall be immediately ready for traffic.

559.03.02 Quality Assurance/Quality Control. Refer to 549.03.01.

559.03.03 Cleaning Pavement Surfaces. Refer to 549.03.02.

553.03.04 Application. Refer to 549.03.03 and the following:

(a) Manufacturer's Recommendations. The Contractor shall provide a copy of the manufacturer's recommendations to the Engineer, and shall follow them for the installation of the line markings.

(b) Adherence. Adherence of PPPRP markings shall be randomly checked by using a paint scraper or another approved tool, which shall be held nearly parallel with the highway surface, so there is no dislodging of the tape.

10-31-08¶

(c) Thickness. The finished thickness of the PPPRP markings shall have a minimum caliper of 0.060 in. at the thickest portion of the patterned cross section, and a minimum caliper of 0.020 in. at the thinnest portion of the cross section. Measurements shall be made from the top of finished pavement surface.

(d) Color. The color of the markings shall match Federal Standard 595 (33538 - yellow, 37886 – white, or 37038 - black). The Contractor shall supply the specified color chips for the Engineer's use to visually determine that the PPPRP markings match the specified color.

(e) Retroreflectance. Refer to MSMT 729 and the following:

MINIMUM RETROREFLECTANCE

COLOR	RETROREFLECTIVITY	CORRECTIVE ACTION
White	350 or higher	None
Yellow	250 or higher	
White	less than 350	Necessary corrective actions, removal, replacement
Yellow	less than 250	

(f) Width. Refer to 549.03.01(a).

(g) Alignment. Refer to 549.03.01(a).

(h) Layout Markings. Refer to 549.03.01(a).

559.03.05 Quality Control Test Strip. Refer to 549.03.03.

559.03.06 Responsibility. Refer to Section 549.

559.03.07 Observation Period. The Contractor shall be responsible for any defects in materials and workmanship of the PPPRP markings for a period of 180 days from the date the markings are applied and under traffic.

The Engineer will not assess time charges during the observation period provided all other work on the Contract is complete. At the end of the observation period, the Engineer will inspect the pavement marking for durability, color, reflectivity, and inform the Contractor of all pavement markings that have failed and require replacement. The pavement marking will be considered failed for any of the following conditions:

(a) More than five percent of the substrate is exposed in any 2000 ft section of longitudinal pavement marking line.

(b) Retroreflectance values have dropped below 300 mcd/L/m^2 for white or 220 mcd/L/m^2 for yellow.

(c) Marking is discolored on a visual comparison with the color chips.

10-31-08¶

The Contractor shall remove and replace all failed PPPRP markings within 30 days of receiving written notification from the Engineer at no additional cost to the Administration. Work shall be in conformance with the manufacturer's recommendation and as approved by the Engineer before the project is accepted. The replacement markings shall conform to the same requirements as the original markings. If the work is not completed in this period, the Engineer will resume time charges until this work is completed.

At the end of the observation period, the Engineer will accept the work and terminate the Contractor's responsibilities upon satisfactory inspection of the PPPRP markings.

559.04 MEASUREMENT AND PAYMENT. Measurement and payment for the pertinent Permanent Preformed Patterned Reflective Pavement Marking items will be as specified in 549.04. The reflectometer will become the property of the Contractor at the completion of the project.

CATEGORY 500
PAVING

SECTION 565 — REMOVAL OF EXISTING PAVEMENT MARKINGS

565.01 DESCRIPTION. Remove existing pavement markings (lines, letters, numbers, arrows, and symbols) during temporary or permanent traffic shifts, and repairing any roadway areas damaged during the removal process. This Specification does not apply to raised or recessed pavement markers. Temporary blackout tape shall be applied when existing pavement markings will require salvaging for reuse after completion of temporary traffic shifts necessary to perform work specified in the Contract Documents. Refer to 104.11.02.

565.02 MATERIALS. Not applicable.

565.03 CONSTRUCTION. The Contractor shall layout and apply all new pavement markings (temporary or permanent) as specified in Section 549 before any removal of existing pavement markings begin.

565.03.01 Quality Control/Quality Assurance. At least two weeks prior to the start of pavement markings removal, the Contractor shall submit a Quality Control Plan (QCP) to the Engineer for review. The QCP shall contain (as a minimum) the following information:

(a) How the Contractor proposes to perform the work while ensuring conformance with the Specifications.

(b) Proposed method of removal based on road conditions, type and number of equipment to be used, manpower expectations, and time frame to complete the work based on maintenance of traffic (MOT) restrictions.

(c) Location and quantity of markings to be removed.

(d) Protective shielding plan and containment system, particularly in the case of markings that may contain toxic materials.

The QCP shall also detail when, how, and what corrective actions will be taken for unsatisfactory construction practices and deviations from the Contract Documents. Any deviation from the QCP shall be cause for immediate suspension of work. Operations shall not resume without the Engineer's approval.

565.03.02 Quality Control Test Strip. Prior to the beginning of work, the Contractor shall demonstrate the removal method to the Engineer for approval. A minimum of 100 ft of existing pavement markings shall be removed as a test strip at a location determined by the Engineer. If the method does not work or shows signs of damaging the road surface, then another method shall be tried. Additional control strips will be required. The preferred method is that which least damages the roadway and completely removes the markings.

565.03.03 Methods of Removal. The following removal methods are based on the pavement condition and type of marking material:

(a) Manual. A scraper or putty knife shall be used to lift tape from the pavement surface. Open flame for tape removal is prohibited.

(b) High Pressure Water Blasting. A high pressure water blast shall be used to break the bond between the marking material and the pavement surface. The water blast may contain fine grit.

(c) Alternate Methods. Abrasive blasting or grinding methods shall be submitted for approval to the Office of Materials Technology prior to use.

565.03.04 Cleaning Pavement Surfaces. Immediately behind the removal operation, a vacuum equipped street sweeper capable of removing all loose material shall be used to remove all dust and debris generated by the removal process prior to returning the area to traffic. The Contractor shall prevent debris from draining into inlets and waterways, and all debris shall be collected and disposed of on an approved spoil area or landfill.

565.03.05 Alignment. Removal shall be performed in a straight and uniform manner, and shall follow the longitudinal alignment of the markings with a lateral deviation of no more than 1 in. in any 10 ft section. Affected area shall not exceed 1/2 in. on either side of the existing marking. The depth shall be uniform throughout, 1/8 in. or less, with no gouge areas in the pavement surface. If a second pass is necessary to completely remove the markings, the edges of the groove shall be feathered to a width of 1.25 in. on each side for every additional 1/8 in. of depth.

565.03.06 Corrective Action. Any pavement surface damaged beyond the requirements specified herein by the Contractor's operations shall be repaired or repaved as determined by the Engineer at no additional cost to the Administration.

565.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for the removal of the markings, pavement clean up, test strips, protective shielding, containment, disposal of marking material and pavement debris, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Removal of the existing pavement markings will be measured and paid for at the Contract unit price for one or more of the following items:

(a) Removal of Existing Pavement Marking Lines per linear foot, any width.

(b) Removal of Existing Pavement Marking Letters, Symbols, Arrows, and Numbers per square foot.

CATEGORY 600
SHOULDERS

SECTION 605 — METAL TRAFFIC BARRIERS

530 **605.02 MATERIALS.**

DELETE: MATERIALS in its entirety.

INSERT: The following.

MATERIALS. Refer to 701.02, 705.02, 708.02, 709.02, and the following:

Crusher Run Aggregate CR-6	901.01
Brown Polyester Coating	465.03.02 (b)
W Beam/Thrie Beam	918.01
Metal Posts	918.02
Traffic Barrier Hardware	918.03
Timber Posts	918.04
Wood Offset Blocks	918.04
Wire Rope	918.05
Salvaged Topsoil	920.01.01
Furnished Topsoil	920.01.02
Salvaged Topsoil	920.01.03
Furnished Topsoil	920.01.04
Asphalt Millings or Grindings	Size of individual particles shall be less than 2 in. as determined visually
Rub Rail	A 36, Galvanized, A 123
Thrie Beam	M 180, Class A, Type 2
Reflective Delineators	As approved by the Office of Traffic and Safety
Recycled Composite Material Offset Blocks	As specified by the manufacturer

605.03 CONSTRUCTION.

605.03.04 Brown Polyester Coated Traffic Barrier W Beam Using 6 Foot Post or 8 Foot Post.

531 **ADD:** The following before the first sentence of the first paragraph, "Ensure that all...unloading, and installation."

Apply polyester powder as specified in 465.03.02(b).

605.03.06 Remove and Reset Existing Traffic Barrier.

532 **ADD:** The following before the first sentence.

Replace severely corroded or damaged individual w-beam panels as directed.

ADD: The following after the first paragraph.

After replacing w-beam panels, backfill disturbed areas with topsoil per Section 701, or crusher run aggregate CR-6, or asphalt millings or grindings, to restore grades in designated areas as specified or as directed.

In areas where more than 8 in. depth of topsoil is required, place subsoil per Section 701 and place 2 in. or 4 in. topsoil over the subsoil as specified or as directed. Immediately after placing topsoil, either perform Turfgrass Sod Establishment per Section 708, or perform Turfgrass Establishment and install Type A or Type E Soil Stabilization Matting per Section 709 over the seeded areas.

ADD: The following after 605.03.08 End Treatments.

605.03.09 Remove and Dispose of Existing Traffic Barrier. Assume all responsibility and make every effort to recycle or stockpile for noncontract use, all existing metal components of traffic barrier. Written certification (including date, time, materials, measurement and other pertinent information) shall be submitted to the Administration upon completion and upon request. Certification of material recycled or stockpiled shall be required prior to payment for this item or as otherwise directed. All cost associated with these activities are incidental to the item.

605.03.10 Removal and Disposal of Traffic Barrier W-Beam. After removal and disposal of traffic barrier, backfill disturbed areas with topsoil per Section 701, or crusher run aggregate CR-6, or asphalt millings or grindings, to restore grades in designated areas as specified or as directed.

In areas where more than 8 in. depth of topsoil is required, place subsoil per Section 701 and place 2 in. or 4 in. topsoil over the subsoil as specified or as directed. Immediately after placing topsoil, either perform Turfgrass Sod Establishment per Section 708, or perform Turfgrass Establishment per Section 705 and install Type A or Type E Soil Stabilization Matting per Section 709 over the seeded areas.

532 **605.04 MEASUREMENT AND PAYMENT.**

DELETE: 605.04.05 in its entirety.

INSERT: The following**.**

12-03-14

605.04.05 Removal and Disposal of Existing Traffic Barriers and any end treatments will be measured and paid for at the Contract unit price per linear foot. A written certification as specified in 605.03.09 will be required.

Landscaping construction and materials, as specified in Sections 701, 705, 708, and 709 will not be measured but the cost will be incidental to the item.

605.04.06

ADD: The following after the last sentence.

Landscaping construction and materials, as specified in Sections 701, 705, 708, and 709 will not be measured but the cost will be incidental to the item.

605.04.07

ADD: The following after the last sentence.

Landscaping construction and materials, as specified in Sections 701, 705, 708, and 709 will not be measured but the cost will be incidental to the item.

CATEGORY 600
SHOULDERS

SECTION 606 — PERMANENT TRAFFIC BARRIER END TREATMENTS

533 **DELETE: SECTION 606 — PERMANENT TRAFFIC BARRIER END TREATMENTS** in its entirety.

INSERT: The following.

SECTION 606 — PERMANENT TRAFFIC BARRIER END TREATMENTS

606.01 DESCRIPTION. Furnish, and install permanent traffic barrier end treatments.

606.02 MATERIALS. Refer to 605.02, 701.02, 705.02, 708.02, 709.02 and the following:

End Treatments and Spare Parts Packages	As specified by the manufacturer
Antifreeze Agent	As approved
Reflectorization	950.03
Plastic Barrels (Yellow)	QPL
Crusher Run Aggregate CR-6	901.01
Sand	901.01
Concrete Mix 2 and 6	902.10
Salvaged Topsoil	920.01.01
Furnished Topsoil	920.01.02
Asphalt Millings or Grindings	Size of individual particles shall be less than 2 in. as determined visually

606.03 CONSTRUCTION.

606.03.01 End Treatments.

(a) Type A System. Bury the ends of the traffic barrier, the end anchorage terminal, and the rub rail when required, in a cut slope. Excavate the slope to install these components. Upon installation, backfill the area with topsoil installed per Section 701 to match the adjacent slope, perform Turfgrass Sod Establishment per Section 708, or perform Turfgrass Establishment per Section 705 and immediately cover with Type A or Type E Soil Stabilization Matting per Section 709 as specified or as directed.

For single rail systems, use 6 ft posts throughout the entire end treatment. For double rail systems, use 8 ft posts, except for the last three posts buried in the cut slope.

Construct the end anchorage terminal using either option 1 or 2 from the Book of Standards.

Install traffic barrier W beam as specified in 605.03.

(b) Type B System. Install according to the manufacturer's recommendations.

(c) Type C, D, E, ~~and~~ F, G, H, J, K, and L. Install these systems in a straight line, unless otherwise specified by the manufacturer and approved by the Engineer. Refer to the manufacturer's recommendations for installation methods and procedures.

(d) Nose Section. Reflectorize as approved by the Office of Traffic and Safety.

(e) Finish Coat. Traffic barrier end treatments shall have the same finish coat as the W beam traffic barrier to which they are attached. Refer to Section 605. If end treatments are designated to be powder coated, coater shall contact the manufacturer of the end treatment for recommendations as to areas that can be coated without having an effect on the NCHRP or MASH crash rating.

(f) Permanent Crash Cushion Sand Filled Plastic Barrels (SFPB). Provide the components and assemble, place in the required configuration, and fill each barrel according to the manufacturer's recommendations or as specified in the Contract Documents. Ensure that each SFPB is watertight and separated from other SFPB by a distance of 3 in. Place the last row of SFPB 12 in. from the shielded object.

Reflectorize the first barrel of the SFPB configuration as specified. Mix approved antifreeze agent into loose, dry sand according to the manufacturer's recommendations, and install sand mixture in barrels.

606.03.02 Surface Adjustment. When surface adjustment is required for installation of Type B, C, D, E, F**,** G, H, J, K, and L end treatments, use topsoil for the surface adjustment, or crusher run aggregate CR-6, or asphalt millings or grindings, as follows.

(a) Topsoil. Complete the surface adjustments with topsoil installed per Section 701. Immediately after placing topsoil, perform Turfgrass Sod Establishment per Section 708, or perform Turfgrass Establishment per Section 705 and immediately install Type A or Type E Soil Stabilization Matting per Section 709, by the end of the day as specified or as directed prior to opening to traffic.

(b) CR-6 Aggregate or Asphalt Millings and Grindings. Complete the surface adjustment with crusher run aggregate CR-6, or ~~a~~sphalt millings or grindings, in designated areas as specified or as directed within 24 hours.

606.03.03 Transitions to Existing Structures. When transitions to existing structures or traffic barriers are required, perform the work as recommended by the manufacturer.

606.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all excavation, removal of the existing end treatment to be replaced, fabrication of all component parts, transitions to barriers, reflectorization, backfill, compaction, topsoil, restoration of turfgrass or paved areas, CR-6 crusher run aggregate, asphalt millings or grindings, and for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

606.04.01 Type A End Anchorage Terminal Either Option will be measured and paid for at the Contract unit price per each.

606.04.02 Type B C, D, E, F, G, H, J, K, and L Traffic Barrier End Treatments will be measured and paid for at the Contract unit price per each.

606.04.03 Placing Salvaged Topsoil for Grading Adjustment, or Placing Furnished Topsoil for Grading Adjustment, for Types B, C, D, E, F**,** G, H, J, K, and L end treatments, will be measured and paid for at the Contract unit price per square yard, or as specified. The payment will also include full compensation for furnishing, adjusting, and compacting embankment or aggregate material.

606.04.04 Turfgrass Sod Establishment or Turfgrass Establishment will be measured and paid for at the Contract unit price per square yard.

606.04.05 Type A Soil Stabilization Matting or Type E Soil Stabilization Matting will be measured and paid for at the Contract unit price per square yard.

606.04.06 Surface adjustment for types B, C, D, E, F, G, H, J, K, and L end treatments using CR-6 crusher run aggregate, or asphalt millings or grindings, will be measured and paid for at the Contract unit price per square yard, or per ton, or as specified. The payment will also include full compensation for furnishing, adjusting, and compacting embankment or aggregate material.

606.04.07 Permanent Crash Cushion Sand Filled Plastic Barrels will be measured and paid for at the Contract unit price per barrel. The payment will also include full compensation for furnishing and placing sand and antifreeze agent.

606.04.08 Repairs.

(a) Traffic Barrier End Treatment Spare Parts Package furnished and installed will be measured and paid for at the Contract unit price per each for the type specified. The payment will also include full compensation for the clearing and removal of debris and damaged unsalvageable parts, and for restoring damaged topsoil, turfgrass or aggregate.

(b) When spare parts packages are furnished by the Administration, Repairing Traffic Barrier End Treatments will be measured and paid for at the Contract unit price per each for the type specified. The payment will also include full compensation for all transportation, reconnection to fixed objects where necessary, and clearing and removal of debris and damaged unsalvageable parts, and for restoring damaged topsoil, turfgrass or aggregate.

(c) Payment will not be made for spare parts packages used for end treatments damaged due to the Contractor's operations.

606.04.09 The application of fusion bonded brown polyester coating, as well as all special handling, will not be measured but the cost will be incidental to the item to which the coating is applied.

CATEGORY 600
SHOULDERS

SECTION 609 — SHOULDER EDGE DROP OFF GRADING ADJUSTMENT

540 **DELETE: SECTION 609 — SHOULDER EDGE DROP OFF GRADING ADJUSTMENT** in its entirety.

INSERT: The following.

SECTION 609 — SHOULDER EDGE DROP OFF GRADING ADJUSTMENT

609.01 DESCRIPTION. Construct the area adjacent to the outside edge of the shoulder to eliminate the shoulder edge drop off.

609.02 MATERIALS. Refer to 605.02, 701.02, 705.02, 708.02, 709.02, and the following:

Crusher Run Aggregate CR-6	901.01
Salvaged Topsoil	920.01.01
Furnished Topsoil	920.01.02
Asphalt Millings or Grindings	Size of individual particles shall be less than 2 in. as determined visually.

609.03 CONSTRUCTION. When the outside edge of the shoulder is greater than 2 -1/2 in. above the existing groundline, place a wedge of topsoil installed per Section 701, or crusher run aggregate CR-6, or asphalt millings or grindings, in designated areas as specified or as directed.

Grade the topsoil, or crusher run aggregate CR-6, or asphalt millings or grindings, to a slope of 4:1 or as directed. Compact the material as specified or as directed.

Immediately after grading topsoil, perform either of the following as specified or as directed:

(a) Perform Turfgrass Establishment per Section 705 and immediately install Type A or Type E Soil Stabilization Matting per Section 709.

(b) Perform Turfgrass Sod Establishment per Section 708.

Complete the grading adjustment and install all materials by the end of the day that the drop off is created and prior to opening to traffic. The material, lines and grades, and the cross section shall be as specified.

609.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

609.04.01 Placing Salvaged Topsoil for Grading Adjustment or Placing Furnished Topsoil for Grading Adjustment will be measured and paid for at the Contract unit price per square yard, or as specified.

609.04.02 Crusher Run Aggregate CR-6 or Asphalt Millings or Grindings for Shoulder Edge Drop Off will be measured and paid for at the Contract unit price per square yard, or per ton.

609.04.03 Turfgrass Sod Establishment or Turfgrass Establishment will be measured and paid for at the Contract unit price per square yard.

609.04.04 Type A Soil Stabilization Matting or Type E Soil Stabilization Matting will be measured and paid for at the Contract unit price per square yard.

CATEGORY 700
LANDSCAPING

BIO-SWALE MEADOW ESTABLISHMENT

DESCRIPTION. Establish meadow in bioretention soil mix (BSM) to provide permanent vegetation groundcover. When it is not possible to perform Bio-Swale Meadow Establishment, refer to Section 704 and perform Temporary Mulch, or as directed. Performance of Bio-Swale Meadow Establishment as specified herein complies with all requirements of the Maryland Department of the Environment for permanent seeding.

MATERIALS.

Limestone	920.02.01
Sulfur	920.02.02
Compost	920.02.05
Fertilizer	920.03.01
Tall Fescue, Hard Fescue	920.06.06(a)
Common Oat,	920.06.06(b)
Meadow Forb Seed	920.06.06(c)
Meadow Grass, Sedge and Rush Seed	920.06.06(d)
Wildflower Seed	920.06.06(e)
Water	920.09.01
Seed Carrier	920.09.02
Red Clover, Trifolium pratense L	
Alkaligrass, Puccinellia distans (Jacq.) Parl.	

CONSTRUCTION.

General.

(a) Regions. Refer to 705.03.01.

(b) Seeding Seasons. Perform operations in conformance with Table 1 when soil moisture and weather conditions are suitable, when the temperature is above 32 F, and the soil is not frozen. Cease operations when conditions are unsuitable.

(c) Pesticide Application. Refer to 701.03.01(b).

(d) Pesticide Application Reporting. Refer to 701.03.01(c).

(e) Seeding Schedule. Develop a Schedule that provides dates for completing seeding operations. Submit the written Schedule at least 14 days before beginning operations. The Schedule will be reviewed by the Engineer and Landscape Operations Division for completeness and feasibility, and will be approved or returned for correction.

BIO-SWALE MEADOW ESTABLISHMENT TABLE 1 - SEEDING SEASONS AND SEED ADDITIVES				
REGION	**SEEDING SEASON - MONTH/DAY**			
	Spring	**Summer**	**Fall**	**Late Fall**
	SHA Bio-Swale Meadow Seed			
1	3/1 to 6/14	6/15 to 7/31	8/1 to 9/30	10/1 to 11/30
2	2/1 to 5/14	5/15 to 7/31	8/1 to 10/14	10/15 to 11/30
3	2/1 to 4/30	5/1 to 7/31	8/1 to 10/31	11/1 to 11/30
All Regions	Plus Additive A*	Plus Additive B*	Plus Additive B*	Plus Additive D*
	Plus Additive B*	Plus Additive C*	Plus Additive D*	Plus Additive E*
Seed Additive Notes *				
Additive A = Garden Cosmos		Additive C = Tall Fescue		Additive E = Common Oat
Additive B = Plains Coreopsis		Additive D = Corn Poppy		

(f) Nutrient Management Plan (NMP). Soil testing will be performed and a NMP will be developed by the Administration. Replace fertilizer and soil amendment application rates as required by the NMP. When a NMP has not been developed, apply 200 lb. per acre of 20-16-12 (83 percent UF with MAP & SOP) fertilizer as the NMP rate for Meadow Establishment.

(g) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

Modification Request. Submit a written Modification Request to perform seeding between Late Fall and Spring Seeding Seasons, or to install other species, or to adjust seeding rates. The Engineer in consultation with the Landscape Operations Division will evaluate the Request. If granted, a notice of approved modification will be returned within 14 days after the request is received.

Application Rates. Apply seed and other materials as specified in Table 1 - Seeding Seasons and Seed Additives, Table 2 - Application Rates, and Table 3 - Meadow Seed Species and Application Rates.

BIO-SWALE MEADOW ESTABLISHMENT TABLE 2 - APPLICATION RATES [a, b, c, d]		
MATERIAL	**LB PER SY**	**LB PER ACRE**
SOIL AMENDMENTS per Nutrient Management Plan for Bioretention Soil Mix		
Compost	0 to 1.033	0 to 5,000
Gypsum	0 to 0.455	0 to 2,200
Limestone	0 to 0.930	0 to 4,500
Sulfur	0 to 0.052	0 to 250

FERTILIZER	**LB PER SY**	**LB PER ACRE**
20-16-12 (83% UF with MAP & SOP)	0 to 0.041	0 to 200
38-0-0 (UF)	0 to 0.021	0 to 100
11-52-0 (MAP)	0 to 0.036	0 to 175
0-0-50 (SOP)	0 to 0.041	0 to 200
MEADOW SEED SPECIES Refer to Table 3		
ADDITIVE SEED Refer to Table 1	**LB PER SY**	**LB PER ACRE**
A = Garden Cosmos	0.028	0.3
B = Plains Coreopsis	0.028	0.3
C = Tall Fescue	2.345	25
D = Corn Poppy	0.028	0.3
E = Common Oat	4.690	50
OVERSEEDING	18.76	200
TYPE D SOIL STABILIZATION MATTING	Apply over the seeded area	

Notes:

[a] Apply compost, gypsum, limestone, sulfur, and fertilizer at rates specified in the NMP.

[b] For Bioretention Soil Mix (BSM) the application rates will be developed for the approved source of supply.

[c] When no NMP has been developed, apply 200 lb per acre of 20-16-12 fertilizer, and do not apply any soil amendments.

[d] UF = Ureaform; MAP = Monoammonium Phosphate; SOP = Sulfate of Potash. When application rate of 20-16-12 fertilizer is below 200 lb. per acre, apply UF, MAP, and SOP per NMP.

BIO-SWALE MEADOW ESTABLISHMENT

TABLE 3 - MEADOW SEED SPECIES AND APPLICATION RATES

FORBS	**PURE LIVE SEED ***		**GRASSES**	**PURE LIVE SEED ***	
	GRAM PER SY	**LB PER ACRE**		**GRAM PER SY**	**LB PER ACRE**
Include All			**Include All**		
Blackeyed Susan	0.094	1.0	Switchgrass	0.188	2.0
Partridge Pea	0.188	2.0	Deertongue	0.188	2.0
Red Clover	0.188	2.0	Hard Fescue	0.938	10.0
			Alkaligrass	0.188	2.0
			Purpletop	0.188	2.0
			Virginia Wildrye	0.094	1.0

Note: The rate shown is Pure Live Seed. Use germination and purity data from the seed tag to calculate the actual seeding rate needed to obtain the seeding rate in Pure Live Seed.

Preparing Soil. Use rakes, soil rollers, and similar tools and equipment as necessary to ensure a firm and uniform soil surface in preparation for seeding.

Seed Delivery, Weighing, and Mixing. Refer to 706.03.04.

Fertilizing and Seeding. Refer to 706.03.07 and apply materials at specified rates to the surface of Bioretention Soil Mix.

Matting. Apply Type D Soil Stabilization Matting and water over the seeded area in conformance with Section 709.

Seeding Phase Acceptance. Submit a request for Seeding Phase Acceptance when operations are completed. Inspection will be conducted to verify completion, and Seeding Phase Acceptance will be granted at that time.

Establishment Phase. Apply water as necessary to ensure survival of the seeded vegetation. Remove noxious weeds such as Canada Thistle and Johnsongrass as needed or as directed. Maintain seeded areas for 6 months after Seeding Phase Acceptance.

Overseeding. When living seedling groundcover is less than 70 percent, perform overseeding as directed. Overseeding consists of lifting or loosening soil stabilization matting, applying Tall Fescue seed at the rate of 200 pounds per acre, and restoring soil stabilization matting and applying water in conformance with Section 709.

Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report of seedling height, color, and percent coverage. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible. The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed. Final Acceptance will be granted after all operations have been completed, and when meadow seedlings and other permanent seeded species have grown at least 4 in. tall, exhibit dark green color, and are least 95 percent groundcover.

MEASUREMENT AND PAYMENT. Bio-Swale Meadow Establishment will be measured and paid for at the Contract unit price for one or more of the Specified items. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

(a) Payment Schedule. Payments will be made according to Table 4 when construction requirements are met.

BIO-SWALE MEADOW ESTABLISHMENT
TABLE 4 - PAYMENT SCHEDULE

CONSTRUCTION REQUIREMENTS	PERCENT OF TOTAL CONTRACT PRICE	PAYMENT FOR COMPLETED WORK
General thru Seeding Phase Acceptance	70	At Seeding Phase Acceptance
Establishment Phase thru Partial Establishment Phase Inspection	15	At Partial Establishment Phase Acceptance
Final Acceptance	15	At Final Acceptance
Total Payment	**100%**	

06-21-16

(b) Forfeiture. Failure to complete operations as required or directed in conformance with the Payment Schedule will result in forfeiture of that percentage of payment.

Bio-Swale Meadow Establishment. Bio-Swale Meadow Establishment, including preparing soil, applying fertilizer, soil amendments, meadow seed, seed additives, watering, weed control, and overseeding will be measured and paid for at the Contract unit price per square yard. The use of other materials in conformance with an approved Modification Request shall be incidental to the Contract unit price, and will not be measured or paid for.

Bioretention Soil Mix will be measured and paid for at the Contract unit price.

Temporary Mulch will be measured and paid for at the Contract unit price.

Type D Soil Stabilization Matting will be measured and paid for at the Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 701 — TOPSOIL AND SUBSOIL

544 **DELETE:** Section 701 — Topsoil and Subsoil, in its entirety.

INSERT: The following.

SECTION 701 — SUBSOIL AND TOPSOIL

701.01 DESCRIPTION. Prepare existing topsoil, or salvage and place subsoil and topsoil for vegetation establishment. Perform Temporary Mulch or Temporary Seed in conformance with Section 704 to provide temporary soil stabilization.

Performance of Subsoil and Topsoil as specified herein complies with all requirements of the Maryland Department of the Environment for handling and placing soils in preparation for permanent seeding or other permanent vegetation establishment.

701.02 MATERIALS.

Existing Topsoil	920.01.01
Salvaged Topsoil	920.01.01
Furnished Topsoil	920.01.02
Salvaged Subsoil	920.01.03
Furnished Subsoil	920.01.04
Water	920.09.01
Pesticides	920.09.03

701.03 CONSTRUCTION.

701.03.01 General.

(a) Schedule. Perform subsoil and topsoil operations when soil moisture and weather conditions are suitable. Cease operations when soil is muddy, frozen, or otherwise unsuitable.

(b) Pesticide Application. Apply pesticides in conformance with the Maryland Pesticide Applicator's Law and the manufacturer's label. The Contractor shall possess a Maryland Department of Agriculture Commercial Pesticide Business License and a Pesticide Applicator Certificate for the pertinent pesticide application Category: (2) Forest; (3-A) Ornamental Plant Exterior; (3-C) Turf; (5) Aquatic; (6) Right-of-Way and Weed. Pesticides shall be applied by a Maryland Certified Pesticide Applicator, or by a Registered Pesticide Applicator under the supervision of a Certified Pesticide Applicator.

(c) Pesticide Application Reporting. Record the location, acreage treated, pesticide name and quantity applied on the Pesticide Application Reporting Form. Submit the Form within 24 hours after applying pesticide.

(d) Nutrient Management Plan (NMP). The specified application rates of the pertinent vegetation establishment will be the NMP unless the Administration develops a substitute NMP. Replace application rates of the pertinent specification as required by the NMP.

(e) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 48 hours after applying fertilizer.

701.03.02 Site Preparation and Salvaging.

(a) Prohibited Weeds. Refer to 920.01.01. Existing topsoil, and topsoil and subsoil to be salvaged, will be inspected and shall be free of prohibited weeds. Control prohibited weeds when preparing existing topsoil for vegetation establishment, or before salvaging operations. Prevent the spread of prohibited weeds as needed or as directed.

When herbicide application is necessary for control of prohibited weeds, apply glyphosate 3 percent solution in water, or other herbicide as directed. Refer to 701.03.01(b) and complete the Pesticide Application Reporting Form in conformance with 701.03.01(c).

(b) Removal. Remove vegetation, brush, and other debris from the areas of existing topsoil, and from areas where topsoil and subsoil will be salvaged. Remove topsoil and subsoil to the depth as specified or directed. Transport salvaged topsoil and subsoil separately, and keep them apart from other materials. Do not remove existing topsoil.

(c) Storage. Constructing stockpiles on well drained land, away from streams, drainage areas, and floodplains as specified in Section 308. Maintain stockpiles of salvaged topsoil and salvaged subsoil away from other materials, and separate from each other.

Apply temporary mulch or temporary seed in conformance with Section 704 immediately after constructing stockpiles. Install and maintain silt fence around stockpiles in conformance with 308.03.29. Control prohibited weeds as needed or as directed.

(d) Excess. Existing topsoil, salvaged topsoil, and salvaged subsoil, are the property of the Administration. Do not remove soils without written approval.

701.03.03 Placing Subsoil and Topsoil.

(a) Removal from Stockpile. Stockpiles of salvaged subsoil and salvaged topsoil will be inspected and shall be free of prohibited weeds.

Do not remove surface debris or transport soil from stockpiles before the inspection is completed, or before prohibited weeds are controlled. Control prohibited weeds as needed or as directed.

Remove grass, weeds, brush and other debris from the surface of stockpiles before transporting soil.

(b) Spreading Subsoil. Ensure the site where subsoil will be spread is uniformly graded true to line and cross section. Spread and compact subsoil in layers up to 8 in. thickness to provide a firm and uniform subsoil base, and to ensure spreading of the specified depth.

Track slopes 4:1 and steeper with cleated track equipment operated perpendicular to the slope. Check subsoil thickness, lines, grades, and elevations to ensure the completed work is as specified.

Remove stones and other debris with a length or width greater than 4 in. from the surface of the subsoil before spreading topsoil.

(c) Spreading Topsoil. Ensure the site where topsoil will be spread is uniformly graded true to line and cross section, and that the surface of the subsoil base is loose and able to provide a suitable bond for the topsoil layer to be spread.

If the subsoil is crusted or excessively compacted, then roughen and loosen the surface of the subsoil base with approved machinery before spreading topsoil.

Spread topsoil over the designated areas and lightly firm the topsoil to ensure uniform thickness of the specified depth, and to meet the required grades.

Track slopes 4:1 and steeper with cleated track equipment operated perpendicular to the slope.

When placing topsoil for grading adjustment, the minimum thickness shall be 1/2 in. and the maximum thickness shall be 8 in.

Ensure that topsoil is uniformly spread and firmed near sidewalk and pavement edges, and that the topsoil surface is without gaps, mounds, depressions, soft spots, or areas that may impair surface drainage or future maintenance. Check topsoil thickness, lines, grades, and elevations to ensure the completed work is as specified.

In areas within 10 ft of the pavement edge and near commercial and residential property, remove stones, wood, metal, and other debris with a length or width greater than 2.0 in. from the soil surface when spreading is completed. In all other areas, remove debris with a length or width greater than 4.0 in., or as directed.

(d) Soil Amendments and Fertilizer. Apply limestone, sulfur, gypsum, compost, and fertilizer to existing topsoil, salvaged topsoil, and furnished topsoil as specified in the NMP, or as specified in the pertinent section for vegetation establishment.

701.03.04 Inspection and Acceptance. Submit a request for Acceptance when operations are completed. Inspection will be conducted to verify that operations were completed as specified. Acceptance will be granted at that time.

701.04 MEASUREMENT AND PAYMENT. Subsoil and topsoil will be measured and paid for at the Contract unit price for one or more of the specified items. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

701.04.01 Existing topsoil will not be measured but the cost of preparing existing topsoil will be incidental to the Contract unit price for clearing and grubbing, or will be incidental to the pertinent Contract unit price for the vegetation establishment.

701.04.02 Salvaging Subsoil and Salvaging Topsoil will not be measured but the cost will be incidental to the Contract unit price for Class 1 Excavation.

701.04.03 Placing Salvaged Subsoil and Placing Salvaged Topsoil will be measured and paid for at the pertinent Contract unit price per square yard for the specified depth, or per cubic yard.

701.04.04 Placing Furnished Subsoil and Placing Furnished Topsoil will be measured and paid for at the pertinent Contract unit price per square yard for the specified depth, or per cubic yard.

701.04.05 Placing Salvaged Topsoil for Grading Adjustment and Placing Furnished Topsoil for Grading Adjustment will be measured and paid for at the pertinent Contract unit price per square yard, or per cubic yard. No payment will be made for topsoil placed less than 1/2 in. depth.

701.04.06 Temporary Mulch, Temporary Seed, Turfgrass Establishment and other permanent vegetation establishment will be measured and paid for at the pertinent Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 704 — TEMPORARY MULCH
AND TEMPORARY SEED

547 **DELETE:** Section 704 — Temporary Seed and Temporary Mulch, in its entirety.

INSERT: The following.

SECTION 704 — TEMPORARY MULCH
AND TEMPORARY SEED

704.01 DESCRIPTION. Perform Temporary Mulch and Temporary Seed to provide temporary soil erosion protection as follows.

For areas that are not at final grade or which are not ready for permanent stabilization, apply Temporary Mulch to stabilize topsoil, subsoil, common borrow, or other specified soil substrate for up to 2 months after installation.

For areas that are not at final grade or when redisturbance is expected in 2 to 6 months, apply Temporary Seed to stabilize topsoil, subsoil, common borrow, or other specified soil substrate up to 6 months after installation.

When redisturbance is expected in more than 6 months, refer to Section 705 and perform Turfgrass Establishment.

Performance of Temporary Mulch and Temporary Seed as specified herein complies with all requirements of the Maryland Department of the Environment for temporary stabilization of soils.

704.02 MATERIALS.

Fertilizer	920.03.01
Straw Mulch	920.04.01
Wood Cellulose Fiber Mulch	920.04.02
Soil Stabilization Matting	920.05.01
Fasteners	920.05.02
SHA Temporary Seed Mix	920.06.07
Water	920.09.01

704.03 CONSTRUCTION.

704.03.01 General.

(a) Schedule. Apply Temporary Mulch and Temporary Seed any time of the year.

(b) Nutrient Management Plan (NMP). The fertilizer application rate specified in 704.03.03 shall be the NMP rate for Temporary Seed unless the Administration develops a substitute NMP.

(c) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

704.03.02 Temporary Mulch. Temporary Mulch may be either temporary straw mulch or temporary matting mulch.

Apply temporary straw mulch or temporary matting mulch to provide temporary erosion protection in flat or mildly sloping areas.

Apply temporary matting mulch to provide temporary erosion protection in slopes or channels where flowing water may dislodge temporary straw mulch.

(a) Temporary Straw Mulch. Lightly smooth excessively rough areas, but do not till the soil. Immediately apply straw and cover with wood cellulose fiber. Apply materials as follows.

TEMPORARY MULCH AND TEMPORARY SEED
TABLE 1 - APPLICATION RATES - TEMPORARY STRAW MULCH

MATERIAL	LB PER SY	LB PER ACRE
Straw Mulch	0.826	4000
Wood Cellulose Fiber Mulch	0.155	750

Cover at least 90 percent of the soil surface with straw mulch. When applied with mulch blower, apply straw mulch to a loose depth of 3/4 to 2 in. When applied by hand, apply straw mulch to a loose depth of 1-1/2 to 3 in.

Secure straw mulch immediately after the completion of mulching operations by applying wood cellulose fiber uniformly over the straw without displacing the mulch.

Do not operate machinery during windy weather that may interfere with uniform application. Do not allow materials to blow onto sensitive areas or structures.

(b) Temporary Matting Mulch. Select Type A, Type B, Type D, or Type E soil stabilization matting for installation in areas that will be redisturbed within 2 months. Install any of

these matting types using methods and fasteners as per Section 709 for Type E Soil Stabilization Matting.

Smooth the soil surface to allow uniform installation of matting. Install matting over the soil surface without tenting. Overlap edges of the matting at least 2 in. Install fasteners no more than 24 in. apart along edges, overlaps, and throughout the matting to firmly secure the matting to the soil surface. Do not water the matting.

Remove matting and fasteners before performing permanent vegetation establishment. When approved, matting and fasteners may be removed and reused as Temporary Mulch in the same or different locations when their integrity is not degraded by damage or decomposition.

704.03.03 Temporary Seed. Prepare the soil and apply seed, fertilizer, straw mulch, and wood cellulose fiber mulch to areas that will remain undisturbed for 2 to 6 months.

Complete grading and shaping operations as directed. Loosen soil surfaces before applying seed and fertilizer.

Refer to 705.03.06(b) regarding application equipment and apply fertilizer materials according to Table 2. Immediately apply straw and wood cellulose fiber over seeded and fertilized areas as specified in 704.03.02(a).

TEMPORARY MULCH AND TEMPORARY SEED
TABLE 2 - APPLICATION RATES - TEMPORARY SEED

MATERIAL	LB PER SY	LB PER ACRE
SHA Temporary Seed Mix	0.026	125
Fertilizer (15-30-15)	0.031	150
Straw Mulch	0.826	4000
Wood Cellulose Fiber Mulch	0.155	750

704.03.04 Repair. Repair Temporary Mulch or Temporary Seed that is defective before Acceptance.

704.03.05 Acceptance. Submit a request for Acceptance when operations are completed. Inspection will be conducted to verify completion.

704.03.06 Replacement. Replace Temporary Mulch and Temporary Seed as additional work when directed.

(a) Replace Temporary Mulch with approved materials when it has degraded, or when more than 2 months have elapsed since Acceptance.

(b) Replace Temporary Seed with approved materials when it has degraded, or when more than 6 months have elapsed since Acceptance.

704.04 MEASUREMENT AND PAYMENT. Temporary Mulch and Temporary Seed will be measured and paid for at the Contract unit price for one or more of the specified items. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

704.04.01 Temporary Mulch, applied as either temporary straw mulch or temporary matting mulch, will be measured and paid for at the Contract unit price per square yard.

704.04.02 Temporary Seed will be measured and paid for at the Contract unit price per square yard.

704.04.03 Turfgrass Establishment will be measured and paid for at the Contract unit price per square yard.

CATEGORY 700
LANDSCAPING

SECTION 705 — TURFGRASS ESTABLISHMENT

550 **DELETE:** Section 705 — Turfgrass Establishment, in its entirety.

INSERT: The following.

SECTION 705 — TURFGRASS ESTABLISHMENT

705.01 DESCRIPTION. Perform Turfgrass Establishment as follows.

For areas that are at final grade, establish turfgrass in topsoil or other specified soil substrate to provide permanent vegetation groundcover.

For areas that are not at final grade, or areas that will not be redisturbed for at least 6 months after seeding operations are completed, establish turfgrass in topsoil, subsoil, common borrow, or other specified soil substrate to provide temporary vegetation groundcover.

When it is not possible to perform Turfgrass Establishment, refer to Section 704 and perform Temporary Mulch or Temporary Seed, or as directed.

Performance of Turfgrass Establishment as specified herein complies with all requirements of the Maryland Department of the Environment for permanent seeding.

705.02 MATERIALS.

Limestone	920.02.01
Sulfur	920.02.02
Gypsum	920.02.04
Compost	920.02.05
Fertilizer	920.03.01
Straw Mulch	920.04.01
Wood Cellulose Fiber	920.04.02
Seed	920.06
SHA Turfgrass Seed Mix	920.06.07(a)
SHA Special Purpose Seed Mix	920.06.07(b)
SHA Temporary Seed Mix	920.06.07(c)
Water	920.09.01

705.03 CONSTRUCTION.

705.03.01 General.

(a) Regions. Maryland is divided into Regions by counties as follows:

Region 1. Garrett, Allegany, and Washington, west of Clear Spring MD.

Region 2. Washington, east of Clear Spring, MD, Frederick, Carroll, Baltimore, Harford, Cecil, Howard, Montgomery, and Baltimore City.

Region 3. Anne Arundel, Prince George's, Calvert, Charles, St. Mary's, Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Worcester, and Somerset.

(b) Seeding Seasons and Seed Mixes. Perform operations according to Table 1 when soil moisture and weather conditions are suitable, when the temperature is above 32 F, and the soil is not frozen. Cease operations when conditions are unsuitable.

TURFGRASS ESTABLISHMENT
TABLE 1 - SEEDING SEASONS AND SEED MIXES

REGION	SEEDING SEASON - MONTH/DAY			
	Spring	Summer	Fall	Late Fall
	SHA Turfgrass Seed Mix [1]			
1	3/1 to 6/14	6/15 to 7/31	8/1 to 9/30	10/1 to 11/15
2	2/1 to 5/14	5/15 to 7/31	8/1 to 10/14	10/15 to 11/15
3	2/1 to 4/30	5/1 to 7/31	8/1 to 10/31	11/1 to 11/15
		Plus Additive [2]		Plus Additive [2]

Notes:

[1] When seeding within 4 miles of a State airport: Use no additives and use SHA Special Purpose Seed Mix in lieu of SHA Turfgrass Seed Mix on slopes 4:1 and steeper, or in designated areas.

[2] Additive = SHA Temporary Seed Mix

(c) Nutrient Management Plan (NMP). Soil testing will be performed and a NMP will be developed by the Administration. Replace application rates of 705.03.02 as required by the NMP. When a NMP has not been developed, apply 200 lb. per acre of 20-16-12 (83 percent UF with MAP & SOP) fertilizer as the NMP rate for Turfgrass Establishment.

(d) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

705.03.02 Application Rates. Apply materials according to Table 2.

TURFGRASS ESTABLISHMENT

TABLE 2 - APPLICATION RATES [a, b, c, d]

MATERIAL	LB PER SY	LB PER ACRE
SOIL AMENDMENTS per Nutrient Management Plan for topsoil or other specified soil substrate.		
Compost	0 to 1.033	0 to 5,000
Gypsum	0 to 0.455	0 to 2,200
Limestone	0 to 0.930	0 to 4,500
Sulfur	0 to 0.052	0 to 250
MATERIAL	**LB PER SY**	**LB PER ACRE**
INITIAL FERTILIZER		
20-16-12 (83% UF with MAP & SOP)	0 to 0.041	0 to 200
38-0-0 (UF)	0 to 0.021	0 to 100
11-52-0 (MAP)	0 to 0.036	0 to 175
0-0-50 (SOP)	0 to 0.041	0 to 200
SEED MIXES; select one		
SHA Turfgrass Seed Mix, applied to roadsides, facilities, and other designated areas	0.041	200
or		
SHA Special Purpose Seed Mix, applied to slopes 4:1 and steeper within four miles of a State airport, and other designated areas.	0.041	200
ADDITIVE SEED; when required per Table 1		
SHA Temporary Seed Mix	0.006	25
STRAW MULCH	0.826	4000
WOOD CELLULOSE FIBER to secure straw mulch	0.155	750
REFERTILIZING		
20-16-12	0.041	200

Notes:

[a] Apply compost, gypsum, limestone, sulfur, and initial fertilizer at rates specified in the NMP.

[b] For salvaged topsoil, the application rates will be included in the Contract documents. For furnished topsoil, the application rates will be developed for the approved source of supply.

[c] When no NMP has been developed, apply 200 lb per acre of 20-16-12 initial fertilizer, and do not apply any soil amendments. Apply refertilizing when specified in the Contract documents.

[d] UF = Ureaform; MAP = Monoammonium Phosphate; SOP = Sulfate of Potash. When application rate of 20-16-12 fertilizer is below 200 lb. per acre, apply UF, MAP, and SOP per NMP.

705.03.03 Modification Request. Submit a written Modification Request to perform seeding between Late Fall and Spring Seeding Seasons; to install an approved tackifier at manufacturer's recommended application rates in lieu of wood cellulose fiber to secure straw mulch; or to use

Type A, Type D, or Type E Soil Stabilization Matting per Section 709 in lieu of straw mulch and wood cellulose fiber in areas where those mattings have not been specified.

The Engineer in consultation with the Landscape Operations Division will evaluate the Request. If granted, a notice of approved modification will be returned within 14 days after the request is received.

705.03.04 Grade Repair. Ensure that soil meets specified grades. Repair any gullies, washes, or disturbed areas that develop before preparing soil.

705.03.05 Preparing Topsoil. Provide a uniform and porous surface that is free of debris and weeds as follows:

(a) Areas Flatter than 4:1. Apply soil amendments and till to a depth of 2 in. to uniformly incorporate amendments into the soil. After tilling, remove clods, stones, wood, metal and other debris with a length or width greater than 1-1/2 in. from the soil surface.

(b) Slopes 4:1 and Steeper. Track slopes 4:1 and steeper with cleated track equipment operated perpendicular to the slope. After tracking, remove stones, wood, metal, and other debris with a length or width greater than 3.0 in. from the soil surface. Apply soil amendments to tracked soil.

705.03.06 Seeding and Initial Fertilizer. Apply seed and initial fertilizer after preparing soil. Do not apply fertilizer from November 15 thru March 1.

(a) Application Equipment. Use hydroseeders, spreaders, drills, or other approved machinery. Calibrate equipment before application. Apply materials accurately and uniformly to avoid misses and overlaps. Do not operate machinery during windy weather that may interfere with uniform application.

(b) Hydroseeders. Hydroseeders shall be equipped with an agitation system able to keep solids in suspension, and have a gauge to show fill levels and tank capacity. Apply fertilizer and seed mixtures within two hours after mixing. Direct hydroseeding mixtures so the droplets produce a uniform spray. Do not allow materials to runoff or cause erosion, or to blow onto sensitive areas or structures.

(c) Mechanical Seeders. Mechanical seeders shall be capable of uniformly placing seed and fertilizer at the specified rate.

705.03.07 Mulching. Apply mulch immediately after seeding.

(a) Soil Stabilization Matting. Refer to Section 709 and install soil stabilization matting in lieu of straw mulch in designated areas.

(b) Straw Mulch. Cover at least 90 percent of the soil surface with straw mulch. When applied with mulch blower, apply straw mulch to a loose depth of 3/4 to 2 in. When applied by hand, apply straw mulch to a loose depth of 1-1/2 to 3 in. Secure straw mulch immediately after the completion of mulching operations by applying wood cellulose fiber uniformly over the straw without displacing the mulch.

Do not operate machinery during windy weather that may interfere with uniform application. Do not allow materials to blow onto sensitive areas or structures.

705.03.08 Seeding Phase Acceptance. Submit a request for Seeding Phase Acceptance when operations are completed. Inspection will be conducted to verify completion, and Seeding Phase Acceptance will be granted at that time.

705.03.09 Establishment Phase. The Establishment Phase will begin upon Seeding Phase Acceptance.

(a) Period of Maintenance. Maintain seeded areas until Final Acceptance.

(b) Required Maintenance. Perform the following during the Establishment Phase.

(1) Watering. Apply water as needed to ensure survival of the turfgrass. Apply water to seeded and mulched areas with approved machinery. Do not allow water to cause erosion or to displace the mulch.

(2) Overseeding. Overseeding consists of seeding and mulching in areas where living turfgrass coverage is 40 to 90 percent. When living turfgrass groundcover is not acceptable, perform overseeding as directed. In areas to be overseeded, cut the turfgrass to a height of 3 to 5 in. and remove debris that may interfere with seeding. Apply seed mixtures, seed additives, fertilizer, mulch, and secure mulch as specified in 705.03.01 thru .07, but do not repair grade or prepare soil.

(3) Reseeding. Reseeding consists of tilling, seeding and mulching in areas where turfgrass coverage is less than 40 percent. When living turfgrass groundcover is not acceptable, perform reseeding as directed. In areas to be reseeded, cut the turfgrass to a height of 3 to 5 in. and remove debris that may interfere with seeding. Repair grades, prepare soil, apply seed, fertilizer, and mulch, and secure mulch as specified in 705.03.01 thru .07.

(4) Mowing. Mow turfgrass in areas flatter than 4:1 before the grass grows to a height of 12 in. when directed. Use approved machinery to cut to a height of 3 to 5 in.

(c) Refertilizing. Apply 20-16-12 fertilizer as specified in 705.03.02 at least 1 month after initial fertilizer was applied. Do not refertilize from November 15 thru March 1.

705.03.10 Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report of turfgrass height, color, and percent groundcover. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible. The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed.

Final Acceptance will be granted after all operations have been completed, and when the seedlings of turfgrass species have grown at least 4 in. tall, exhibit dark green color, and are least 95 percent groundcover.

705.04 MEASUREMENT AND PAYMENT. Turfgrass Establishment will be measured and paid for at the Contract unit price for one or more of the specified items. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

705.04.01 Turfgrass Establishment, including grade repair, preparing soil, applying fertilizer, soil amendments, seed mixes, seed additives, mulching, securing mulch, watering, overseeding, reseeding, and mowing, will be measured and paid for at the Contract unit price per square yard. The use of other materials in conformance with an approved Modification Request shall be incidental to the Contract unit price, and will not be measured or paid for.

(a) Payment Schedule. Payments will be made according to Table 3 when construction requirements are met.

TURFGRASS ESTABLISHMENT

TABLE 3 - PAYMENT SCHEDULE

CONSTRUCTION REQUIREMENTS	PERCENT OF TOTAL CONTRACT PRICE	PAYMENT FOR COMPLETED WORK
705.03.01 thru .08	80	At Seeding Phase Acceptance
705.03.09 (a) and (b) and 705.03.10	20	At Final Acceptance
Total Payment	**100%**	

(b) Forfeiture. Failure to complete operations as required in conformance with the Payment Schedule will result in forfeiture of that percentage of payment.

705.04.02 Refertilizing will be measured and paid for at the Contract unit price per square yard.

705.04.03 Temporary Mulch and Temporary Seed will be measured and paid for at the pertinent Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 706 — SHRUB SEEDING

560 **DELETE:** Section 706 — Shrub Seeding, in its entirety.

INSERT: The following.

SECTION 706 — SHRUB SEEDING ESTABLISHMENT

706.01 DESCRIPTION. Establish shrub seeding in topsoil or other specified soil substrate to provide permanent vegetation groundcover. When it is not possible to perform Shrub Seeding Establishment to provide permanent soil stabilization, refer to Section 704 and perform Temporary Mulch, or as directed. Performance of Shrub Seeding Establishment as specified herein complies with all requirements of the Maryland Department of the Environment for permanent seeding.

706.02 MATERIALS.

Limestone	920.02.01
Sulfur	920.02.02
Compost	920.02.05
Fertilizer	920.03.01
Straw Mulch	920.04.01
Wood Cellulose Fiber	920.04.02
Tall Fescue, Hard Fescue, Kentucky Bluegrass	920.06.06(a)
Common Oat	920.06.06(b)
Meadow Forb Seed	920.06.06(c)
Meadow Grass, Sedge and Rush Seed	920.06.06(d)
Shrub Seed	920.06.06(f)
Water	920.09.01
Seed Carrier	920.09.02
Pesticides	920.09.03

706.03 CONSTRUCTION.

706.03.01 General.

(a) Regions. Refer to 705.03.01(a).

(b) Seeding Seasons. Perform operations according to Table 1 when soil moisture and weather conditions are suitable, when the temperature is above 32 F, and the soil is not frozen. Cease operations when conditions are unsuitable.

SHRUB SEEDING ESTABLISHMENT

TABLE 1 - SEEDING SEASONS AND SEED MIXES

REGION	SEEDING SEASON - MONTH/DAY			
	Spring	Summer	Fall	Late Fall
	SHA Lowland Shrub Seed or SHA Upland Shrub Seed			
1	3/1 to 6/14	6/15 to 7/31	8/1 to 9/30	10/1 to 11/30
2	2/1 to 5/14	5/15 to 7/31	8/1 to 10/14	10/15 to 11/30
3	2/1 to 4/30	5/1 to 7/31	8/1 to 10/31	11/1 to 11/30
		Plus Additive A*		Plus Additive B*
Notes* Additive A = Tall Fescue Additive B = Common Oat				

(c) Nutrient Management Plan (NMP). Soil testing will be performed and a NMP will be developed by the Administration. Replace application rates of 706.03.04 as required by the NMP. When a NMP has not been developed, apply 200 lb. per acre of 20-16-12 (83 precent UF with MAP & SOP) fertilizer as the NMP rate for Shrub Seeding Establishment.

(d) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the SHA Nutrient Management Reporting Form. Submit the Form to the Engineer within 24 hours after applying fertilizer.

(e) Pesticide Application. Apply pesticides in conformance with the Maryland Pesticide Applicator's Law and the manufacturer's recommendations. The Contractor shall possess a Maryland Department of Agriculture Commercial Pesticide Business License and a Pesticide Applicator Certificate for the pertinent pesticide application Category: (2) Forest; (3-A) Ornamental Plant Exterior; (3-C) Turf; (5) Aquatic; (6) Right-of-Way and Weed. Pesticides shall be applied by a Maryland Certified Pesticide Applicator, or by a Registered Pesticide Applicator under the supervision of a Certified Pesticide Applicator.

(f) Pesticide Application Reporting. Record the location, acreage treated, pesticide name and quantity applied on the Pesticide Application Reporting Form. Submit the Form within 24 hours after applying pesticide.

(g) Nutrient Management Plan (NMP). Soil testing will be performed and a NMP will be developed by the Administration. Replace application rates of 706.03.08 as required by the NMP. When a NMP has not been developed, apply 500 lb. per acre of 20-16-12 (83 percent UF with MAP & SOP) fertilizer as the NMP rate for Meadow Establishment.

(h) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

(i) Seeding Schedule. Develop a Schedule that provides dates for completing seeding operations. Submit the written Schedule at least 14 days before beginning operations. The Schedule will be reviewed by the Engineer and Landscape Operations Division for completeness and feasibility, and will be approved or returned for correction.

(j) IPM Program and Establishment Schedule. Develop an IPM Program that includes methods of pest monitoring for weed control, pesticide selection, application rates, and scheduling. Submit the IPM Program and Establishment Schedule when seeding operations are completed. The Program and Schedule will be forwarded to the Landscape Operations Division for review and comment before approval is granted.

706.03.02 Modification Request. Submit a written Modification Request to perform seeding between Late Fall and Spring Seeding Seasons; to install other species or to adjust seeding rates; to install an approved tackifier at manufacturer's recommended application rates in lieu of wood cellulose fiber to secure straw mulch; or to use Type D or Type E Soil Stabilization Matting per Section 709 in lieu of straw mulch and wood cellulose fiber in areas where those mattings have not been specified. The Engineer in consultation with the Landscape Operations Division will evaluate the Request. If granted, a notice of approved modification will be returned within 14 days after the request is received.

706.03.03 Grade Repair and Preparing Soil. Refer to 705.03.03 and .04.

706.03.04 Seed Delivery, Weighing, and Mixing. Deliver seed unmixed with label showing common name and scientific name per 920.06. Test seed as specified in 920.06.05 before weighing and mixing. Use a scale with 0.01 oz or gram accuracy to verify application rates and quantities of seed. Mix and apply seed separately or with other specified seed.

706.03.05 Application Rates. Refer to 706.03.01(d) and include seed additives as specified. Apply materials according to Table 2, Table 3 and Table 4.

SHRUB SEEDING ESTABLISHMENT

TABLE 2 - APPLICATION RATES [a, b, c, d]

MATERIAL	LB PER SY	LB PER ACRE
SOIL AMENDMENTS per Nutrient Management Plan for topsoil or other specified soil substrate.		
Compost	0 to 1.033	0 to 5,000
Gypsum	0 to 0.455	0 to 2,200
Limestone	0 to 0.930	0 to 4,500
Sulfur	0 to 0.052	0 to 250
FERTILIZER		
20-16-12 (83% UF with MAP & SOP)	0 to 0.041	0 to 200
38-0-0 (UF)	0 to 0.021	0 to 100
11-52-0 (MAP)	0 to 0.036	0 to 175
0-0-50 (SOP)	0 to 0.041	0 to 200
SEED MIXES; select one		
SHA Lowland Shrub Seed	Refer to Table 3 - Application Rates	
SHA Upland Shrub Seed	Refer to Table 4 - Application Rates	
ADDITIVE SEED; when required per Table 1		
A = Tall Fescue	0.005	25
B = Common Oat	0.010	50
STRAW MULCH	0.413	2000
WOOD CELLULOSE FIBER to secure straw mulch	0.103	500

Notes:

[a] Apply compost, gypsum, limestone, sulfur, and fertilizer at rates specified in the NMP.

[b] For salvaged topsoil, the application rates will be included in the Contract documents. For furnished topsoil, the application rates will be developed for the approved source of supply.

[c] When no NMP has been developed, apply 200 lb per acre of 20-16-12 fertilizer, and do not apply any soil amendments.

[d] UF = Ureaform; MAP = Monoammonium Phosphate; SOP = Sulfate of Potash. When application rate of 20-16-12 fertilizer is below 200 lb per acre, apply UF, MAP, and SOP per NMP.

SHRUB SEEDING ESTABLISHMENT

TABLE 3 - APPLICATION RATES - LOWLAND SHRUB SEED

SHRUB SPECIES Select 7 Marked 'x'	**SEEDING RATE**		**REGION**		
	GRAM PER SY	**LB PER ACRE**	**1**	**2**	**3**
American Cranberrybush	0.281	3.0	x	x	x
American Black Elderberry	0.235	2.5	x		
Blackhaw	0.281	3.0	x	x	x
Common Buttonbush	0.328	3.5	x	x	
Common Winterberry	0.281	3.0	x		
Desert False Indigo	0.281	3.0	x	x	
Inkberry	0.328	3.5		x	x
Maryland Senna	0.188	2.0	x	x	x
Ninebark	0.094	1.0	x	x	x
Red Chokeberry	0.188	2.0	x		
Redosier Dogwood	0.328	3.5	x	x	x
Silky Dogwood	0.188	2.0		x	x
Southern Arrowwood	0.328	3.5	x	x	x
Steeplebush	0.094	1.0		x	x
Swamp Rose	0.141	1.5	x	x	x
OTHER SPECIES Select all marked 'x'					
Blackeyed Susan, PLS [1]	0.094	1.0	x	x	x
Deertongue, PLS [1]	0.188	2.0	x	x	x
Kentucky Bluegrass	0.469	5.0	x	x	x
Purpletop, PLS [1]	0.094	1.0	x	x	x
Switchgrass, PLS [1]	0.094	1.0	x	x	x
Purple Coneflower, PLS [1]	0.188	2.0	x	x	x

Note:

[1] The rate shown is Pure Live Seed. Use germination and purity data from the seed tag to calculate the actual seeding rate needed to obtain the seeding rate in Pure Live Seed.

SHRUB SEEDING ESTABLISHMENT TABLE 4 - APPLICATION RATES - UPLAND SHRUB SEED					
SHRUB SPECIES **Select 7 Marked 'x'**	**SEEDING RATE**		**REGION**		
	GRAM PER SY	**LB PER ACRE**	**1**	**2**	**3**
Black Chokeberry	0.094	1.0	x	x	x
Blackhaw	0.281	3.0	x	x	x
Bristly Locust	0.235	2.5	x		
Chokecherry	0.281	3.0	x	x	
Fragrant Sumac	0.281	3.0	x		
Gray Dogwood	0.281	3.0	x	x	
Mapleleaf Viburnum	0.141	1.5		x	x
Nannyberry	0.281	3.0	x	x	x
Red Elderberry	0.047	0.5	x		
Smooth Sumac	0.281	3.0	x	x	x
Spicebush	0.281	3.0		x	x
Staghorn Sumac	0.281	3.0	x	x	x
Witch Hazel	0.281	3.0		x	x
OTHER SPECIES **Select all marked 'x'**					
Blackeyed Susan, PLS [1]	0.047	0.5	x	x	x
Hard Fescue	1.876	20.0	x	x	x
Indiangrass, PLS [1]	0.188	2.0	x	x	x
Purpletop, PLS [1]	0.094	1.0	x	x	x
Switchgrass, PLS [1]	0.094	1.0	x	x	x
Wild Bergamot, PLS [1]	0.019	0.2	x	x	x

Note:

[1] The rate shown is Pure Live Seed. Use germination and purity data from the seed tag to calculate the actual seeding rate needed to obtain the seeding rate in Pure Live Seed.

706.03.06 Preparing Soil. Provide a uniform and porous surface that is free of debris and weeds as follows:

(a) Areas Flatter than 4:1. Apply soil amendments and till to a depth of 2 in. to uniformly incorporate amendments into the soil. If no soil amendments are required per the NMP, and when a drill seeder will be used for seeding, tilling will not be required.

(b) Slopes 4:1 and Steeper. Track slopes 4:1 and steeper with cleated track equipment operated perpendicular to the slope. Apply soil amendments to tracked soil.

(c) Debris Removal. Remove stones, wood, metal, and other debris with a length or width greater than 3.0 in. from the soil surface.

706.03.07 Fertilizing and Seeding. Use spreaders, drills, or other approved machinery. Hydroseeders shall not be used to apply seed or fertilizer. Apply fertilizer and seed after preparing soil. Seeders shall be capable of uniformly placing seed and fertilizer at the specified rate. Calibrate equipment before application.

Apply materials accurately and uniformly to avoid misses and overlaps. Do not operate machinery during windy weather that may interfere with uniform application.

706.03.08 Mulching. Refer to 705.03.07.

706.03.09 Seeding Phase Acceptance. Refer to 705.03.08.

706.03.10 Establishment Phase. The Establishment Phase will begin upon Seeding Phase Acceptance.

(a) Period of Maintenance. Maintain seeded areas for 12 months after Seeding Phase Acceptance.

(b) Required Maintenance. Perform the following during the Establishment Phase.

(1) Watering. Apply water to ensure survival of the seeded species as needed. Apply water to seeded and mulched areas with approved machinery. Do not allow water to cause erosion or to displace the mulch.

(2) Weed Control. Monitor and promptly implement the IPM Program to control weeds in conformance with the IPM Program as needed or as directed. Remove weeds over 18 in. tall.

(3) Overseeding. Overseeding consists of seeding and mulching areas where living seedling coverage is less than 70 percent. When living seedling groundcover is not acceptable, perform overseeding as directed. Repair grades but do not cut vegetation or prepare soil. Apply seed mixtures, seed additives, fertilizer, mulch, and secure mulch as specified in 706.03.01 thru .08.

(c) Partial Establishment Phase Inspection. Seeded areas will be inspected 6 months after Seeding Phase Acceptance. The Inspection Report will include actions to perform before Partial Establishment Phase Acceptance is granted.

706.03.11 Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report of seedling height, color, and percent coverage. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible. The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed.

Final Acceptance will be granted after all operations have been completed, and when shrub seedlings and other permanent seeded species have grown at least 4 in. tall, exhibit dark green color, and are at least 95 percent groundcover.

706.04 MEASUREMENT AND PAYMENT. Shrub Seeding Establishment will be measured and paid for at the Contract unit price for one or more of the Specified items. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

(a) Payment Schedule. Payments will be made according to Table 5 when construction requirements are met.

SHRUB SEEDING ESTABLISHMENT
TABLE 5 - PAYMENT SCHEDULE

CONSTRUCTION REQUIREMENTS	PERCENT OF TOTAL CONTRACT PRICE	PAYMENT FOR COMPLETED WORK
706.03.01 thru .09	70	At Seeding Phase Acceptance
706.03.10	15	At Partial Establishment Phase Acceptance
706.03.10 and .11	15	At Final Acceptance
Total Payment	**100%**	

(b) Forfeiture. Failure to complete operations as required or directed in conformance with the Payment Schedule will result in forfeiture of that percentage of payment.

706.04.01 Upland Shrub Seeding. Upland Shrub Seeding, including grade repair, preparing soil, applying fertilizer, soil amendments, seed mixes, seed additives, mulching, securing mulch, watering, weed control, and overseeding will be measured and paid for at the Contract unit price per square yard. The use of other materials in conformance with an approved Modification Request shall be incidental to the Contract unit price, and will not be measured or paid for.

706.04.02 Lowland Shrub Seeding. Lowland Shrub Seeding, including grade repair, preparing soil, applying fertilizer, soil amendments, seed mixes, seed additives, mulching, securing mulch, watering, weed control, and overseeding will be measured and paid for at the Contract unit price per square yard. The use of other materials in conformance with an approved Modification Request shall be incidental to the Contract unit price, and will not be measured or paid for.

706.04.03 Temporary Mulch will be measured and paid for at the Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 707 — MEADOW ESTABLISHMENT

566 **DELETE:** Section 707 — Meadow Establishment and Wildflower Seeding, in its entirety.

INSERT: The following.

SECTION 707 — MEADOW ESTABLISHMENT

707.01 DESCRIPTION. Establish meadow in topsoil or other specified soil substrate to provide permanent vegetation groundcover. When it is not possible to perform Meadow Establishment, refer to Section 704 and perform Temporary Mulch, or as directed. Performance of Meadow Establishment as specified herein complies with all requirements of the Maryland Department of the Environment for permanent seeding.

707.02 MATERIALS.

Limestone	920.02.01
Sulfur	920.02.02
Compost	920.02.05
Fertilizer	920.03.01
Straw Mulch	920.04.01
Wood Cellulose Fiber	920.04.02
Tall Fescue, Hard Fescue, Kentucky Bluegrass	920.06.06(a)
Common Oat, Perennial Ryegrass	920.06.06(b)
Meadow Forb Seed	920.06.06(c)
Meadow Grass, Sedge and Rush Seed	920.06.06(d)
Wildflower Seed	920.06.06(e)
Water	920.09.01
Seed Carrier	920.09.02
Pesticides	920.09.03

707.03 CONSTRUCTION.

707.03.01 General.

(a) Regions. Refer to 705.03.01.

(b) Seeding Seasons. Perform operations in conformance with Table 1 when soil moisture and weather conditions are suitable, when the temperature is above 32 F, and the soil is not frozen. Cease operations when conditions are unsuitable.

MEADOW ESTABLISHMENT

TABLE 1 - SEEDING SEASONS AND SEED MIXES

REGION	SEEDING SEASON - MONTH/DAY			
	Spring	**Summer**	**Fall**	**Late Fall**
	SHA Wet Meadow Seed, SHA Lowland Meadow Seed, SHA Upland Meadow Seed			
1	3/1 to 6/14	6/15 to 7/31	8/1 to 9/30	10/1 to 11/30
2	2/1 to 5/14	5/15 to 7/31	8/1 to 10/14	10/15 to 11/30
3	2/1 to 4/30	5/1 to 7/31	8/1 to 10/31	11/1 to 11/30
All Regions	Plus Additive A*	Plus Additive B*	Plus Additive B*	Plus Additive D*
	Plus Additive B*	Plus Additive C*	Plus Additive D*	Plus Additive E*

Notes *

Additive A for Lowland Meadow and Upland Meadow = Garden Cosmos

Additive B for Lowland Meadow and Upland Meadow = Plains Coreopsis

Additive C for Lowland Meadow and Upland Meadow = Tall Fescue

Additive C for Wet Meadow = Perennial Ryegrass

Additive D for Lowland Meadow and Upland Meadow = Corn Poppy

Additive E for all Meadow Establishment = Common Oat

(c) Pesticide Application. Refer to 701.03.01(b).

(d) Pesticide Application Reporting. Refer to 701.03.01(c).

(e) Nutrient Management Plan (NMP). Soil testing will be performed and a NMP will be developed by the Administration. Replace application rates of 707.03.08 as required by the NMP. When a NMP has not been developed, apply 200 lb. per acre of 20-16-12 (83 percent UF with MAP & SOP) fertilizer as the NMP rate for Meadow Establishment.

(f) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

(g) Seeding Schedule. Develop a Schedule that provides dates for completing seeding operations. Submit the written Schedule at least 14 days before beginning operations. The Schedule will be reviewed by the Engineer and Landscape Operations Division for completeness and feasibility, and will be approved or returned for correction.

(h) IPM Program and Establishment Schedule. Develop an IPM Program that includes methods of pest monitoring for weed control, pesticide selection, application rates, and

scheduling. Submit the IPM Program and Establishment Schedule when seeding operations are completed. The Program and Schedule will be forwarded to the Landscape Operations Division for review and comment before approval is granted.

707.03.02 Modification Request. Submit a written Modification Request to perform seeding between Late Fall and Spring Seeding Seasons; to install other species or to adjust seeding rates; to install an approved tackifier at manufacturer's recommended application rates in lieu of wood cellulose fiber to secure straw mulch; or to use Type D, or Type E Soil Stabilization Matting per Section 709 in lieu of straw mulch and wood cellulose fiber in areas where those mattings have not been specified. The Engineer in consultation with the Landscape Operations Division will evaluate the Request. If granted, a notice of approved modification will be returned within 14 days after the request is received.

707.03.03 Application Rates. Refer to 707.03.01(b) and include seed and seed additives as specified. Apply materials in accordance with Table 2 thru Table 5.

MEADOW ESTABLISHMENT

TABLE 2 - APPLICATION RATES [a, b, c, d]

MATERIAL	**LB PER SY**	**LB PER ACRE**
SOIL AMENDMENTS per Nutrient Management Plan for topsoil or other specified soil substrate		
Compost	0 to 1.033	0 to 5,000
Gypsum	0 to 0.455	0 to 2,200
Limestone	0 to 0.930	0 to 4,500
Sulfur	0 to 0.052	0 to 250
FERTILIZER	**LB PER SY**	**LB PER ACRE**
20-16-12 (83% UF with MAP & SOP)	0 to 0.041	0 to 200
38-0-0 (UF)	0 to 0.021	0 to 100
11-52-0 (MAP)	0 to 0.036	0 to 175
0-0-50 (SOP)	0 to 0.041	0 to 200
SEED MIXES; select one		
SHA Wet Meadow Seed	Refer to Table 3 - Application Rates	
SHA Lowland Meadow Seed	Refer to Table 4 - Application Rates	
SHA Upland Meadow Seed	Refer to Table 5 - Application Rates	
ADDITIVE SEED; per Table 1	**LB PER SY**	**LB PER ACRE**
A = Garden Cosmos	0.028	0.3
B = Plains Coreopsis	0.028	0.3
C = Tall Fescue or Perennial Ryegrass	2.345	25
D = Corn Poppy	0.028	0.3

E = Common Oat	4.690	50
	LB PER SY	**LB PER ACRE**
STRAW MULCH	0.413	2000
WOOD CELLULOSE FIBER to secure straw mulch	0.103	500

Notes:

[a] Apply compost, gypsum, limestone, sulfur, and fertilizer at rates specified in the NMP.

[b] For salvaged topsoil, the application rates will be included in the Contract documents. For furnished topsoil, the application rates will be developed for the approved source of supply.

[c] When no NMP has been developed, apply 200 lb per acre of 20-16-12 fertilizer, and do not apply any soil amendments.

[d] UF = Ureaform; MAP = Monoammonium Phosphate; SOP = Sulfate of Potash. When application rate of 20-16-12 fertilizer is below 200 lb. per acre, apply UF, MAP, and SOP per NMP.

MEADOW ESTABLISHMENT

TABLE 3 - WET MEADOW SEED

FORBS	**PURE LIVE SEED ***		**GRASSES, SEDGES and RUSHES**	**PURE LIVE SEED ***	
	GRAM PER SY	**LB PER ACRE**		**GRAM PER SY**	**LB PER ACRE**
Select 8			**Include All**		
Allegheny Monkeyflower	0.038	0.4	Common Rush	0.150	1.6
Crimsoneyed Rose Mallow	0.038	0.4	Fox Sedge	0.094	1.0
Flat-top Goldenrod	0.038	0.4	Fowl Bluegrass	0.188	2.0
King of the Meadow	0.038	0.4	Longhair Sedge	0.056	0.6
New York Aster	0.038	0.4	Rattlesnake Mannagrass	0.094	1.0
New York Ironweed	0.038	0.4	Shallow Sedge	0.056	0.6
Seedbox	0.038	0.4	Woolgrass	0.056	0.6
Swamp milkweed	0.019	0.2			
Swamp Sunflower	0.56	0.6	Note:		
Swamp Verbena	0.131	1.4	* The rate shown is Pure Live Seed. Use germination and purity data from the seed tag to calculate the actual seeding rate needed to obtain the seeding rate in Pure Live Seed.		
Trumpetweed or Spotted Trumpetweed	0.038	0.4			

MEADOW ESTABLISHMENT TABLE 4 - LOWLAND MEADOW SEED					
FORBS	**PURE LIVE SEED ***		**GRASSES, SEDGES and RUSHES**	**PURE LIVE SEED ***	
	GRAM PER SY	**LB PER ACRE**		**GRAM PER SY**	**LB PER ACRE**
Select 8			**Include All**		
Common Boneset	0.019	0.2	Big Bluestem	0.188	2.0
Eastern Purple Coneflower	0.113	1.2	Gamagrass	0.188	2.0
Evening Primrose	0.019	0.2	Hard Fescue	1.876	20.0
Lanceleaf Tickseed	0.141	1.5	Indiangrass	0.188	2.0
Maximilian Sunflower	0.047	0.5	Kentucky Bluegrass	0.469	5.0
New England Aster	0.019	0.2	Switchgrass	0.094	1.0
New York Ironweed	0.019	0.2	Virginia Wildrye	0.047	0.5
Showy Tickseed	0.019	0.2	Note: * The rate shown is Pure Live Seed. Use germination and purity data from the seed tag to calculate the actual seeding rate needed to obtain the seeding rate in Pure Live Seed.		
Stiff Goldenrod	0.028	0.3			
Swamp Verbena	0.066	0.7			
Trumpetweed or Spotted Trumpetweed	0.019	0.2			

MEADOW ESTABLISHMENT TABLE 5 - UPLAND MEADOW SEED					
FORBS	**PURE LIVE SEED ***		**GRASSES, SEDGES and RUSHES**	**PURE LIVE SEED ***	
	GRAM PER SY	**LB PER ACRE**		**GRAM PER SY**	**LB PER ACRE**
Select 8			**Include All**		
Blackeyed Susan	0.094	1.0	Broomsedge	0.094	1.0
Browneyed Susan	0.094	1.0	Deertongue	0.188	2.0
Eastern Purple Coneflower	0.225	2.4	Hard Fescue	1.876	20.0
Gray Goldenrod	0.038	0.4	Little Bluestem	0.188	2.0
Lanceleaf Tickseed	0.263	2.8	Purpletop	0.094	1.0
Maryland Senna	0.056	0.6	Virginia Wildrye	0.047	0.5
Partridge Pea	0.225	2.4	Note: * The rate shown is Pure Live Seed. Use germination and purity data from the seed tag to calculate the actual seeding rate needed to obtain the seeding rate in Pure Live Seed.		
Smooth Blue Aster	0.038	0.4			
Sundial Lupine	0.263	2.8			
Talus Slope Penstemon	0.038	0.4			
Wild Bergamot	0.038	0.4			

707.03.04 Grade Repair. Refer to 705.03.04.

707.03.05 Preparing Soil. Refer to 706.03.06. Use rakes, soil rollers, and similar tools and equipment as necessary to ensure a firm and uniform soil surface in preparation for seeding.

707.03.06 Seed Delivery, Weighing, and Mixing. Refer to 706.03.04.

707.03.07 Fertilizing and Seeding. Refer to 706.03.07.

707.03.08 Mulching. Refer to 705.03.07.

707.03.09 Seeding Phase Acceptance. Refer to 705.03.08.

707.03.10 Establishment Phase. Refer to 706.03.10.

707.03.11 Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report of seedling height, color, and percent coverage. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible.

The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed. Final Acceptance will be granted after all operations have been completed, and when meadow seedlings and other permanent seeded species have grown at least 4 in. tall, exhibit dark green color, and are least 95 percent groundcover.

707.04 MEASUREMENT AND PAYMENT. Meadow Establishment will be measured and paid for at the Contract unit price for one or more of the Specified items. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

(a) Payment Schedule. Payments will be made according to Table 6 when construction requirements are met.

MEADOW ESTABLISHMENT
TABLE 7 - PAYMENT SCHEDULE

CONSTRUCTION REQUIREMENTS	PERCENT OF TOTAL CONTRACT PRICE	PAYMENT FOR COMPLETED WORK
707.03.01 thru .09	70	At Seeding Phase Acceptance
707.03.10	15	At Partial Establishment Phase Acceptance
707.03.10 and .11	15	At Final Acceptance
Total Payment	**100%**	

(b) Forfeiture. Failure to complete operations as required or directed in conformance with the Payment Schedule will result in forfeiture of that percentage of payment.

707.04.01 Wet Meadow Establishment. Wet Meadow Establishment, including grade repair, preparing soil, applying fertilizer, soil amendments, seed mixes, seed additives, mulching,

securing mulch, watering, weed control, and overseeding will be measured and paid for at the Contract unit price per square yard. The use of other materials in conformance with an approved Modification Request shall be incidental to the Contract unit price, and will not be measured or paid for.

707.04.02 Lowland Meadow Establishment. Lowland Meadow Establishment, including grade repair, preparing soil, applying fertilizer, soil amendments, seed mixes, seed additives, mulching, securing mulch, watering, weed control, and overseeding will be measured and paid for at the Contract unit price per square yard. The use of other materials in conformance with an approved Modification Request shall be incidental to the Contract unit price, and will not be measured or paid for.

707.04.03 Upland Meadow Establishment. Upland Meadow Establishment, including grade repair, preparing soil, applying fertilizer, soil amendments, seed mixes, seed additives, mulching, securing mulch, watering, weed control, and overseeding will be measured and paid for at the Contract unit price per square yard. The use of other materials in conformance with an approved Modification Request shall be incidental to the Contract unit price, and will not be measured or paid for.

707.04.04 Temporary Mulch will be measured and paid for at the Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 708 — TURFGRASS SOD ESTABLISHMENT

578 **DELETE:** Section 708 — Turfgrass Sod Establishment, in its entirety.

INSERT: The following.

SECTION 708 — TURFGRASS SOD ESTABLISHMENT

708.01 DESCRIPTION. Establish turfgrass sod on topsoil or other specified soil substrate to provide permanent vegetation groundcover. When it is not possible to perform Turfgrass Sod Establishment, refer to Section 704 and perform Temporary Mulch, or as directed. Performance of Turfgrass Sod Establishment as specified herein complies with all requirements of the Maryland Department of the Environment for permanent vegetation groundcover.

708.02 MATERIALS.

Limestone	920.02.01
Sulfur	920.02.02
Gypsum	920.02.04
Compost	920.02.05
Fertilizer	920.03.01
Turfgrass Sod	920.06.03
Fasteners	920.05.02
Water	920.09.01

708.03 CONSTRUCTION.

708.03.01 General.

(a) Regions. Refer to 705.03.01(a).

(b) Installation Season and Species. Perform operations when soil moisture and weather conditions are suitable. Cease operations when sod or soil is frozen, or conditions are unsuitable.

(1) Tall Fescue Sod. Install in Region 1, Region 2, and Region 3 regions unless another species is specified, from August 15 to November 15, and from March 1 to May 31.

(2) Zoysiagrass Sod. Install in specified areas of Region 2 and Region 3 from March 1 to June 15, and from August 1 to September 15.

(3) Bermudagrass Sod. Install in specified areas of Region 3 from March 1 to June 15, and from August 1 to September 15.

(c) Nutrient Management Plan (NMP). Soil testing will be performed and a NMP will be developed by the Administration. Replace application rates of 708.03.04 as required by the NMP. When a NMP has not been developed, apply 200 lb. per acre of 20-16-12 (83% UF with MAP & SOP) fertilizer as the NMP rate for Turfgrass Sod Establishment.

(d) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

708.03.02 Grade Repair. Refer to 705.03.04.

708.03.03 Preparing Soil. Refer to 705.03.05.

708.03.04 Application Rates. Apply materials according to Table 1.

TURFGRASS SOD ESTABLISHMENT

TABLE 1 - APPLICATION RATES [a, b, c, d]

MATERIAL	LB PER SY	LB PER ACRE
SOIL AMENDMENTS per Nutrient Management Plan for topsoil or other specified soil substrate		
Compost	0 to 1.033	0 to 5000
Gypsum	0 to 0.455	0 to 2200
Limestone	0 to 0.930	0 to 4500
Sulfur	0 to 0.052	0 to 250
INITIAL FERTILIZER		
20-16-12 (83% UF with MAP & SOP)	0 to 0.041	0 to 200
38-0-0 (UF)	0 to 0.021	0 to 100
11-52-0 (MAP)	0 to 0.036	0 to 175
0-0-50 (SOP)	0 to 0.041	0 to 200
REFERTILIZING		
20-16-12	0.027	200

Notes:

[a] Apply compost, gypsum, limestone, sulfur, and initial fertilizer at rates specified in the NMP.

[b] For salvaged topsoil, the application rates will be included in the Contract documents. For furnished topsoil, the application rates will be developed for the approved source of supply.

[c] When no NMP has been developed, apply 200 lb per acre of 20-16-12 initial fertilizer, and do not apply any soil amendments. Apply refertilizing when specified in the Contract documents.

[d] UF = Ureaform; MAP = Monoammonium Phosphate; SOP = Sulfate of Potash. When application rate of 20-16-12 fertilizer is below 200 lb. per acre, apply UF, MAP, and SOP per NMP.

708.03.05 Initial Fertilizer. Use spreaders, drills, or other approved machinery. Apply initial fertilizer after preparing soil, or after installing sod. Seeders shall be capable of uniformly placing fertilizer at the specified rate. Calibrate equipment before application. Apply materials accurately and uniformly to avoid misses and overlaps. Do not operate machinery during windy weather that may interfere with uniform application.

708.03.06 Transporting and Handling Sod. Transport and install turfgrass sod within 48 hours after harvest. Handle sod without excessive breaking, tearing, or loss of soil.

708.03.07 Placing Sod. Place sod neatly over the soil surface. Ensure that sod edges are tightly abutted. Do not overlap edges of sod, or leave gaps between strips of sod.

708.03.08 Securing. Install fasteners in locations where sod may be dislodged by water flow. Secure turfgrass sod to the soil of ditches and slopes with at least two fasteners per strip spaced no more than 2 ft apart. Drive the fasteners through the sod and firmly into the soil, so there is no gap at the top of the fastener.

708.03.09 Firming. Tamp or roll turfgrass sod after installation and securing sod to close press the sod firmly into the soil. Hand tampers shall weigh approximately 15 lb with a flat surface of approximately 100 in^2. Rollers shall weigh approximately 40 lb per ft of width.

708.03.10 Initial Watering. Gently apply water with a sprinkler or water-breaker nozzle over the surface of the sod. Do not allow water to cause erosion or to displace the sod. Perform the first watering within 4 hours after placing sod. Wet the soil to a depth at least 2 in. below the sod.

708.03.11 Installation Acceptance. Submit a request for Installation Phase Acceptance when operations are completed. Inspection will be conducted to verify completion. Installation Phase Acceptance will be granted at that time.

708.03.12 Establishment Phase. The Establishment Phase will begin upon Installation Phase Acceptance. Perform the following during the Establishment Phase.

(a) Period of Maintenance. Maintain areas of sod until Final Acceptance.

(b) Required Maintenance. Perform the following during the Establishment Phase.

(1) Watering. Apply water to ensure survival of sod in good condition. Apply water with approved machinery. Do not allow water to cause erosion, or to displace the sod.

(2) Reset Sod. When sod is not firmly fastened to the soil, repair the unsecured areas using fasteners as needed or as directed.

(3) Sod Replacement. When sod does not meet acceptance standards, remove the unacceptable sod and install new sod as needed or as directed.

(4) Mowing. Mow sod before it grows to a height of 12 in. when directed. Use approved machinery to cut to a height of 3 to 5 in.

(c) Refertilizing. Apply 20-16-12 fertilizer as specified in 708.03.04 at least 1 month after initial fertilizer was applied. Do not refertilize from November 15 thru March 1.

708.03.13 Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report of sod height, color, and percent groundcover. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible. The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed.

Final Acceptance will be granted after all operations have been completed, and when the turfgrass sod has grown at least 4 in. tall, exhibits dark green color, is firmly rooted into the soil, and is at least 99 percent groundcover.

708.04 MEASUREMENT AND PAYMENT. Turfgrass Sod Establishment will be measured and paid for at the Contract unit price for one or more of the specified items. The payment will be full compensation for all material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

(a) Payment Schedule. Payments will be made according to Table 2 when construction requirements are met.

TURFGRASS SOD ESTABLISHMENT
TABLE 2 - PAYMENT SCHEDULE

CONSTRUCTION REQUIREMENTS	PERCENT OF TOTAL CONTRACT PRICE	PAYMENT FOR COMPLETED WORK
708.03.01 thru .11	80	At Installation Phase Acceptance
708.03.12 (a) and (b) and 705.03.13	20	At Final Acceptance
Total Payment	**100%**	

(b) Forfeiture. Failure to complete operations as required in conformance with the Payment Schedule will result in forfeiture of that percentage of payment.

708.04.01 Turfgrass Sod Establishment, including grade repair, preparing soil, applying fertilizer at installation, soil amendments, sod, fasteners, watering, resetting sod, sod replacement, and mowing will be measured and paid for at the Contract unit price per square yard.

708.04.02 Zoysiagrass Sod Establishment, including grade repair, preparing soil, applying fertilizer at installation, soil amendments, sod, fasteners, watering, resetting sod, sod replacement, and mowing will be measured and paid for at the Contract unit price per square yard.

708.04.03 Bermudagrass Sod Establishment, including grade repair, preparing soil, applying fertilizer at installation, soil amendments, sod, fasteners, watering, resetting sod, sod replacement, and mowing will be measured and paid for at the Contract unit price per square yard.

708.04.04 Refertilizing will be measured and paid for at the Contract unit price per square yard.

708.04.05 Temporary Mulch will be measured and paid for at the Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 709 — SOIL STABILIZATION MATTING

583 **DELETE:** Section 709 — Soil Stabilization Matting, in its entirety.

INSERT: The following.

SECTION 709 — SOIL STABILIZATION MATTING

709.01 DESCRIPTION. For areas that are at final grade, install soil stabilization matting in conjunction with permanent vegetation groundcover per Section 705, 706 and 707, or as specified.

For areas that are not at final grade or that will be redisturbed at least 6 months after seeding operations are completed, install soil stabilization matting in conjunction with Section 704 or 705.

Performance of Soil Stabilization Matting as specified herein complies with all requirements of the Maryland Department of the Environment for permanent seeding.

709.02 MATERIALS.

Topsoil	920.01
Turfgrass Sod	920.04.06
Soil Stabilization Matting	920.05.01
Fasteners	920.05.02
Water	920.09.01

709.03 CONSTRUCTION.

709.03.01 Modification Request. Certain types of matting may be substituted for other matting when the substitution will provide improved erosion protection.

Submit a written Modification Request to substitute one type of soil stabilization matting for another type in areas where specific types of matting have been specified.

The Engineer in consultation with the Landscape Operations Division will evaluate the Request. If granted, a notice of approved modification will be returned within 14 days after the request is received.

The following modifications and others may be approved:

(a) Turfgrass Establishment: Type D SSM in lieu of Type A SSM.

(b) Turfgrass Establishment: Type A SSM in lieu of Type E SSM.

(c) Meadow Establishment: Type D SSM in lieu of Type E SSM.

(d) Shrub Seeding Establishment: Type D SSM in lieu of Type E SSM.

709.03.02 Soil Preparation. Perform operations when soil moisture and weather conditions are suitable. Cease operations when conditions are unsuitable.

Perform operations for the SSM type as follows:

(a) Type A. Prepare soil and seedbed for Turfgrass Establishment per Section 705, or for other specified vegetation, but do not apply mulch.

Install SSM as specified in 709.03.03 thru .06.immediately after seeding and fertilizing.

(b) Type B. Prepare soil and seedbed for Turfgrass Establishment per Section 705, or for other specified vegetation, but do not apply mulch.

Firm soil with an approved roller to ensure uniform soil surface and firmness. The roller shall weigh approximately 40 lb per ft of width.

Install SSM as specified in 709.03.03 thru .06 immediately after seeding, fertilizing and rolling are completed.

(c) Type C. Prepare soil and firm with an approved roller to ensure uniform soil surface and firmness.

Install Type C SSM as specified in 709.03.03 thru .06 and infill with soil per 709.03.07.

(1) Immediately perform Turfgrass Sod Establishment per Section 708, but do not till; or

(2) Immediately perform Turfgrass Establishment per Section 705, but do not till or apply mulch, and then cover with Type B SSM; or

(3) Immediately install other specified material and vegetation.

(d) Type D. Prepare soil and seedbed for Meadow Establishment per Section 707, or for other specified vegetation, but do not apply mulch.

Install SSM as specified in 709.03.02 thru .05 immediately after seeding and fertilizing.

(e) Type E. Prepare soil and seedbed for Turfgrass Establishment per Section 705, or for other specified vegetation, but do not apply mulch.

Install SSM as specified in 709.03.03 thru .06 immediately after seeding and fertilizing.

709.03.03 Unrolling. Unroll SSM in the direction of the flow of water. Lay matting smoothly in firm, uniform contact with the soil surface, without stretching or tenting.

709.03.04 Overlapping. Overlap SSM with the upslope portion on top. Overlap edges at least 2 in., and ends at least 6 in. Do not install longitudinal overlaps in channel bottoms.

709.03.05 Keying-in. Key-in matting by digging a trench, fastening and backfilling one or more edges of the matting into the bottom of the trench.

(a) Type of Matting. Key-in the areas described in Table 1 for each type of matting:

SOIL STABILIZATION MATTING
TABLE 1 - AREAS OF MATTING TO KEY-IN

MATTING TYPE	AREA OF MATTING
A, B	Uppermost or leading-edge.
A, B, D	Edges adjacent to pavement, catch basins, and structures.
B	Lowermost or toe-edge.
B	Check trenches; folds of matting perpendicular to water flow every 40-45 ft.
C	All edges.
C	Check trenches; folds of matting perpendicular to water flow every 20-25 ft.
D	Edges exposed to flow in BSM, ponds, swales, channels, slopes. All edges when installed in streams.
E	As directed.

(b) Trenching. Trench into the soil perpendicular to the flow of water to at least 6 in. depth.

(c) Fastening. Install fasteners per 709.05.05 through SSM into the bottom of the trench.

(d) Backfilling. Backfill the trench with firmly tamped soil, and secure the matting over the backfilled area.

709.03.06 Fastening. Secure SSM with fasteners driven perpendicular to the soil grade, and flush with the surface of the matting.

(a) Fastener Selection. Refer to 920.05.02 and use fasteners of the shape and length approved for the matting type according to Table 2.

When more than one fastener is acceptable, install the fastener type and length best suited to the installation conditions, or as directed.

SOIL STABILIZATION MATTING TABLE 2 - FASTENER SELECTION					
MATTING TYPE	**FASTENER SHAPE**	**FASTENER LENGTH [1]**			
		6 in. Length	**8 in. Length**	**12 in. Length**	**18 in. Length**
A & E	U-Shaped Staple	X	X		
	Circle-Top Pin	X	X		
	Round Head Pin	X	X		
	T-Head Pin	X	X		
B	U-Shaped Staple		X	X	
	Fabric Pin			X	X
C	U-Shaped Staple			X	X
	Fabric Pin			X	X
D	U-Shaped Staple in BSM, Ponds, Swales, Slopes	X	X	X	
	U-Shaped Staple or Fabric Pin in Channels, Streams		X	X	X
Note: [1] X = Denotes fasteners acceptable for the matting type.					

(b) Placement of Fasteners. Install fasteners at the specified distance apart as required for the matting type and the area of matting according to Table 3.

SOIL STABILIZATION MATTING TABLE 3 - FASTENER PLACEMENT		
AREA OF MATTING	**MATTING TYPE**	**MAXIMUM DISTANCE BETWEEN FASTENERS In.**
Uppermost or Leading-Edge of Matting	A, B, C, D, E	6
Overlapping Edges of Matting	A, B, C, D, E	18
Center of Ditch	A, B, C, D, E	18
Lowermost or Toe-Edge of Matting	A, B, C, D, E	18
Throughout Matting	A, B, C, D, E	24
Check Trenches in Folds Every 40-45 ft	B [1]	12
Check Trenches in Folds Every 20-25 ft	C	12
Note: [1] Do not install check trenches in Type B SSM installed over Type C SSM.		

709.03.07 Infilling Type C SSM. Infill the matting with approved topsoil to fill matting voids and to slightly cover the matting. Immediately install sod, or seed and cover with Type B SSM, or as specified.

709.03.08 Watering. Gently apply water with a sprinkler or water-breaker nozzle immediately after installation is completed as follows:

(a) For Type E SSM, apply water over the surface of the matting as needed to settle the matting and soil.

(b) For Types A, B, and D SSM, apply water over the surface of the matting to wet the soil at least 2 in. depth.

(c) For Type C SSM, apply water over the sod, over the Type B SSM, or over other specified material, to wet the soil at least 2 in. depth.

709.03.09 Installation Phase Acceptance. Inspection will be conducted to verify that matting and vegetation installation operations were completed as specified. Installation Phase Acceptance will be granted at that time.

709.03.10 Establishment Phase. The Establishment Phase will begin upon Installation Phase Acceptance. Perform the following during the Establishment Phase.

(a) Period of Maintenance. Maintain areas of soil stabilization matting until Final Acceptance.

(b) Required Maintenance. Perform the following during the Establishment Phase.

(1) Watering. Apply water to ensure survival of the seeded species or sod as needed. Apply water with approved machinery. Do not allow water to cause erosion or to displace the matting, seed, or sod.

(2) Reset Matting. When matting is not firmly fastened to the soil, or if keyed-in areas or check trenches are not secure, repair the unsecured areas using fasteners as needed or as directed.

(3) Reseeding. When live seedling groundcover is not acceptable, perform overseeding in conformance with specifications for the pertinent vegetation as directed.

When Turfgrass Establishment or other seeded vegetation has not met acceptance standards, remove Type A, B, D, or E SSM to perform reseeding operations. Remove Type C matting when directed.

Prepare soil, reseed the specified vegetation, and apply water. Install new matting unless the original matting is approved for reuse.

(4) Sod Replacement. When Turfgrass Sod Establishment does not meet acceptance standards, remove the unacceptable sod and install new sod.

709.03.11 Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report of the installed soil stabilization matting and vegetation establishment in conformance with the pertinent specifications. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible.

The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed. Final Acceptance will be granted when the SSM is secure, and when the specified vegetation has met acceptance standards.

709.04 MEASUREMENT AND PAYMENT. Soil stabilization matting will be measured and paid for at the Contract unit price per square yard for one or more of the specified items. The payment will be full compensation for all material, fasteners, water, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

(a) Payment Schedule. Payments will be made according to Table 4 when construction requirements are met.

SOIL STABILIZATION MATTING
TABLE 4- PAYMENT SCHEDULE

CONSTRUCTION REQUIREMENTS	PERCENT OF TOTAL CONTRACT PRICE	PAYMENT FOR COMPLETED WORK
709.03.01 thru .09	80	At Installation Phase Acceptance
709.03.10 and .11	20	At Final Acceptance
Total Payment	**100**	

(b) Forfeiture. Failure to complete operations as required in conformance with the Payment Schedule will result in forfeiture of that percentage of payment.

709.04.01 Type A Soil Stabilization Matting. The measurement will be the area actually covered by matting, per square yard. Payment for Turfgrass Establishment or other specified vegetation will be measured and paid for separately.

709.04.02 Type B Soil Stabilization Matting. The measurement will be the area actually covered by matting, per square yard. Payment for Turfgrass Establishment or other specified vegetation will be measured and paid for separately.

709.04.03 Type C Soil Stabilization Matting. The measurement will be the area actually covered by matting, per square yard. Topsoil used for infilling will be incidental to the Contract price. Payment for Type B Soil Stabilization Matting, Turfgrass Sod Establishment, Turfgrass Establishment, or other specified vegetation will be measured and paid for separately.

709.04.04 Type D Soil Stabilization Matting. The measurement will be the area actually covered by matting, per square yard. Payment for Meadow Establishment or other specified vegetation will be measured and paid for separately.

709.04.05 Type E Soil Stabilization Matting. The measurement will be the area actually covered by matting, per square yard. Payment for Turfgrass Establishment or other specified vegetation will be measured and paid for separately.

CATEGORY 700
LANDSCAPING

SECTION 710 — TREE, SHRUB, AND PERENNIAL INSTALLATION AND ESTABLISHMENT

587 **DELETE:** Section 710 — Tree, Shrub, and Perennial Installation and Establishment in its entirety.

INSERT: The following.

SECTION 710 — TREE, SHRUB, AND PERENNIAL INSTALLATION AND ESTABLISHMENT

710.01 DESCRIPTION. Install and establish trees, shrubs, perennials, vines, and grasses in topsoil or Bioretention Soil Mix. When it is not possible to perform this work, refer to Section 704 and perform Temporary Mulch, or as directed to provide temporary soil stabilization.

710.02 MATERIALS.

Furnished Subsoil	920.01.04
Limestone	920.02.01
Sulfur	920.02.02
Compost	920.02.05
Fertilizer	920.03
Shredded Hardwood Bark (SHB) Mulch	920.04.03
Plant Materials	920.07
Marking and Staking Materials	920.08
Water	920.09.01
Pesticides	920.09.03
Marking Dye	920.09.04
Spray Adjuvant and Wetting Agent	920.09.05

710.03 CONSTRUCTION.

710.03.01 General.

(a) Planting Seasons. Perform operations when soil moisture and weather conditions are suitable, when the temperature is above 32 F, and the soil is not frozen. Cease operations when conditions are unsuitable.

(b) Modification Request. Submit a written Modification Request to install plants of different species, cultivars, sizes, growth habits, or planting stock type. The Engineer in consultation with the Landscape Operations Division will evaluate the Request. If granted, a Notice of Approved Modification will be returned within 14 days afterwards.

(c) Pesticide Application. Apply pesticides in conformance with the Maryland Pesticide Applicator's Law, OSHA and MOSH regulations, and the manufacturer's label and Material Data Safety Sheets (MSDS).

The Contractor shall possess a Maryland Department of Agriculture Commercial Pesticide Business License and a Pesticide Applicator Certificate for the pertinent pesticide application Category: (2) Forest; (3-A) Ornamental Plant Exterior; (3-C) Turf; (5) Aquatic; (6) Right-of-Way and Weed.

Pesticides shall be applied by a Maryland Certified Pesticide Applicator, or by a Registered Pesticide Applicator under the supervision of a Certified Pesticide Applicator.

(d) Pesticide Application Reporting. Record the location, acreage treated, pesticide name and quantity applied on the Pesticide Application Reporting Form. Submit the Form within 24 hours after applying pesticide.

(e) Nutrient Management Plan (NMP). The specified application rates of 14-14-14 fertilizer will be the NMP unless the Administration develops a substitute NMP. Replace application rates of 710.03.04 and .05 as required by the NMP.

(f) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 48 hours after applying fertilizer.

(g) Plant Storage and Handling. Refer to 920.07.05.

710.03.02 Submittals and Inspection. Submit the following items:

(a) Breakdown List of Contract Prices. Refer to 710.04.01 and develop a Breakdown List of Contract Prices for each plant in the Contract. Include the cost of all installation and establishment operations in the per plant price.

Submit the written Breakdown List within 14 days after Award of Contract. The Breakdown List will be reviewed by the Engineer and Landscape Operations Division for completeness and balance, and will be approved or returned for correction.

(b) Installation Phase Schedule. Develop a Schedule with dates for completing operations related to 710.03.01 thru .15 according to Table 1.

TREE, SHRUB, AND PERENNIAL TABLE 1 - OPERATIONS IN INSTALLATION PHASE SCHEDULE	
1	Layout, utilities review and marking.
2	Undesirable vegetation removal and herbicide application.
3	Planting pit excavation, soil preparation, and plant installation.
4	Planting beds rototilling and soil preparation, applying shredded hardwood bark (SHB) mulch, and plant installation.
5	Applying fertilizer solution after installation, and cleanup.

Submit the written Schedule at least 30 days before beginning landscape work. The Schedule will be reviewed by the Engineer and Landscape Operations Division for completeness and feasibility, and will be approved or returned for correction.

(c) Plant Material Inspection and Approval. The Inspection will be conducted by the Landscape Operations Division as specified in 920.07.03.

(d) Establishment Phase Schedule & IPM Program. Develop a Schedule with dates for completing 710.03.22. Include an Integrated Pest Management (IPM) Plan with methods of pest monitoring (weeds, diseases, insects, mammals, etc.), pesticide selection, application rates, and scheduling.

Submit the written Establishment Phase Schedule & IPM Program at the Installation Phase Inspection.

The Schedule will be reviewed by the Engineer and the Landscape Operations Division, and will be approved or returned for correction.

710.03.03 Utilities Marking, Layout, and Inspection. Refer to Section 875 when included in the Contract Documents.

(a) Utilities Marking. Contact 'Miss Utility' or another approved service to identify and mark utilities in the rights-of-way. Contact the District Utilities Engineer to mark utilities on Administration property.

(b) Conflicts. Notify the Administration of conflicts that may involve design changes. Conflicts will be reviewed by the Landscape Operations Division and resolved within 14 days after notice.

(c) Planting Layout. Provide the necessary materials and lay out the locations of planting pits and planting beds specified in the Contract Documents, or as adjusted by the Landscape Operations Division.

(d) Inspection. At least 7 days notice will be required to schedule each stage of a layout inspection in consultation with the Landscape Operations Division. Proceed with operations after layout approval.

710.03.04 Preparing Planting Pits. Perform the following operations when preparing planting pits for individual plants:

(a) Undesirable Vegetation. Manually remove undesirable vegetation or refer to 710.03.01(c) and 710.03.01(d) and apply non-selective herbicide in water with wetting agent and dye according to Table 2 at least 14 days before plant installation. Cut and remove dead vegetation or debris that interferes with soil preparation, plant installation or future maintenance.

TREE, SHRUB, AND PERENNIAL
TABLE 2 - NON-SELECTIVE HERBICIDE APPLICATION

MATERIAL	RATE PER ACRE
Glyphosate Herbicide	5 lb of active ingredient
Marking Dye	6 to 15 oz
Water	40 to 50 gal

(b) Excavation. Excavate planting pits to the depth required for the placement of root collars as specified in 710.03.09(c). Retain the excavated soil for preparation as backfill soil. Remove excess soil from the site, or spread as directed.

For Expanded Tree Pits (ETP), refer to the detail provided in the Contract documents. Excavate additional depth and width as shown in the detail, place furnished subsoil to the dimensions shown in the detail, and complete tree installation using Table 3. Remove excess soil from the site, or spread as directed.

(c) Planting Pit Diameter. Use Table 3 to determine the diameter of the planting pit based upon the container or root ball diameter.

TREE, SHRUB, AND PERENNIAL

TABLE 3 - PREPARING PLANTING PITS AND BACKFILL SOIL

Container or Root Ball Diameter In.	ANSI Z60 Container Size	Planting Pit Diameter In.	Compost Ft.^{3}	14-14-14 Fertilizer Oz.	Water per Event Gal.
3	#SP3	6	0.02	0.10	0.15
5	#SP4	10	0.02	0.12	0.2
6	#SP5 or #1	12	0.03	0.18	0.3
8	#2	17	0.09	0.30	0.5
10	#3	21	0.18	0.55	1.0
12	#5	24	0.28	0.75	1.5
14	#7	28	0.44	1.0	2.3
16	#10	32	0.65	1.3	3.5
18	#15	36	0.94	1.6	5.0
20	#20	40	1.27	2.0	6.8
24	#25	48	2.20	3.0	12
30	-	60	4.30	4.5	23
36	#45	72	7.40	6.5	40
42	#65	84	11.80	8.8	60

Note:

When water is applied over the surface of planting beds where most plants are less than 36 in. apart, apply water per plant in conformance with 'Water per Event', or apply at least 5 gallons of water per SY of planting bed.

(d) Compost and Fertilizer. Use Table 3 to determine the quantity of compost and 14-14-14 fertilizer to mix into backfill soil, based upon planting pit diameter. Uniformly mix compost and fertilizer into the backfill soil.

Use a scale with 0.01 oz or gram accuracy to calibrate measures and verify application rates of 14-14-14 fertilizer when directed.

(e) Water. Use Table 3 to determine the quantity of water to apply for each installed plant based upon planting pit diameter.

710.03.05 Preparing Planting Beds. Perform the following operations when preparing planting beds.

(a) Undesirable Vegetation. Remove undesirable vegetation as specified in 710.03.04(a). Cut or mow dead vegetation to a height of 1 in. and remove the debris.

(b) Compost and Rototilling.

(1) Areas Flatter than 4:1. Apply 2 in. layer of compost over the soil surface of the planting bed. Rototill to a depth of 6 in. to thoroughly mix compost and any materials specified in the NMP. Do not apply compost or rototill Bioretention Soil Mix (BSM) unless specified otherwise.

(2) Slopes 4:1 and Steeper. Do not rototill.

(c) Fertilizer. Mix 14-14-14 fertilizer into the backfill soil of each planting pit within the bed according to Table 3.

(d) Debris Removal. Remove debris, stones, and soil clods with a length or width greater than 2 in. that are uncovered during rototilling.

(e) Leveling. Level the soil surface after rototilling, and leave it in a condition ready for shredded hardwood bark (SHB) mulching and plant installation.

710.03.06 Plant Acclimation. Ensure that container grown plants are acclimated to prevailing weather conditions before installing. Install bare root plants while dormant when soil and air temperatures are above freezing.

710.03.07 Plant Care. Begin plant care at the time each plant is installed, and continue until Installation Phase Acceptance is granted.

710.03.08 Pruning. Remove dead branches, damaged branches, water sprouts, and other undesirable growth manually with pruners. Preserve the natural appearance of trees and shrubs. Remove branches or portions of branches over sidewalks to ensure 8 ft clearance for pedestrians.

710.03.09 Installing. Install plants vertically in planting pits and beds prepared as specified in 710.03.04 and .05, and as follows:

(a) Removing Containers, Burlap, Wire Baskets. Remove containers. Remove twine, burlap or other fabric from the tops of root balls to a depth at least 6 in. below the surface of the backfilled planting pit. Cut and remove the tops of wire baskets from the upper half of the rootball. Discard containers and any removed twine, wire, burlap or other fabric.

(b) Preparing Roots. Carefully remove the containers of container grown plants, and loosen the soil mass to eliminate girdling roots.

Spread the roots of bare root plants in a natural position, and firmly press backfill soil around the roots.

(c) Placing Root Collar. Place the root collar of plants at or above the average soil surface grade outside the planting pit according to Table 4.

TREE, SHRUB, AND PERENNIAL TABLE 4- ROOT COLLAR PLACEMENT	
SOIL CONDITIONS	**HEIGHT OF ROOT COLLAR**
Normal, Well Drained	Place collar at same level to 1 in. above average surface grade.
Compacted	Place collar at 1 to 2 in. above average surface grade.
Poorly Drained or Wet	Place collar as needed to ensure 25% of root mass is above average surface grade.

(d) Backfilling. Remove clods, stones and other foreign material with a length or width greater than 2 in. from soil used for backfilling.

Place backfill soil that has been mixed with compost and fertilizer as specified in 710.03.04 and .05 under and around roots to stabilize plants in upright position and restore the grade. Lightly firm and compact backfill soil to reduce air pockets.

710.03.10 Soil Berming. Form a 4 in. high berm of backfill soil around planting pits and planting beds as follows:

(a) Planting Pits. On areas flatter than 4:1, form the berm around the entire planting pit. On slopes 4:1 and steeper, take soil from the upslope rim of the pit and place it on the downslope rim to form the berm.

(b) Planting Beds. On slopes 4:1 and steeper, form the berm as a shoulder at the lower edge of the bed. Berm individual trees and shrubs installed within beds on slopes 4:1 and steeper as described in (a) above.

710.03.11 Edging. Cut edging at a steep angle into the mulched area to a 3 in. depth into the soil. On slopes 4:1 and steeper, cut edging outside of the bermed area on the lower edge of berm. Remove and discard excess soil.

(a) Planting Pits. Edge entirely around all planting pits except planting pits within planting beds.

(b) Planting Beds. Smoothly cut edging around all planting beds to the shapes specified.

710.03.12 Staking and Guying. Stake and guy trees the same day they are installed.

(a) Installation. When two or three stakes are specified for trees, install two stakes parallel to the direction of traffic, or as directed. Drive stakes vertically to a depth of 10 in. below the bottom of the pit, and 5 to 8 in. away from roots according to Table 5.

TREE, SHRUB, AND PERENNIAL TABLE 5 - STAKING AND GUYING				
TREE TYPE	**CALIPER In.**	**HEIGHT Ft**	**SUPPORT**	
			No. of Stakes	Length, ft
Shade	Under 1	6 and 8	2	6
	1 to 2	–	2	8
	2-1/2 to 3-1/2	–	3	10
	4 and over	–	—	3 guy wires attached to tree anchors
Flowering	3/4 to 2-1/2	–	2	5-8
	3 and over	–	—	3 guy wires attached to tree anchors
Evergreen	–	5 and 6	2	5-6
	–	7, 8 and 9	3	7-8
	–	10 and over	—	3 guy wires attached to tree anchors

(b) Maintenance. Promptly straighten trees that become crooked after installation. Repair or replace stakes, guys, and other support materials as needed.

710.03.13 Mulching. Spread SHB mulch uniformly over the soil surface to a 3 in. depth. Promptly repair damage caused by washouts or construction activities.

(a) Planting Pits. Spread SHB mulch the same day that plants are installed. Mulch around the base of each plant to cover the soil of the planting pit to its outside edge, including the soil berm. Do not allow mulch to touch the bark or main stem of the plant.

(b) Planting Beds. SHB mulch may be spread before or after installing plants. Spread mulch over the entire bed and rake it to an even surface, including berms and shoulders. Ensure that mulch does not cover plants.

For rototilled beds, spread mulch the same day after rototilling. For non-rototilled beds, spead mulch within 3 days after plant installation. When installation is completed, ensure that mulch uniformly covers the soil to a uniform 3 in. depth.

710.03.14 Watering after Installation.

(a) Application Equipment. Watering equipment shall consist of sprinklers or hoses equipped with water breaker nozzles so the materials are applied with care to prevent damage to plants and minimize disturbance to SHB mulch.

For planting pits, refer to Table 4 and apply the required quantity of water to each plant.

For planting beds, apply water to the entire bed area to wet the soil to a depth of 3 in.

(b) Follow-Up Watering. Monitor and apply water during the Installation Phase to supply plant needs.

710.03.15 Cleanup. Remove growers tape, plant stakes, pot markers, field tags, and similar materials at the time of installation. Ensure that the Administration's Material Inspection Approval Seals and plant tags remain on trees and shrubs until the end of the Establishment Phase.

Keep turfgrass areas, paved surfaces, and sidewalks clean. Promptly remove excess and waste materials. Take precautions to avoid damage to existing structures, plants, and turfgrass. Repair damage caused to surrounding areas during installation, and fill ruts and reestablish turfgrass as necessary.

710.03.16 Relocating Plants. Begin plant relocation operations within 7 days after notice to relocate, and continue until work is completed. Remove plants installed in undesirable locations as directed by the Engineer, and reinstall these plants as specified in herein.

710.03.17 Abandoned Planting Pits. Backfill abandoned planting pits when directed with excavated soil or approved backfill. Compact the backfill in 8 in. layers to the finished grade. Establish turfgrass as specified in Section 705.

710.03.18 Unacceptable Plants and Replacement Plants. Promptly remove and replace plants that are unacceptable at any time during the Installation Phase as specified in 920.07, or when requested.

Plants that are determined to be missing, dead, dying, damaged, diseased, deformed, underdeveloped, damaged by pesticides, or not true to species, cultivar, size or quality shall be replaced.

Refer to GP-5.09 regarding removal of defective work and materials, and GP-7.16 regarding Contractor responsibility for work, theft, damage, and loss.

(a) Criteria. The criteria of Table 6 will be used to identify unacceptable plants.

TREE, SHRUB, AND PERENNIAL TABLE 6 - CRITERIA FOR UNACCEPTABLE PLANTS			
Item	**Plant Type**	**Condition**	**Unacceptable**
1	Tree, Shrub, Vine, Perennial Grass	Dead or Missing	Any dead or missing plant, any cause.
2	Tree, Shrub, Vine, Perennial Grass	Defoliation	More than 25% of leaf area dead, lost or dropped.
3	Tree, Shrub, Vine	Bark Wound	More than 15% of bark circumference or 2 in. length.
4	Shrub or Vine	Height Die-back	More than 25% of the shrub or vine height.
5	Tree	Leader Die-back	More than 10% of tree height.
6	Tree	Branch Die-back	More than 6 in. on 75% of branches.

(b) Replacement Plants. Replacement plants shall be true to species, cultivar, size, and quality as specified in the Contract Documents unless a Substitution Request is approved.

Install replacement plants as soon as feasible during the current Planting Season, or if between Planting Seasons, during the next Planting Season. Promptly submit a Modification Request as specified in 710.03.01(b) when it is not possible to obtain plants that meet specifications.

Replacement plants shall meet the specifications of 920.07, and be installed and established as specified in Section 710 for 12 months, until Final Acceptance.

710.03.19 Installation Phase Inspection. Submit a request for Installation Phase Inspection when operations are completed, and provide the Establishment Phase Schedule as specified in 710.03.02(d).

The Installation Phase Inspection will be scheduled by the Engineer at the project with the Contractor and the Landscape Operations Division to verify completion. At least 14 days notice will be provided before the scheduled Inspection so that it may be completed in the company of the Contractor.

710.03.20 Installation Phase Punch List. The Engineer in consultation with the Contractor and the Landscape Operations Division will develop the Installation Phase Punch List and list of plants to be replaced. Complete the Punch List requirements and replace plants as required.

710.03.21 Installation Phase Acceptance. Re-inspection will be performed as needed. Installation Phase Acceptance will be granted when the Punch List and all Installation Phase requirements are completed according to Table 7.

TREE, SHRUB, AND PERENNIAL TABLE 7 - REQUIREMENTS FOR INSTALLATION PHASE ACCEPTANCE		
Item	**Requirement**	**Section**
a	Submittals are accepted and Inspections are completed.	710.03.01(b), 710.03.02, 920.07
b	Damaging pests are controlled.	710.03.02(c)
c	Layouts are inspected and approved.	710.03.03
d	Fertilizer and compost is mixed soil, as required.	710.03.04 and 710.03.05
e	Planting pits and planting beds are weed free.	710.03.04(a) and 710.03.05(a)
f	Trees and shrubs are pruned.	710.03.08
g	Trees are installed vertically and straightened.	710.03.09
h	Planting pits and beds are bermed and edged.	710.03.10 and 710.03.11
i	Staking and guying are repaired or replaced.	710.03.12
j	SHB mulch is uniformly spread to the specified depth.	710.03.13
k	Washouts in planting pits and beds are repaired.	710.03.13
l	Plants receive initial watering and follow up watering.	710.03.04 and 710.03.14
m	Clean up is completed, plant tags and ribbons are removed.	710.03.15
n	Plants are relocated to approved locations.	710.03.16
o	Abandoned planting pits are filled and seeded.	710.03.17
p	Unacceptable plants are replaced.	710.03.18
q	Damage repairs and Installation Phase Punch List is completed.	710.03.20
r	Pesticide Application and Nutrient Management Reporting Forms are completed.	710.03.01(d) and (f)
s	Plants are properly installed, are none are unacceptable or require replacement.	710.03.01 thru .18
t	Establishment Phase Schedule & IPM Program is accepted.	710.03.02 (e) and 710.03.21

710.03.22 Establishment Phase. The Establishment Phase begins upon Installation Phase Acceptance. Maintain plants and provide care and replacement as specified in 710.03.01 thru 0.21, and as follows:

(a) Period of Maintenance. Maintain plants for 12 months after installation, until Final Acceptance.

(b) Plant Watering. Monitor the soil moisture and water needs of plants. Promptly apply water as specified in 710.03.14 to planting pits and planting beds as needed, or as directed.

(c) Pest Management. Monitor and promptly control weeds, insects and other pests in conformance with the IPM Program, or when requested. Control weeds in mulched areas in preparation for inspection. Remove dead weeds taller than 6 in. Refer to 710.03.01(d) and complete the Pesticide Application Reporting Form.

(d) Unacceptable Plants and Replacement Plants. Refer to 710.03.18. Promptly remove and replace plants that have become unacceptable during the Establishment Phase as needed or as directed.

(e) End-of-Season Foliage Removal. For perennials, remove the aboveground parts that have declined during the months of November and December, or as directed. For grasses, remove the aboveground parts that have declined and in February or March, or as directed.

(f) Refertilizing. Dissolve 40 lb of 20-20-20 water soluble fertilizer in 1 000 gal of water. Refer to 710.03.14 regarding application equipment. Apply fertilizer solution in the final 60 days of the Establishment Phase.

For planting pits, refer to Table 3 and apply gallons of fertilizer solution to each installed plant based upon the planting pit diameter and water per event gal.

For planting beds, apply 0.21 gal of fertilizer solution per SY of planting bed. Apply fertilizer solution to the entire bed area.

(g) Removing Supports and Seals. Remove tree supports, hoses wires, guys and Material Inspection Approval Seals in the final 30 days of the Establishment Phase. Pull stakes from the soil or cut them to ground level.

(h) Partial Establishment Phase Inspection. The Project Engineer will inspect plant establishment 6 months after Installation Phase Acceptance according to Table 8. The Inspection Report will include actions to perform before Partial Establishment Phase Acceptance is granted. Perform repairs, replacements, and other work as specified in the Contract Documents and Inspection Report.

710.03.23 Establishment Phase and Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report 12 months after Installation Phase Acceptance. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible.

Final Acceptance will be granted when the requirements of Table 8 are satisfactorily completed. The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed.

TREE, SHRUB, AND PERENNIAL TABLE 8 - REQUIREMENTS FOR ESTABLISHMENT PHASE AND FINAL ACCEPTANCE		
Item	**Requirement**	**Section**
1	Water sprouts are manually pruned and removed.	710.03.08
2	Trees are straightened.	710.03.09
3	Staking and guying are repaired or replaced.	710.03.12
4	Washouts in planting pits and beds are repaired.	710.03.13
5	Plants are relocated to approved locations.	710.03.16
6	Abandoned planting pits are filled and seeded.	710.03.17
7	Plants are successfully established.	710.03.22(a) and (b)
8	Damaging pests are controlled.	710.03.22(c)
9	Planting pits and planting beds are weed free.	710.03.22(c)
10	Unacceptable plants are replaced.	710.03.22(d)
11	Annual foliage dieback of perennials and grasses is cut and removed.	710.03.22(e)
12	Plants are refertilized.	710.03.22(f)
13	Pesticide Application and Nutrient Management Reporting Forms are completed.	710.03.01(d) and (f)
14	Staking, guying, and Material Inspection Seals are removed.	710.03.22(g)
15	Damage repairs and Establishment Punch List are completed.	710.03.22(h)

710.04 MEASUREMENT AND PAYMENT. Tree, Shrub, and Perennial Installation and Establishment will be measured and paid for at the Contract unit price for one or more of the specified items. The payment will be full compensation for all plants, material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

710.04.01 Tree, Shrub, and Perennial Installation and Establishment. Tree, Shrub, and Perennial Installation and Establishment shall include the cost of trees, shrubs, perennials, vines, and grasses, layout, marking, pruning, planting pit excavation and disposal of excavated soil, fertilizer, compost, backfilling, staking, guying, berming, edging, watering, pest management, plant maintenance, refertilizing, and all operations related to the Installation and Establishment Phases of each plant, until Final Acceptance.

Tree, Shrub, and Perennial Installation and Establishment will be paid according to Table 9 based upon the approved Breakdown List of Contract Prices. Refer to 710.03.02(a). In the event of change in the quantities required, payment adjustments will be based on the approved Breakdown List of Contract Prices.

(a) Payment Schedule. Payments will be made according to Table 9 when construction requirements are met.

TREE, SHRUB, AND PERENNIAL TABLE 9 - PAYMENT SCHEDULE			
CONSTRUCTION REQUIREMENTS		**PERCENT OF TOTAL CONTRACT PRICE**	**PAYMENT FOR COMPLETED WORK**
710.03.01 thru .21	Installation Phase	70	At Installation Phase Acceptance
710.03.22(a) thru (e)	Establishment Phase	15	At Partial Establishment Phase Acceptance
710.03.22(a) thru (h) and 710.03.23	Establishment Phase and Final Acceptance	15	At Final Acceptance
Total Payment		**100%**	

(b) Forfeiture. Failure to complete operations as required or directed in conformance with the Payment Schedule will result in forfeiture of that percentage of payment based upon the Breakdown List of Contract Prices.

710.04.02 Constructing Planting Beds. Constructing Planting Beds will be measured and paid for at the Contract unit price per square yard. The price shall include the cost of layout, marking, fertilizer, soil amendments, rototilling, berming, edging, applying 3 in. of SHB mulch, refertilizing, and all operations related to construction of the planting bed.

Mulching individual planting pits of trees, shrubs, perennials, vines, and grasses within planting beds will not be measured but the cost will be incidental to 710.04.02.

710.04.03 Expanded Tree Pit. Expanded Tree Pit will be measured and paid for at the Contract unit price per each. The price shall include the cost of excavation to the specified dimensions, furnished subsoil, disposal of excavated soil, and all operations related to construction of the expanded tree pit.

710.04.04 Temporary Mulch will be measured and paid for at the Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 711 — ANNUALS AND BULBS
INSTALLATION AND ESTABLISHMENT

603 **DELETE:** Section 711 — Annuals and Bulbs Installation and Establishment in its entirety.

INSERT: The following.

SECTION 711 — ANNUALS AND BULBS
INSTALLATION AND ESTABLISHMENT

711.01 DESCRIPTION. Install and establish annuals and bulbs in topsoil. When it is not possible to perform this work, refer to Section 704 and perform Temporary Mulch, or as directed to provide temporary soil stabilization.

711.02 MATERIALS.

Limestone	920.02.01
Sulfur	920.02.02
Compost	920.02.05
Fertilizer	920.03
Shredded Hardwood Bark (SHB) Mulch	920.04.03
Plant Materials	920.07
Marking and Staking Materials	920.08
Water	920.09.01
Pesticides	920.09.03

711.03 CONSTRUCTION.

711.03.01 General.

(a) Regional Areas. Refer to 705.03.01(a).

(b) Planting Seasons. Perform operations when soil moisture and weather conditions are suitable. Cease operations when conditions are unsuitable. Install plants according to Table 1.

ANNUALS AND BULBS TABLE 1 - PLANTING SEASONS				
SEASON	**PLANTS**	**INSTALLATION DATE**		
		Region 1	**Region 2**	**Region 3**
Spring	Container Grown Summer Annuals	5/20 – 6/20	5/10 – 6/10	5/01 – 6/01
Fall	Container Grown Winter Annuals	9/01 – 10/20	9/10 – 10/31	9/20 – 11/10
	Spring Flowering Bulbs	9/01 – 11/30	9/10 – 12/31	9/20 – 12/31

(c) Modification Request. Refer to 710.03.01(b).

(d) Pesticide Application. Refer to 701.03.01(b).

(e) Pesticide Application Reporting. Refer to 701.03.01(c).

(f) Nutrient Management Plan (NMP). Refer to 710.03.01(e).

(g) Nutrient Management Reporting. Refer to 710.03.01(f).

(h) Plant Storage and Handling. Refer to 920.07.05.

711.03.02 Submittals and Inspection. Submit the following items as indicated:

(a) Breakdown List of Contract Prices. Refer to 710.03.02(a).

(b) Installation Phase Schedule. Refer to 710.03.02(b) and submit the Schedule with dates for completing 711.03.02 thru .12.

(c) Plant Material Inspection and Approval. The Inspection will be conducted by the Landscape Operations Division as specified in 920.07.01.

(d) Establishment Phase Schedule & IPM Program. Refer to 710.03.02(d) and submit the Schedule with dates for completing 711.03.17.

711.03.03 Utilities Marking, Layout, and Inspection. Refer to 710.03.03.

711.03.04 Preparing Planting Beds and Planting Areas.

(a) Planting Beds. Refer to 710.03.05 for preparing beds and planting holes for container grown annuals and bulbs. Dig holes for bulbs to the depth and width recommended for the species or variety by the grower.

(b) Planting Areas for Naturalized Daffodils. Dig planting holes to 3 in. diameter and to a 5 in. depth. Mix 0.20 oz of 14-14-14 fertilizer into the backfill soil of each bulb, or as specified in the NMP. Firmly cover each bulb with backfill soil to the level of the surrounding grade. Omit 711.03.05 thru .10 when installing naturalized daffodils.

711.03.05 Soil Berming. Refer to 710.03.10.

711.03.06 Edging. Refer to 710.03.11.

711.03.07 Mulching. Refer to 710.03.13.

711.03.08 Plant Acclimation. Refer to 710.03.06.

711.03.09 Plant Care. Refer to 710.03.07.

711.03.10 Installing. Handle annuals and bulbs with care to avoid damage or bruising. Refer to 710.03.09 and the following:

(a) Foliage Removal. Remove dead foliage of annuals and other unwanted vegetation from the previous season without damaging or disturbing perennials or other desirable vegetation.

(b) Mulch. Remove and conserve SHB mulch at sites where annuals or bulbs will be installed before digging the planting hole. Replace mulch to a depth of 2 in. over bulbs and around the stems of annuals.

711.03.11 Watering After Installation.

(a) Application Equipment. Refer to 710.03.14(a).

(b) Follow-Up Watering. Refer to 710.03.14(d).

711.03.12 Cleanup. Refer to 710.03.15.

711.03.13 Unacceptable Plants and Replacement Plants. Refer to 710.03.18, 920.07 and replace unacceptable plants as specified in Section 711 for the remainder of the growing season until Final Acceptance.

711.03.14 Installation Phase Inspection. Refer to 710.03.19.

711.03.15 Installation Phase Punch List. Refer to 710.03.20.

711.03.16 Installation Phase Acceptance. Refer to 710.03.21 and provide the Establishment Phase Schedule as specified in 711.03.02(e).

Installation Phase Acceptance will be granted when the Punch List and all Installation Phase requirements are completed according to Table 2.

ANNUALS AND BULBS

TABLE 2 - REQUIREMENTS FOR INSTALLATION PHASE ACCEPTANCE

Item	Requirement	Section
a	Submittals are accepted and Inspections are completed.	710.03.01(b), 711.03.02, 920.07
b	Dead foliage in existing beds is removed.	711.03.10(a)
c	Fertilizer and compost is applied, as required.	711.03.04
d	Planting pits and planting beds are bermed and edged.	710.03.10 and 710.03.11
e	SHB mulch is uniformly spread to the specified depth.	710.03.13 and 711.03.10(c)
f	Plants receive initial watering and follow up watering.	711.03.04 and 711.03.11
g	Damaging pests are controlled.	711.03.02(c)
h	Cleanup is completed, plant tags and ribbons are removed.	710.03.15
i	Washouts in and around planting beds are repaired.	710.03.13
j	Unacceptable plants are replaced as needed or required.	710.03.18
k	Damage repairs and Installation Phase Punch List is completed.	710.03.20
l	Pesticide Application and Nutrient Management Reporting Forms are completed.	710.03.01(d) and (f)
m	Plants are properly installed, are none are unacceptable or require replacement.	711.03.01 thru .13
n	Establishment Phase Schedule & IPM Program is accepted.	710.03.02(e) and 711.03.16

711.03.17 Establishment Phase. The Establishment Phase for annuals and bulbs planted in beds begins upon Installation Phase Acceptance. Maintain all plants except naturalized daffodils as specified in 711.03.01 thru 0.16 and as follows:

(a) Period of Maintenance. Plants shall be maintained for one Planting Season, until Final Acceptance.

(b) Plant Watering. Refer to 710.03.22(b).

(c) Pest Management. Refer to 710.03.22(c).

(d) Unacceptable Plants and Replacement Plants. Refer to 710.03.18. Promptly remove and replace plants that have become unacceptable during the Establishment Phase as needed, or at the request of the Engineer.

(e) End-of-Season Foliage Removal. Remove the foliage of annuals that have declined in late summer or fall, as directed by the Engineer. Remove the foliage and flower stems of bulbs planted in beds after they have declined at the end of their growing season in June.

(f) Refertilizing. Refer to 710.03.22(f).

(g) Partial Establishment Phase Inspection. The Project Engineer will inspect plant establishment 2 to 4 months after Installation Phase Acceptance according to Table 8. The Inspection Report will include actions to perform before Partial Establishment Phase Acceptance is granted. Perform repairs, replacements, and other work as specified in the Contract Documents and Inspection Report.

711.03.18 Establishment Phase and Final Acceptance. The Engineer and the Landscape Operations Division will complete an Inspection Report 12 months after Installation Phase Acceptance. When it is not possible to perform the Inspection, Final Acceptance will be delayed until Inspection is possible.

Final Acceptance will be granted when the requirements of Table 3 are satisfactorily completed. The Inspection Report will be included in the Punch List requirements for the project. Complete the Punch List requirements as directed.

ANNUALS AND BULBS

TABLE 3 - REQUIREMENTS FOR ESTABLISHMENT PHASE AND FINAL ACCEPTANCE

Item	Requirement	Section
1	Washouts in and around planting beds are repaired.	710.03.13
2	Plants are watered as needed and refertilized when directed.	710.03.22(b) and (f)
3	Damaging pests are controlled.	710.03.22(c)
4	Planting beds are weed free.	710.03.22(c)
5	Pesticide Reporting and Nutrient Management Reporting Forms are completed.	710.03.01(d) and (f)
6	Unacceptable plants are replaced as requested.	711.03.17(d)
7	End-of-season foliage removal is completed.	711.03.17(e)
8	Damage repairs and Establishment Punch List are completed.	711.03.17(f)

711.04 MEASUREMENT AND PAYMENT. Annuals and Bulbs Installation and Establishment will be measured and paid for at the Contract unit price for one or more of the specified items. The payment will be full compensation for all plants, material, labor, equipment, tools, disposal fees and incidentals necessary to complete the work.

711.04.01 Annuals and Bulbs Installation and Establishment. Annuals and Bulbs Installation and Establishment shall include the cost of plants, layout, marking, pruning, planting pit excavation, fertilizer, compost, backfilling, berming, edging, watering, pest management, plant maintenance, refertilizing, and all operations related to the Installation and Establishment Phases of each plant, until Final Acceptance.

Annuals and Bulbs Installation and Establishment will be paid according to Table 4 based upon the approved Breakdown List of Contract Prices. Refer to 711.03.02(a). In the event of change in the quantities required, payment adjustments will be based on the approved Breakdown List of Contract Prices.

(a) Payment Schedule. Payments will be made according to Table 4 when construction requirements are met.

ANNUALS AND BULBS

TABLE 4 - PAYMENT SCHEDULE

INSTALLATION AND ESTABLISHMENT PHASE COMPLETION		PERCENT OF TOTAL CONTRACT PRICE			PAYMENT FOR COMPLETED WORK
		Annuals in Beds	Bulbs in Beds	Naturalized Bulbs	
711.03.0 thru .16	Installation Phase	70	70	100	At Installation Phase Acceptance
711.03.17(a) thru (d)	Establishment Phase In-Season Maintenance	15	15	–	At Partial Establishment Phase Acceptance
711.03.17(e) thru (g)	End-of-Season Maintenance, Removal & Replacement, and Final Acceptance	15	15	–	At Final Acceptance
Total Payment		**100**	**100**	**100**	

(b) Forfeiture. Failure to complete operations as required or directed in conformance with the Payment Schedule will result in forfeiture of that percentage of payment based upon the Breakdown List of Contract Prices.

711.04.02 Constructing Planting Beds. Refer to 710.04.02.

711.04.03 Temporary Mulch will be measured and paid for at the Contract unit price.

CATEGORY 700
LANDSCAPING

SECTION 712 — TREE BRANCH PRUNING

610 **DELETE:** Section 712 — Tree Branch Pruning, in its entirety.

INSERT: The following.

SECTION 712 — TREE BRANCH PRUNING

712.01 DESCRIPTION. Prune tree branches as indicated in the SP 700 Tree Preservation Program, or in the plans. Perform Tree Branch Pruning within a Tree Preservation Area per Section 120 when specified.

712.02 MATERIALS. Not applicable.

712.03 CONSTRUCTION.

712.03.01 General.

(a) Permits. Obtain a Roadside Tree Permit from the Maryland Department of Natural Resources - Forest Service.

(b) Tree Preservation Program (TPP). Conform to the requirements of the TPP when developed by the Administration.

(c) Schedule. Perform operations when weather conditions are suitable. Cease operations when conditions are unsuitable.

712.03.02 Breakdown List of Contract Prices. Refer to 712.04 and develop a Breakdown List of Contract Prices for each tree or group of trees in the Contract. Include costs for pruning and completing all operations per tree or group of trees.

Submit the written Breakdown List within 14 days after Notice of Award. The Breakdown List will be reviewed by the Engineer and Landscape Operations Division for completeness and balance, and will be approved or returned for correction.

712.03.03 Maryland Licensed Tree Expert (LTE). A LTE shall perform or directly supervise the Operations in conformance with the Maryland Roadside Tree Law, the Forest Conservation Act, and accepted arboricultural practices.

712.03.04 Meetings. Meet with the Engineer, the LTE, and the LOD to review areas, Operations, and the approved Breakdown List of Contract Prices before beginning Operations.

712.03.05 Marking. Identify trees to be pruned, and obtain approval before beginning Operations.

712.03.06 Equipment. Equipment and tools shall conform to accepted arboricultural practices.

712.03.07 Notice. Notify the Engineer at least 10 days before beginning Operations.

712.03.08 Operations. The Contract Documents will indicate the trees to be pruned or the dimensions or goals to be achieved by pruning. Meet ANSI A300 Standards for Tree Care Operations in conformance with one or more of the following Operations, or as specified:

(a) Cleaning. To remove dead, diseased, and broken branches.

(b) Thinning. To reduce the density of live branches; or to remove crossed branches or a codominant leader.

(c) Raising. To provide vertical clearance to a height of 15 ft, or as specified in the Contract Documents.

(d) Reducing. To decrease the height or spread.

(e) Specialty Pruning. To meet the needs of young trees, at planting, once established, pollarding, for restoration, to maintain vistas, or to accommodate utilities.

712.03.09 Wood Chipping. Dispose of wood, or chip wood and disperse chips to a depth of 1 in. as directed.

712.03.10 Cleanup and Restoration. Avoid damage to existing structures, plants, and turfgrass. Keep turfgrass areas, paved surfaces and sidewalks clean. Restore ruts and damaged turfgrass areas by seeding in conformance with Section 705, or perform Turfgrass Sod Establishment in conformance with Section 708 when directed, before beginning any other landscape operations.

712.03.11 Damage Repair. Do not injure vegetation to be preserved. Repair injuries to bark, trunks, or limbs by cutting, smoothing, and tracing the bark in accordance with ANSI A300 Standards for Tree Care Operations.

712.03.12 Damage Compensation. Monetary compensation for damage or loss of trees will be calculated and assessed in conformance with the Guide for Plant Appraisal of the Council of Tree & Landscape Appraisers.

712.04 MEASUREMENT AND PAYMENT. Tree Branch Pruning will not be measured, but will be paid for at the Contract lump sum price based upon the Breakdown List of Contract Prices. The payment will be full compensation for all labor, material, equipment, tools, wood chipping, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work. If the Administration requests a change, the units and payment will be adjusted on the basis of the approved Breakdown List of Contract Prices.

CATEGORY 700
LANDSCAPING

SECTION 713 — BRUSH REMOVAL

612 **DELETE:** Section 713 — Brush Removal, in its entirety

INSERT: The following.

SECTION 713 — BRUSH REMOVAL

713.01 DESCRIPTION. Remove brush as indicated in the SP 700 Tree Preservation Program, or in the plans. Perform Brush removal within a Tree Preservation Area per Section 120 when specified.

When areas of bare soil are caused by Brush Removal operations, perform Temporary Mulch in conformance with Section 704 to provide temporary soil stabilization, or perform Turfgrass Establishment in conformance with Section 705, or perform other stabilization as directed.

713.02 MATERIALS.

Herbicide	920.09.03(a)
Water	920.09.01
Marking Dye	920.09.04

713.03 CONSTRUCTION.

713.03.01 General.

(a) Permits. Obtain a Roadside Tree Permit from the Maryland Department of Natural Resources - Forest Service.

(b) Tree Preservation Program (TPP). Conform to the requirements of the TPP when developed by the Administration.

(c) Schedule. Perform operations when soil moisture and weather conditions are suitable. Cease operations when conditions are unsuitable.

(d) Pesticide Application. 701.03.01(b).

(e) Pesticide Application Reporting. 701.03.01(c).

713.03.02 Maryland Licensed Tree Expert (LTE). A LTE shall perform or directly supervise the Operations in conformance with the Maryland Roadside Tree Law, the Forest Conservation Act, and accepted arboricultural practices.

713.03.03 Meetings. Meet with the Engineer, the LTE, and the Landscape Operations Division to review areas and Operations before beginning Operations.

713.03.04 Marking. Mark areas where brush is to be removed. Identify trees and shrubs to be preserved and protected. Ensure that marking and identification is completed and approved before beginning Operations.

713.03.05 Equipment. Equipment and tools shall conform to accepted arboricultural practices.

713.03.06 Notice. Notify the Engineer at least 10 days before beginning Operations.

713.03.07 Operations. Brush removal shall involve cutting, herbicide treatment, and debris removal of areas of living or dead vegetation. Do not injure vegetation identified for preservation. One or more of the following Operations will be specified.

(a) Operation 1 - Brush Removal. Cut vegetation to a height of no more than 1 in. above the soil surface. Remove wood debris.

(b) Operation 2 - Brush Removal with Stump Treatment. Cut vegetation as in Operation 1. Immediately treat the cambium layer and exposed bark of live stumps with an approved herbicide solution and marking dye. Remove wood debris.

713.03.08 Wood Chipping. Dispose of wood in conformance with the pertinent Operation, or chip wood and disperse chips to a depth of 1 in. as directed.

713.03.09 Cleanup and Restoration. Avoid damage to existing structures, plants, and turfgrass. Keep turfgrass areas, paved surfaces and sidewalks clean. Promptly remove, disperse or dispose of wood debris and other waste materials as directed. Restore ruts and damaged turfgrass outside of areas of Brush Removal by seeding in conformance with Section 705, or perform Turfgrass Sod Establishment in conformance with Section 708 when directed, before beginning other landscape operations.

713.03.10 Damage Repair. Do not injure vegetation to be preserved. Repair injuries to bark, trunks, or limbs by cutting, smoothing, and tracing the bark in accordance with ANSI A300 Standards for Tree Care Operations.

713.03.11 Damage Compensation. Monetary compensation for damages or loss of trees will be calculated and assessed in conformance with the Guide for Plant Appraisal of the Council of Tree & Landscape Appraisers.

713.04 MEASUREMENT AND PAYMENT. Brush Removal outside of the limits of Clearing and Grubbing will be measured and paid for at the Contract unit price per square yard, as specified. Brush Removal within the limits of Clearing and Grubbing will be incidental to the Contract unit price for Clearing and Grubbing. The payment will be full compensation for all labor, material, equipment, tools, wood chipping, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work.

713.04.01 Payment for Temporary Mulch, Turfgrass Establishment within areas of Brush Removal, or for other vegetation establishment within areas of Brush Removal will be measured and paid for at the pertinent Contract Unit price.

CATEGORY 700
LANDSCAPING

SECTION 714 — TREE FELLING AND STUMP REMOVAL

614 **DELETE:** Section 714 — Tree Felling, in its entirety.

INSERT: The following.

714.01 DESCRIPTION. Fell trees and remove stumps as indicated in the SP 700 Tree Preservation Program, or in the plans. Perform Tree Felling and Stump Removal within a Tree Preservation area per Section 120 when specified, but do not remove stumps outside the Limits of Disturbance.

714.02 MATERIALS.

Furnished Topsoil	920.01.02
Herbicide	920.09.03(a)
Water	920.09.01
Marking Dye	920.09.04

714.03 CONSTRUCTION.

714.03.01 General.

(a) Permits. Obtain a Roadside Tree Permit from the Maryland Department of Natural Resources - Forest Service.

(b) Tree Preservation Program (TPP). Conform to the requirements of the TPP when developed by the Administration.

(c) Schedule. Perform operations when soil moisture and weather conditions are suitable. Cease operations when conditions are unsuitable.

(d) Pesticide Application. Refer to 701.03.01(b).

(e) Pesticide Application Reporting. Refer to 701.03.01(c).

714.03.02 Breakdown List of Contract Prices. Refer to 714.04 and develop a Breakdown List of Contract Prices for each tree or stump in the Contract. Include costs for felling, removing stumps, and completing all required operations per tree or stump.

Submit the written Breakdown List within 14 days after Notice of Award. The Breakdown List will be reviewed by the Engineer and Landscape Operations Division for completeness and balance, and will be approved or returned for correction.

714.03.03 Maryland Licensed Tree Expert (LTE). A LTE shall perform or directly supervise the Operations in conformance with the Maryland Roadside Tree Law, the Forest Conservation Act, and accepted arboricultural practices.

714.03.04 Meetings. Meet with the Engineer, the LTE, and the LOD to review areas, Operations, and the Breakdown List of Contract Prices before beginning Operations.

714.03.05 Utilities and Tree Marking. Refer to Section 875 when included in the Contract Documents.

(a) Utilities Marking. Contact 'Miss Utility' or another approved service to identify and mark utilities in the rights-of-way. Contact the District Utilities Engineer to mark utilities on Administration property.

(b) Tree Marking. Mark trees to be felled. Obtain approval before beginning Operations.

714.03.06 Equipment. Equipment and tools shall conform to accepted arboricultural practices.

714.03.07 Notice. Notify the Engineer at least 10 days before beginning Operations.

714.03.08 Operations. Tree felling and stump removal involves cutting, herbicide treatment, stump removal, stump grinding, debris removal, and restoration of turfgrass in conformance with the pertinent Operation. When trees cannot be felled as a unit without danger to traffic or injury to other plants or property, remove the top sections until the tree can be safely felled. One or more of the following Operations will be specified:

(a) Operation 1 - Felling and Stump Removal. Perform Operation 1 in turfgrass areas and as specified within the Limits of Disturbance. Fell trees and remove the stumps or grind stumps to a minimum depth at least 8 in. below the soil surface. Remove wood debris and stump grindings. Within 24 hours after removal or grinding, backfill and compact the stump holes with topsoil to the surrounding soil level. Perform Turfgrass Sod Establishment in conformance with Section 708, or perform Turfgrass Establishment in conformance with Section 705 when directed.

(b) Operation 2 - Felling and Stump Treatment. Perform Operation 2 for species that sprout from stumps, as directed. Fell trees and remove wood debris. Cut stumps to a height of no more than 4 in. above the soil surface. Treat with herbicide as specified in 713.03.07(b). When basal stem treatment is used prior to tree felling, herbicide treatment of stumps may be waived at the discretion of the Landscape Operations Division.

(c) Operation 3 - Felling and Removal. Perform Operation 3 in non-turfgrass areas. Fell trees and remove wood debris. Cut stumps to a height of no more than 4 in. above the soil surface. Treat with herbicide as specified in 713.03.07(b).

(d) Operation 4 - Felling and Delimbing. Perform Operation 4 in naturalized areas that will not be maintained. Cut woody stumps to 8 inches in height or less. Treat all stumps with approved herbicide as specified in 713.03.07(b). Woody debris, tree trunks, branches and slash

may be left on site if more than 50 ft from the roadside and ditch line. Cut tree trunks into section 8 feet in length or less and place perpendicular to the slope. Cut branches into pieces 3 feet in length or less and pile less than 12 inches in height. Woody debris may be chipped. Spread chips evenly, not to exceed 2 inches in depth. Do not place debris in wetlands or drainage swales.

(e) Operation 5 - Stump Removal. Perform Operation 5 to remove stumps of trees in turfgrass areas within the Limits of Disturbance that were not removed per Operation 1. Remove existing stumps or grind stumps to a minimum depth at least 8 in. below the soil surface. Remove wood debris and stump grindings. Within 24 hours after removal or grinding, backfill and compact the stump holes with topsoil to the surrounding soil level. Perform Turfgrass Establishment in conformance with Section 705, or perform Turfgrass Sod Establishment in conformance with Section 708 when directed.

714.03.09 Wood Chipping. Dispose of wood in conformance with the pertinent Operation, or chip wood and disperse chips to a depth of 2 in. as directed.

714.03.10 Cleanup and Restoration. Avoid damage to existing structures, plants, and turfgrass. Keep turfgrass areas, paved surfaces and sidewalks clean. Promptly remove, disperse or dispose of wood debris and other waste materials as directed. Restore ruts and damaged turfgrass areas by seeding in conformance with Section 705, or perform Turfgrass Sod Establishment in conformance with Section 708 when directed, before beginning other landscape operations.

714.03.11 Damage Repair. Do not injure vegetation to be preserved. Repair injuries to bark, trunks, or limbs by cutting, smoothing, and tracing the bark in accordance with ANSI A300 Standards for Tree Care Operations.

714.03.12 Damage Compensation. Monetary compensation for damage or loss of trees will be calculated and assessed in conformance with the Guide for Plant Appraisal of the Council of Tree & Landscape Appraisers.

714.04 MEASUREMENT AND PAYMENT. Tree Felling and Stump Removal will be paid for as follows:

Tree Felling and Stump Removal within the Limits of Clearing and Grubbing will not be measured and paid and will be incidental to the Contract lump sum price for Clearing and Grubbing. The payment will be full compensation for all labor, material, equipment, tools, wood chipping, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work.

Tree Felling occurring outside the Limits of Clearing and Grubbing will be measured and paid for at the Contract unit price each according to the following size classes:

TREE FELLING SIZE CLASSES	
TREE DIAMETER AT BREAST HEIGHT (INCHES)	TREE PAY CLASS
Under 10	Class A
10 to 15+	Class B
16 to 20+	Class C
21 to 25+	Class D
26 to 30+	Class E
31 to 35+	Class F

The payment will be full compensation for all labor, material, equipment, tools, wood chipping, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work. Topsoil and materials required to perform Turfgrass Establishment and Turfgrass Sod Establishment shall be incidental to the Contract price for Tree Felling and Stump Removal.

Stump Removal will be measured and paid for at the Contract unit price per hour. The payment will be full compensation for all labor, material, equipment, tools, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work.

If the Administration requests a change, the units and payment will be adjusted on the basis of the approved Breakdown List of Contract Prices.

Tree Felling Class A, Operation 1, 2, or 3 per each
Tree Felling Class B, Operation 1, 2, or 3 per each
Tree Felling Class C, Operation 1, 2, or 3 per each
Tree Felling Class D, Operation 1, 2, or 3 per each
Tree Felling Class E, Operation 1, 2, or 3 per each
Tree Felling Class F Operation 1, 2, or 3 per each
Tree Felling Class A, B and C, Operation 4 per each
Tree Felling Class D, E, F Operation 4 per each
Stump Removal per hour

CATEGORY 700
LANDSCAPING

SECTION 715 — TREE ROOT PRUNING

617 **DELETE:** Section 715 — Tree Root Pruning, in its entirety.

INSERT: The following.

SECTION 715 — TREE ROOT PRUNING

715.01 DESCRIPTION. Prune tree roots as indicated in the SP 700 Tree Preservation Program, or in the plans. Perform Tree Root Pruning within a Tree Preservation Area per Section 120 when specified.

715.02 MATERIALS.

Salvaged Topsoil	920.01.01
Furnished Topsoil	920.01.02

715.03 CONSTRUCTION.

715.03.01 General.

(a) Permits. Obtain a Roadside Tree Permit from the Maryland Department of Natural Resources - Forest Service.

(b) Tree Preservation Program (TPP). Adhere to the requirements of the TPP when developed by the Administration.

(c) Schedule. Perform operations when soil moisture and weather conditions are suitable. Cease operations when conditions are not suitable.

715.03.02 Maryland Licensed Tree Expert (LTE). A LTE shall perform or directly supervise the Operations in conformance with the Maryland Roadside Tree Law, the Forest Conservation Act, and accepted arboricultural practices.

715.03.03 Meetings. Meet with the Engineer, the LTE, and the Landscape Operations Division before beginning Operations.

715.03.04 Utilities Marking and Conflicts. Refer to Section 875 when included in the Contract Documents.

(a) Utilities Marking. Contact 'Miss Utility' or another approved service to identify and mark utilities in the rights-of-way. Contact the District Utilities Engineer to mark utilities on Administration property.

(b) Conflicts. Notify the Administration of conflicts that may affect operations. Conflicts will be reviewed by the Landscape Operations Division and resolved within 14 days after notice.

715.03.05 Marking. Mark areas to be root pruned, and obtain approval before beginning Operations.

715.03.06 Equipment. Use a vibratory knife or other equipment and tools that conform to accepted arboricultural practices.

715.03.07 Notice. Notify the Engineer at least 10 days before beginning Operations.

715.03.08 Operations. Meet ANSI A300 Standards for Tree Care Operations. Cleanly cut tree roots to a depth of 24 in. along the approved line, and immediately backfill trenches with excavated soil.

715.03.09 Cleanup and Restoration. Avoid damage to existing structures, plants, and turfgrass. Keep turfgrass areas, paved surfaces and sidewalks clean. Promptly remove, disperse, or dispose of wood debris and other waste materials as directed. Restore areas of root pruning, ruts and damaged turfgrass areas by seeding in conformance with Section 705, or perform Turfgrass Sod Establishment in conformance with Section 708 when directed, before beginning other landscape operations.

715.03.10 Damage Repair. Do not injure vegetation to be preserved. Repair injuries to bark, trunks, or limbs by cutting, smoothing, and tracing the bark in accordance with ANSI A300 Standards for Tree Care Operations.

715.03.11 Damage Compensation. Monetary compensation for damage or loss of trees will be calculated and assessed in conformance with the Guide for Plant Appraisal of the Council of Tree & Landscape Appraisers.

715.04 MEASUREMENT AND PAYMENT. Tree Root Pruning will be measured and paid for at the Contract unit price per linear foot. The payment will be full compensation for all labor, material, equipment, tools, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work.

CATEGORY 700
LANDSCAPING

SECTION 716 — TREE FERTILIZING

617 **DELETE:** Section 716 — Tree Fertilizing, in its entirety

INSERT: The following.

SECTION 716 — TREE FERTILIZING

716.01 DESCRIPTION. Fertilize trees as indicated in the SP 700 Tree Preservation Program, or in the plans. Perform Tree Fertilizing within a Tree Preservation Area per Section 120 when specified.

716.02 MATERIALS.

Fertilizer	920.03.01, and as specified in the TPP.
Water	920.09.01

716.03 CONSTRUCTION.

716.03.01 General.

(a) Permits. Obtain a Roadside Tree Permit from the Maryland Department of Natural Resources - Forest Service.

(b) Tree Preservation Program (TPP). Conform to the requirements of the TPP when developed by the Administration.

(c) Schedule. Perform operations when soil moisture and weather conditions are suitable. Cease operations when conditions are unsuitable.

(d) Nutrient Management Plan (NMP). The fertilizer application rates of this Section will be the NMP for Tree Fertilizing unless other rates are specified in the TPP.

(e) Nutrient Management Reporting. Record the fertilizer analysis, the square yards covered, and the pounds of fertilizer applied on the Nutrient Management Reporting Form. Submit the Form within 24 hours after applying fertilizer.

716.03.02 Maryland Licensed Tree Expert (LTE). A LTE shall perform or directly supervise the Operations in conformance with the Maryland Roadside Tree Law, the Forest Conservation Act, and accepted arboricultural practices.

716.03.03 Meetings. Meet with the Engineer, the LTE, and the Landscape Operations Division before beginning Operations.

716.03.04 Marking. Identify trees to be fertilized, and obtain approval before beginning Operations.

716.03.05 Equipment. Equipment and tools shall conform to accepted arboricultural practices.

716.03.06 Notice. Notify the Engineer at least 10 days before beginning Operations.

716.03.07 Operations. Meet ANSI A300 Standards for Tree Care Operations. One or more of the following Operations will be specified:

(a) Operation 1 - Injection Fertilizing. Dissolve 200 lb of 20-20-20 water soluble fertilizer in 1 000 gal of water, and inject fertilizer solution at the rate of 1 000 gal of solution per acre or 0.21 gal of solution per SY, or at the rate specified in the TPP.

Inject fertilizer solution through a pressurized probe at points 2 to 3 ft apart, to a depth of 8 to 10 in. below the soil surface, under the dripline of the tree, or as specified.

(b) Operation 2 - Drill Fertilizing. Apply 200 lb per acre of 20-16-12 (83 percent UF with MAP & SOP), or at the rate specified in the TPP.

Place fertilizer into 1 to 3 in. diameter drilled holes, at points 2 to 3 ft apart, to a depth of 8 to 10 in., or as specified.

(c) Operation 3 - Broadcast Fertilizing. Apply 200 lbs per acre of 20-16-12 (83 percent UF with MAP & SOP) fertilizer, or at the rate specified in the TPP using approved fertilizer spreader machinery.

Uniformly apply the fertilizer over the soil surface under the dripline of the tree, or as specified.

716.03.08 Cleanup and Restoration. Avoid damage to existing structures, plants, and turfgrass. Keep turfgrass areas, paved surfaces, and sidewalks clean. Restore ruts and damaged turfgrass areas by seeding in conformance with Section 705, or perform Turfgrass Sod Establishment in conformance with Section 708 when directed, before beginning other landscape operations.

716.03.09 Damage Repair. Do not injure vegetation to be preserved. Repair injuries to bark, trunks, or limbs by cutting, smoothing, and tracing the bark in accordance with ANSI A300 Standards for Tree Care Operations.

716.03.10 Damage Compensation. Monetary compensation for damage or loss of trees will be calculated and assessed in conformance with the Guide for Plant Appraisal of the Council of Tree & Landscape Appraisers.

716.04 MEASUREMENT AND PAYMENT. Tree fertilizing will be measured and paid for at the Contract unit price for one or more of the specified items. The payment will be full compensation for all labor, fertilizer, water, material, equipment, tools, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work.

716.04.01 Tree Injection Fertilizing per square yard.

716.04.02 Tree Drill Fertilizing per square yard.

716.04.03 Tree Broadcast Fertilizing per square yard.

CATEGORY 800
TRAFFIC

AS-BUILT ITS PLANS

DESCRIPTION. Provide As-Built construction plans as specified in the Contract Documents or as directed by the Engineer.

MATERIALS. Submit the As-Built plans and construction details on CD-ROM(s) utilizing the latest Microstation format used by the Administration's Office of Traffic & Safety. In addition, provide a hard copy of the As-Built plan(s).

CONSTRUCTION. As-Built construction information shall indicate the exact location and size of all conduits, poles, pedestals, handholes, detectors, cameras, signals, and other equipment, and the routing and destination of all wiring to within 6 in. of actual location as dimensioned and referenced to physical features. A construction-details listing shall also be provided.

(a) Submit As-Built information in latest Microstation format used by the Administration's Office of Traffic & Safety and also, adhering to the latest standard features table developed by the Office of Traffic and Safety. The standard features table and current Microstation format can be obtained by contacting the Chief, Traffic Engineering Design Division. If available, the Administration will furnish the contractor with existing design plans in Microstation format. Create the base plans for the As-Builts in Microstation as required in the Contract Documents using one of the following methods:

(1) If neither electronic files nor hardcopies of the plans are available, the contractor shall re-survey to create the As-Built plans.

(2) If a hard copy only of the plan(s) is/are available, digitize existing plans to create the As-Built plans.

(3) If electronic files are available, the contractor shall use existing plan on disk to create the As-Built plans.

(b) As-Built for traffic signal plans shall have a 1"=20' scale.

(c) As-Built for ITS systems shall have a 1"=50' scale showing all system equipment. Provide all necessary detail as it relates to the system, including connection diagrams for the ITS components.

MEASUREMENT AND PAYMENT. Costs associated with providing As-Built plans will be not be measured but the cost shall be incidental to the other pertinent bid items in the Contract Documents. The payment will be full compensation for all materials and equipment necessary to complete the work, including submitting the final product in hard copy and Microstation format on CD-Rom.

CATEGORY 800
TRAFFIC

AS-BUILT LIGHTING INVENTORY

DESCRIPTION. Provide as-built lighting inventory information to the Administration for use in the Asset Data Warehouse. Data provided shall be in the appropriate format as described below.

MATERIALS. Mapping Grade Global Positioning System (GPS) receiver and software capable of providing the output as described herein.

A data dictionary including input fields will be provided by the Administration to be used with the GPS receiver. GPS receiver shall be compatible with Terra Sync and Pathfinder Office software currently being used by the Administration.

CONSTRUCTION. Collect as-built lighting inventory data for all new and relocated light poles, manholes/handholes, lighting panels and structures (sign structures with lighting) including the data fields described below. Existing equipment which is to remain at a new or reconstructed interchange shall be captured as part of the inventory.

Collect as-built lighting inventory data for all modified light poles and structures (sign structures with lighting) including the data fields described below.

Provide data in hard copy and digital spreadsheet formats. The following fields shall be included and used as Column Headings. The order in which they are shown below shall be matched from left to right in the spreadsheet provided by the contractor.

Light Poles:

EASTING (X) COORDINATE LOCATION DATA
NORTHING (Y) COORDINATE LOCATION DATA
NUMBER OF LIGHTS (Per Pole)
POLE HEIGHT
ARM LENGTH
WATTAGE
COMMENTS
ON/OFF
LIGHT_POLES_ID
BASE TYPE
BULB TYPE
EXIT NUM
INTERCHANGE/INTERSECTION NAME
DATE COLLECTED

Lighting Panels:

EASTING (X) COORDINATE LOCATION DATA
NORTHING (Y) COORDINATE LOCATION DATA
AMPERAGE
COMMENTS
METER NUM UNMETERED
LIGHT_PANELS_ID
DATE COLLECTED
COMMENTS

Structures (Sign structures with lighting):

EASTING (X) COORDINATE LOCATION DATA
NORTHING (Y) COORDINATE LOCATION DATA
NUMBER OF LIGHTS
LUMITRACK
LIGHTING_STRUCTURES_ID
STRUCTURE TYPE
LED
DATE COLLECTED
COMMENTS

Manholes/Handholes:

EASTING (X) COORDINATE LOCATION DATA
NORTHING (Y) COORDINATE LOCATION DATA
DATE COLLECTED
COMMENTS

GPS location information shall conform to the following requirements:

(a) Mapping grade GPS receivers shall be used which have sub-meter accuracy.

(b) The data provided must be able to be post-processed as necessary after data gathering has taken place using Terra Sync and Pathfinder office software suites

(1) Projection - NAD_1983_HARN_StatePlane_Maryland_FIPS_1900_Feet
(2) Geographic Coordinate System - GCS_North_American_1983_HARN
(3) Datum - D_North_American_1983_HARN_Feet

(c) Units of distance shall be published in US Survey Feet.

(d) All horizontal location information shall be Easting (X) and Northing (Y).

As-Built lighting inventory data shall be submitted to the Assistant District Engineer for Maintenance at the following locations:

District 1:	P.O. Box 2679, 660 West road, Salisbury MD 21802	410-677-4010
District 2:	615 Morgnec Rd, Chestertown MD 21620	410-810-3250
District 3:	9300 Kenilworth Ave, Greenbelt MD 20770	301-513-7304
District 4:	320 West Warren Road, Hunt Valley MD 21030	410-229-2361
District 5:	138 Defense Highway, Annapolis MD 21401	410-841-1013
District 6:	1251 Vocke Road, LaVale MD 21502	301-729-8457
District 7:	5111 Buckeystown Pike, Frederick MD 21704	301-624-8105

MEASUREMENT AND PAYMENT. As-Built Lighting Inventory Data will not be measured but the cost will be incidental to other pertinent items in the Contract Documents and will include GPS receivers, software and for all material, labor, equipment, tools and incidentals necessary to complete the work.

As-Built Lighting Inventory data shall be collected for all new and relocated light poles, manholes/handholes, lighting panels and structures (sign structures with lighting). Lighting systems will not be taken over for maintenance by the Administration until As-Built Lighting Inventory Data is received and accepted as correct by the Administration.

CATEGORY 800
TRAFFIC

BAND SIGN TO SUPPORT

DESCRIPTION. Band signs to signal, lighting or sign structures as specified in the contract documents or as directed by the Engineer.

MATERIALS.

Universal Channel Clamp	Type 304 16 Gauge Stainless Steel
Medium Channel	6061 – T6 Aluminum Alloy
Banding (0.75 in. by 0.03 in. thick)	Type 201 Stainless Steel
Blind Rivet	5154A Aluminum Alloy & Stainless Steel Mandrel

CONSTRUCTION. Attach universal channel clamp to signal, lighting or sign structure using stainless steel bands. Attach sign to channel with blind rivets every 6 in. on center. Attach universal channel clamp to medium channel. Refer to Standard MD 813.08 for details.

Install sign with minimum undersign clearance of 7 ft. to top of road grade or top of sidewalk grade.

MEASUREMENT AND PAYMENT. Band Sign to Support will be measured and paid for at the contract price per each sign panel banded to a lighting, signal or sign structure. The payment will be full compensation for stainless steel bands, clamps, rivets and for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Signs will be measured and paid for as specified in Section 813.

CATEGORY 800
TRAFFIC

CATALOG CUTS AND WORKING DRAWINGS

DESCRIPTION. Prepare and transmit submittals to demonstrate the performance of the work in accordance with the Contract Documents. Submittal schedules, catalog cuts, shop drawings, installation methods, manufacturer's certifications, photometric data and working drawings shall be furnished on all Contractor furnished items for highway signing, sign lighting, highway lighting and traffic signals. Submit stakeouts of the sign locations for all sign structure locations, as specified in the Contract Documents.

MATERIALS. Not Applicable.

CONSTRUCTION.

Submittal Requirements. Schedule and Coordinate submittals with the Contractors construction schedule. Submit a complete submittal schedule and list of required submittals with the first submittal, but no later than three days after the pre-construction conference. Arrange the schedule for submission of submittals so that related equipment items are submitted concurrently.

The Engineer may require changes to the submittal schedule to permit concurrent review of related equipment. Submit shop drawings for closely related items such as a sign and ITS support structures together.

Submittal Documents. Provide drawings neat in appearance, legible and explicit to enable proper review. D size plans shall still be legible when reduced to one half size. They shall be complete and detailed to show fabrication, assembly and installation details, wiring and control diagrams, catalog data, pamphlets, descriptive literature, and performance and test data. They shall be accompanied by calculations or other sufficient information to provide a comprehensive description of the structure, machine or system provided and its intended manner of use. If drawings deviate from the Contract Documents, advise the Engineer in writing with the submittal and state the reason for the deviation.

No portion of the work requiring a Contractors drawing shall be started nor shall any materials be fabricated, delivered to the site, or installed prior to the approval or qualified approval of the drawings. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved Contractors drawings shall be at the Contractors risk. The Administration will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

Shop drawings shall show types, sizes, accessories, layouts including plans, elevations and sectional views, component, assembly and installation details, and all other information required to illustrate how applicable portions of the Contract requirements will be fabricated and installed.

In case of fixed mechanical and electrical equipment, submit layout drawings drawn to scale, to show required clearances for operation, maintenance and replacement of parts. Provide manufacturers certified performance curves, catalog cuts, pamphlets, descriptive literature, installation and application recommendations, and indicate conformance to the Contract Documents. Certifications shall be originals. Certification shall also be sent to the Office of Materials and Technology (OMT) as required in the Contract Documents.

Provide manufacturer's catalog, product and equipment data that includes materials type, performance characteristics, voltage, phase, capacity, and similar data along with wiring diagrams, when applicable. Indicate catalog, model and serial numbers representing specified equipment. Provide complete component information to verify all specified required items. Installation recommendations and instructions shall provide written Manufacturer's detail step by step preparation and installation of the materials, and products including recommended tolerances and space for maintenance and operation.

Provide catalog cuts for sign luminaires with photometric data attached for each sign to be illuminated. Photometric printouts shall include the sign number, the illumination on a one foot square grid covering the entire sign face, the average illumination, the maximum to minimum uniformity ratio, and a working drawing for the sign face attached.

Catalog cuts for roadway luminaires shall have photometric data attached as specified in the Contract Documents.

Submit working drawings as required for changes, substitutions, contractor design items, and Contractor designed methods of construction. Requirements for working drawings will be listed in appropriate Specification Sections and in Special Provisions. Drawings shall be accompanied by calculations or other information to completely explain the structure, machine or system described and its intended use. Review and approval of such drawings by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract.

Working drawings and calculations as submitted shall be sealed, dated and signed by a Professional Engineer registered in the State of Maryland.

The review and approval of Contractor's drawings by the Administration shall not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract. The Contractor shall be responsible for the verification and accuracy of all dimensions and insuring that all Contractor furnished items are compatible, and conform to all design and performance criteria.

All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.

Submittal Process. Each drawing submitted shall have affixed to it the following Certification Statement, signed by the Contractor:

"By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and pertinent data and I have checked and coordinated each item with other applicable approved drawings and Contract requirements."

With the first submittal, include a submittal schedule, listing by Specification Section number, all submittals required and approximate date submittal will be forwarded.

Each submittal having catalog descriptions, shop drawings, working drawings, photometric data, manufacturer's certifications, method of construction and manufacturer's installation recommendations shall be submitted to:

Chief, Traffic Operations Division
Maryland State Highway Administration
7491 Connelley Drive
Hanover, Maryland 21076

Each submittal shall have a transmittal page that indicates the Contractor's and Subcontractor's address and phone numbers. Submittals containing multiple items need the transmittal only on the exterior of each package. For original submittals, and each subsequent resubmittal that may be required, 9 copies will be submitted for projects administered by the District, and 6 copies will be submitted for projects administered by Office of Traffic and Safety. A separate copy shall be forwarded to the Engineer.

All submittals for approval shall have the following identification data, as applicable, contained thereon or permanently adhered thereto.

(a) Drawing title, drawing number, TIMS number, TOD number, revision number, and date of drawing and revision.

(b) Applicable Contract Drawing Numbers and Specification Section and Paragraph Numbers.

The first page of every catalog description, working drawing and material certification shall be stamped in red with the following. All pertinent Contract Document information shall be filled in the spaces provided.

MARYLAND STATE HIGHWAY ADMINISTRATION
SUBMITTAL PACKAGE #_____ DATED CONTRACT # _____ LOCATION PROJECT DESC. ITEM # _____ THIS ITEM CONTAINS_____ PAGES ITEM DESCRIPTION
☐ ACCEPTED ☐ ACCEPTED AS NOTED ☐ REJECTED - REVISE & RESUBMIT
REVIEWERS NAME DATE

Indicate the submittal package by sequential numbering and date of submittal. Catalog, product data or brochure submittals containing various products, sizes and materials shall be underscored or highlighted to indicate the salient features required to meet the specifications. Likewise, items not applicable to the Contract shall be marked "not applicable" or crossed out.

If one or more of the items in a submittal are not approved, resubmittal of only the unapproved items is required, highlighted to show the particular item being resubmitted. Resubmittals shall bear original submittal number and be lettered sequentially.

Three copies of all Contractors drawings will be returned to the Contractor.

Each submittal shall be in accordance with the submission schedule. Allow thirty days for checking and appropriate action by the Engineer.

Contractors submittals will be returned, marked with one of the following classifications:

ACCEPTED: no corrections, no marks

ACCEPTED AS NOTED: a few minor corrections. Item shall be installed in accordance with the corrected drawings.

REJECTED - REVISE & RESUBMIT: requires corrections or is otherwise not in accordance with the Contract Documents. No items shall be fabricated. Correct and resubmit drawings as per original submission. Allow thirty days for checking and appropriate action by the Engineer.

MEASUREMENT AND PAYMENT. Catalog Cuts, Manufacturers Certifications, Photometric Data and Working Drawings will not be measured but the cost will be incidental to the pertinent items specified in the Contract Documents.

CATEGORY 800
TRAFFIC

COATING NEW GALVANIZED STRUCTURES

DESCRIPTION. Coat new galvanized steel structures, including exposed anchor bolts, flange bolts, nuts, and washers, as specified in the contract documents or as directed by the Engineer. Color will be as specified in the contract documents.

MATERIALS. Materials shall conform to one of the systems described below. All coatings in the system shall come from the same manufacturer. The Manufacturer shall be on the "Approved List of Manufacturers" maintained by the Office of Materials and Technology, Metals, Coatings and Structural Materials Team.

Colors shall conform to the following Federal Standards, or as specified in the contract documents.

Brown	Federal Standard Number 595a-20040
Black	Federal Standard Number 595a-27038
Green	Federal Standard Number 595a-24108

Paint System.

(a) Primer. Shall be an Epoxy Polyamide meeting the requirements of Section 912.03.02 and must have a dry film thickness of 2 to 5 mils (50 to 125 μm).

(b) Finish Coat. Shall be an Aliphatic Polyurethane meeting the requirements of Section 912.04.02 and must have a dry film thickness of 2 to 4 mils (50 to 100 μm).

Fusion Bonded Polyester Powder System (all Signal & Lighting Structures).

Polyester Powder. Polyester Powder shall meet the requirements of Section 917.

CONSTRUCTION.

Paint System.

Surface Preparation. Galvanized steel shall not be permitted to have been water or chromate quenched. The surface shall be solvent cleaned per SSPC SP-1 using a non-residue solvent and a lint free cloth. The surface shall also be brush off blasted per SSPC SP-7 using Grit. Any damaged areas shall be repaired according to ASTM A-780. If repair is made using an Organic Zinc Rich primer, the primer shall conform to Section 912.02.03.

Paint Application. Following the brush off blasting and prior to the application of the prime coat, store each item in an environment free of moisture and dust. Apply the primer within twelve (12) hours of brush off blasting and in accordance with the manufactures recommendation.

Once the primer has properly cured, apply the finish coat in accordance with the manufacturers recommendations.

The finished painted surface shall be holiday free when tested with a low voltage holiday detector (minimum 30 volts) similar to a K – D Bird Dog, using regular tap water. If holidays are detected, the coatings could be repaired with additional coatings or they may be stripped and repainted at the Contractor's expense.

Fusion Bonded Polyester Powder System.

Surface Preparation. Prepare the galvanized surface by solvent cleaning conforming to SSPC SP-1, followed by brush off blast cleaning conforming to SSPC SP-7 using grit. The blast profile shall be 2 to 3 mills as determined in conformance with D 4417, method C. When blast cleaning exposes bare steel, spot prime the bare steel with an Organic Zinc Rich Coating in conformance with A 780. Apply the polyester powder within 24 hours of surface preparation.

Application. Apply fusion bonded polyester powder per manufacturers recommendations.

MEASUREMENT AND PAYMENT. Coating New Galvanized Structures will not be measured and paid, but the cost will be incidental to the contract item. The payment will be full compensation for all material, labor, equipment, tools and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

CONSTRUCTION NOTICE SIGNS

DESCRIPTION. Furnish and install Point of Presence (POP) signs in accordance with this provision, the Maryland Book of Standards for Highway and Incidental Structures and the current Maryland Standard Specifications for Construction and Materials, or as directed by the engineer.

MATERIALS.

Wood Sign Supports	921.05 and 921.06
Reflectorization	950.03
Signs	950.08

CONSTRUCTION. Install signs as shown on SHA Typical 1 and 2. A project impacting only one direction of a divided highway will require only one sign. Maintain all signs until completion of the project. Upon completion of the project, a Completed as Promised (CAP) pennant shall be affixed to each POP sign. The POP sign(s) shall remain in place 30 days with the CAP pennant attached. After the 30 day period has expired, the Contractor shall be required to remove the sign(s). The sign, pennant, posts and hardware will remain the property of the Contractor.

If the project is not completed within the designated time frame displayed on the POP sign, the Office of Customer Relations and Information (OCRI) will prepare and issue a press release identifying the construction issues responsible for the delay in completion and a new anticipated completion date. At the request of the Administration, a new sign with the new anticipated completion timeframe may be installed if the delay is considered significant. 'Significant' shall be considered a completion date that extends beyond half of the following season.

The POP signs shall be ground mounted in accordance with Standard Nos. MD 812.01, 812.02, 812.04, 813.02, current Maryland Standard Specifications for Construction and Materials and all pertinent federal and state regulations. Due to the sign width, it is preferable to install the POP sign in flat areas to avoid the need for excessive post length in fill areas.

MEASUREMENT AND PAYMENT. Signs, including the CAP pennant, will be measured and paid for at the Contract unit price per square foot of area. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work. Wood Supports will be measured and paid for at the Contract unit price per linear foot for the length and size specified. The payment will be full compensation for all excavation, backfill, drilled holes, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Removing existing ground mounted signs will be measured and paid for at the Contract unit price per square foot area of sign. Removal of sign supports will not be measured but will be incidental to the contract unit price for removing signs.

CATEGORY 800
TRAFFIC

DISCONNECT, PULLBACK AND REROUTE EXISTING CABLE

DESCRIPTION. Disconnect existing cable(s) from traffic control device(s), pullback and reroute through new or existing conduit systems, handholes, span wires, mast arms and/or structures for reconnecting the traffic control device(s) as specified in the contract documents, or as directed by the Engineer.

MATERIALS. Not Applicable

CONSTRUCTION. Notify the Engineer and Traffic Operations Division representatives at least 5 working days before intended work is to be completed. Plan the work to minimize interference and/or down time of any existing traffic control device.

Disconnect specified cable(s) from the traffic control device and pullback to the point noted or as directed, reroute the cables through the specified raceway(s) and back to the device specified.

MEASUREMENT AND PAYMENT. Disconnect, Pullback & Reroute Cable will be measured and paid for at the contract price per linear foot and shall apply for one or as many cables as are disconnected from a specified device and rerouted back to a device (not per cable). The payment will be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

GALVANIZED TRAFFIC SIGNAL PEDESTAL POLES AND TRANSFORMER BASES

DESCRIPTION. Furnish and install galvanized traffic signal pedestal poles and transformer bases at locations specified in the Contract Document or as directed by the Engineer.

MATERIALS. Design shall meet 2001 edition of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, except as noted. All welding shall conform to American Welding Society (AWS) Structural Welding Code D1.1 Steel, Tubular Structures.

Determine each pedestal pole's height by the total height of the pedestal pole including the transformer base.

(a) 10 ft pole height consists of a 103 in. steel shaft with a steel base plate plus a 17 in. transformer base.

(b) 14 ft pole height consists of a 151 in. steel shaft with a steel base plate plus a 17 in. transformer base.

(c) 20 ft pole height consists of a 240 in. steel shaft with a steel base plate plus a 17 in. transformer base.

Each pedestal pole furnished shall consist of a design from a steel shaft with a steel base plate, transformer base and all miscellaneous hardware.

(a) The pedestal pole shaft shall be fabricated of one length and shall have one longitudinal weld, parallel to the long axis of the pedestal pole shaft, with no transverse welds. The longitudinal weld shall be finished to form a smooth outside surface and the wall of the pedestal pole shaft shall be uniform in thickness including the welded area. The pedestal pole shaft shall be round or multi-sided (less than eight sides not acceptable) in cross section. 14 ft units shall be uniformly tapered from butt to tip with a 1 in. reduction in diameter for each 7 ft in length (0.14 in./ ft). 10 ft unit shall not be tapered.

(1) 10 ft pedestal pole shaft shall be 4-1/2 in. outside diameter, Schedule 40 pipe, and conform to A 501.

(2) All 14 ft pedestal poles shall be 7-1/2 in. outside diameter at the base and shall be made of 11 gauge (0.119 in.) thickness steel conforming to A 595, Grade A or equivalent.

(3) All 20 ft pedestal poles shall be 7-1/2 in. outside diameter at the base and shall be made of 3 gauge (0.25 in.) thickness steel conforming to A 595, Grade A or equivalent.

(b) The base plate material shall meet the requirements of A 709, Grade 36. Secure the base plate to the lower end of the pedestal pole shaft by two continuous electric arc welds. The base plate shall telescope the pedestal pole shaft with one weld on the inside of the base plate at the end of the pedestal pole shaft. The remaining weld shall be located on the outside of the base plate at the top of the pedestal pole shaft. The weld connection shall develop the full strength of the adjacent pedestal pole shaft to resist bending action. All bases plate shall be fabricated with the holes for anchor bolts to the size and location dimensions as shown in MD-818.16 and 818.17.

(c) Furnish 14 ft pedestal poles with entrance ways for cable as noted in the contract documents. These holes shall be factory drilled and a straight tapped coupling, conforming to Underwriters Laboratory's UL-6 Specification, for 2 in. rigid conduits, shall be installed for each hole. A nipple with a unitized hexagonal fitting and integral inside radius on one end shall then be installed and fully seated on the interior side of the coupling. Location and installation of the coupling shall be as shown in MD-818.17.

(d) All pedestal poles and hardware, except materials manufactured from stainless steel or cast aluminum, shall be hot dipped galvanized. The galvanized coating shall conform to the thickness, adherence and quality requirements of A 123 and A 153 for hardware. Threaded components shall be chased and cleaned after galvanizing. All internally threaded components shall be tapped oversize the minimum amount required to permit assembly on the coated externally threaded fastener. Internally threaded components shall be provided with a lubricant which shall be clean and dry to the touch.

(e) Furnish each pedestal pole with a removable domed cap, fabricated from cast aluminum, circumferentially attached to the side of the pole with three hex head type 304 stainless steel bolts (1/4 in. – 20 UNC).

(f) Each pedestal pole shall have an identification plate mechanically attached 6 in. above the pedestal pole base plate and oriented so that the identification plate may be read from a ground observation position.

(g) Recessed hub type, galvanized malleable iron plugs shall be inserted flush into all couplings.

Transformer Bases.

(a) All transformer bases shall be approved by FHWA as meeting breakaway under NCHRP 350.

(b) Furnish each transformer base with four hex head bolts, four hex head nuts and all associated hardware as shown on the appropriate detail for fastening the pedestal pole base plate to the top of the transformer base. All bolts shall conform to A 325 specifications and shall be galvanized.

Anchor Bolts.

(a) Each pedestal pole anchor bolt shall be made of steel conforming to M 314, Grade 55 S1

(b) Anchor bolt threads shall be of cut thread design with a minimum 6 in. of threads at the top.

(c) The template and anchor plates shall be as shown on MD 801.01.

(d) The diameter of the anchor bolt shall be stamped into the top of the threaded end of each anchor bolt.

(e) Each anchor bolt shall be provided with two attached heavy hex nuts and two attached flat washers.

(1) Anchor bolt nuts shall conform to A 194, grade 2 or 2H, or A 563, D or DH.

(2) All nuts shall be tapped oversize the minimum amount required to permit assembly on the coated externally threaded fastener.

(3) Washers shall conform to F 436.

(f) All nuts, washers, and the top 12 in. of all anchor bolts shall be hot dipped or mechanically galvanized. The galvanized coating shall conform to the thickness, adherence and quality requirements of A 123 or A 153 for hardware.

All high strength bolts (of a given length), nuts (of a given size) and washers (of a given diameter) shall be from the same manufacturing lot per each requisition of materials. The use of foreign made fasteners is prohibited.

CONSTRUCTION. Refer to 818.03

MEASUREMENT AND PAYMENT. Galvanized Traffic Signal Pedestal Poles and Transformer Bases will be measured and paid for at the Contract unit price per each type of pole and base furnished and installed. The payment will be full compensation for furnishing and installing pedestal poles, breakaway base and all materials, labor, equipment, tools and incidentals necessary to complete work.

Anchor bolts will be measured and paid for as specified in Section 801.

Tag Detail.

Mfg: [1] Contract #: [2]
Pole Diameter: [3] Height: [4] Gauge: [5]
Anchor Bolts: [6] Bolt Circle: [7]

Tag Reference.

[1] Name of the manufacturer of the pedestal pole.

[2] Administration Contract Number of the pedestal pole.

[3] Pole outside diameter at the base: 4-½ in. O.D. or 7-½ in. O.D.

[4] Pole height[1]: 10ft' , 14ft, 20 ft

[5] Pole gauge: Schedule 40 or 11 GA

[6] Anchor bolt size: 1 in. Dia. x 40 in. Length

[7] Bolt circle diameter: 11 in. Dia.

[1]Pole height includes the height of the pedestal pole and transformer base. Typically, the transformer base is 17 in. in height which corresponds to 10 ft pole having a height of 103 in.; and a 14 ft having a height of 151 in.

CATEGORY 800
TRAFFIC

MAINTAIN EXISTING ROADWAY LIGHTING

DESCRIPTION. Maintain existing roadway and sign lighting during construction.

MATERIALS. Not applicable.

CONSTRUCTION. Maintain all roadway and sign lighting at all times except as indicated in the Contract Documents, or as directed by the Engineer. Contact the Traffic Control device Inspection Section prior to beginning any work to inventory the working condition of the existing lights.

The roadway shall continue to be illuminated at the levels existing on the first day of construction throughout the project, unless approved otherwise, in writing, by the Engineer. Upon notification of inadequate illumination by the Engineer, provide lighting up to the minimum levels as specified in the Contract Documents, within 48 hours. Failure to correct the noted problems will result in a $500 per day penalty.

The electrical circuits, either existing or new, which are to be affected by construction activities, shall have replacement circuits in operation before the existing circuits are disconnected. If unable to install the ultimate circuits and maintain them in working order, temporary bypasses shall be provided. All temporary wiring shall conform to NEC, and the policies of the Administration. No overhead wiring shall be connected to breakaway poles unless the poles are protected from traffic and from construction activities.

Install a temporary lighting system with written approval by the Engineer. The temporary lighting system may include relocation of existing lighting poles or installation of final lighting poles.

At the conclusion of construction, all temporary cables shall be disconnected and made safe. Temporary underground cables may be abandoned, but shall be disconnected from the power supply system, and isolated so that there is no possibility of their becoming re-energized.

MEASUREMENT AND PAYMENT. Maintain Existing Roadway Lighting will be not be measured but the cost will be paid for at the contract lump sum price. Payment of the contract lump sum price will be prorated and paid in equal amounts on each monthly estimate. The number of months used for prorating will be the number estimated to complete the work. Payment will be full compensation for all manholes, duct cable, cable, conduit, connector kits, wood poles, luminaires, lighting arms, labor and incidentals needed to complete the work.

CATEGORY 800
TRAFFIC

REMOVE AND DISPOSE OF EXISTING LIGHTING INFRASTRUCTURE

DESCRIPTION. Remove and dispose of existing lighting infrastructure including but not limited to existing lighting structures, bridge mounted sign mountings, manholes, handholes, traffic control device cabinets and equipment, foundations, cables, conduits, duct cables, electrical service equipment, breakaway base support system, ground wire, roadway luminaires, connector kits and ground rods as shown in the contract documents and/or as directed by the field engineer within the project limits.

MATERIALS. Not applicable.

CONSTRUCTION. Remove concrete foundations and place backfill as specified in 822.03.01.

Make all existing cable safe in conformance with the appropriate electrical codes. If removing duct cable, underground conduit, ground wire, etc., backfill as specified in 809.03.

Remove existing manholes and handhole as specified in 207.03.01. Place backfill as specified in 822.03.01.

MEASUREMENT AND PAYMENT. Remove and Dispose of Existing Lighting Infrastructure will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for the removal and disposal of existing lighting infrastructure including but not limited to existing lighting structures, bridge mounted sign mountings, manholes, handholes, traffic control device cabinets and equipment, foundations, cables, conduits, duct cables, electrical service equipment, breakaway base support system, ground wire, roadway luminaires, connector kits, ground rods, excavation, backfill, transportation and all materials, labor, equipment and incidentals necessary to complete the work as indicated on contract documents and/or as directed by the field engineer within the project limits.

CATEGORY 800
TRAFFIC

SIGN LIGHTING MAINTENANCE SYSTEM

DESCRIPTION. Furnish and install sign lighting maintenance systems as specified in the Contract Documents, or as directed by the Engineer. Provide a system that eliminates or reduces the need for lane closures for sign lighting maintenance.

MATERIALS.

Metallic conduit and Fittings	921.07.01
Nonmetallic Conduit and Fittings	921.07.02
Flexible Conduit and Fittings	921.07.02
Electrical Cable and Wire	950.06
Cable and Wire Connectors	950.14

CONSTRUCTION. Sign lighting maintenance systems shall allow all luminaires, ballasts, power regulation systems, and electrical connections to be maintained from the shoulder, or right lane if no shoulder is present, without additional lane closures.

Provide a disconnect switch and electrical supply system for each sign lighting system. The electrical supply system shall provide electrical cable from the disconnect switch to each luminaire on the sign.

Arrange the electrical connections for the luminaires to allow each luminaire to be powered and tested while over the roadway shoulder. The electrical supply system shall use all circuits designated in the Contract Documents, and allow adjacent luminaires to operate on different circuits.

Sign lighting maintenance systems shall make use of the sign structures and luminaire supports as specified in the Contract Documents. Provide additional, or alternative structural supports as required to support the systems.

Sign lighting maintenance systems shall not obstruct the view of the sign faces, shall not require modification of the sign placement on the structure, and shall not require modification of the sign faces.

MEASUREMENT AND PAYMENT. Sign Lighting Maintenance Systems for sign structures will be measured and paid for at the contract unit price per each sign structure. The payment will be full compensation for the mounting hardware, supports, wiring, conduits, disconnect switch, cable supports, luminaires carriages, and all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

SIGN LUMINAIRES

DESCRIPTION. Furnish and install LED sign luminaires as specified in the contract documents or as directed by the Engineer.

MATERIALS. Sign luminaire shall have a color temperature of 3900 degrees Kelvin or higher and a Color Rendering Index (CRI) value greater than 65. Each sign luminaire shall be designed for a useful life of at least 11 years with a minimum L70 value of 50,000 hours of operation based on a 12 hour on, 12 hour off duty cycle.

All components of the luminaire must be rated for the full service life without maintenance.

Sign luminaires shall use no more than 135 watts and be designed to operate at the voltage specified in the contract documents. For 480 volt operation, an integral transformer may be provided to reduce the voltage. The power factor of the sign luminaire must be 0.9 or higher.

All components of the sign luminaire shall be UL approved and the complete luminaire assembly shall be compliant to UL 1598 for wet locations.

The sign luminaire shall be designed to mount on a standard mounting plate as detailed in the book of standards and on the standard carriage of a sign lighting maintenance system.

The sign luminaire lens/refractor shall be sealed to prevent intrusion of moisture for the full service life. Luminaire housings that have the potential to retain water shall be equipped with factory installed drain holes to meet the requirements of UL 1598. The lens/refractor must be constructed of a material that will not show visible yellowing due to UV exposure, or exposure to hydrocarbon emission, for the full service life.

CONSTRUCTION. Photometric calculations shall be provided with the catalog cuts for the sign luminaire verifying the sign illumination for each individual sign including both existing and proposed signs based on actual sign size, support offset below and in front of sign. Calculations shall be provided for a grid with vertical and horizontal spacing of 1 ft. The bottom of the grid will be 0.5 foot above the bottom edge of the sign and left edge 0.5 ft from the left side. A light loss factor (LLF) value of 0.7 shall be used for the calculation.

To be acceptable, the average initial illumination shall be 20 foot candles or greater with a maximum to minimum uniformity ratio no greater then 6 to 1.

MEASUREMENT AND PAYMENT. Sign Luminaires shall be measured and paid for at the contract unit price each for Sign Luminaires. The payment will be full compensation for the sign

luminaire and drivers, mounting hardware, wiring, step down transformer, photometric calculations, and all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

SQUARE PERFORATED TUBULAR STEEL POSTS

DESCRIPTION. Furnish and install square perforated tubular steel posts and square perforated tubular steel anchor bases for mounting traffic signs as specified in the contract documents, or as directed by the Engineer.

MATERIALS.

Steel Posts	A570 Grade 50
Galvanizing	A653 Designation G-90
Spray Galvanizing Compound	A780

Square tubular steel posts and square tubular steel anchor bases shall be formed from 12 gauge steel. All sides of the tubes shall have 7/16 in. die punched circular holes or perforated knock-outs, at 1 in. centers along their entire length.

The tubular steel posts shall be 2 in. square tubes 12 ft long.

Square tubular steel anchor bases shall be comprised of two telescoping tubes. The first shall be 2 -1/4 in. square, three ft long, formed from 12 gauge steel and shall snugly fit over the sign post. The second section shall be a 2-1/2 in. square, 18 in. long, formed from 12 gauge steel, and shall snugly fit over the 2-1/4 in. section.

CONSTRUCTION. Construct the square tubular steel anchor base assembly by placing the 18 in. base section over the 3 ft base section so that they are flush at the top and the holes are aligned. Drive the entire unit into the ground so that one or two rows of holes in the square perforated tubular steel base are exposed. Drive the base so that it remains plumb and provides the final sign assembly with the correct orientation.

Determine the finished length of the tubular steel posts by adding the total height of the signs to 8 ft, 2 in. Cut the sign post to the correct length, and apply cold spray galvanizing to the cut end. Bolt the signs to the top of the post, using tamper proof bolts or drive rivets. Lower the square tubular steel posts 8 in. into the base, and secure the post to the base using two corner bolts designed for this purpose.

MEASUREMENT AND PAYMENT. Square Perforated Tubular Steel Posts will be measured and paid for at the contract unit price per each. The payment will be full compensation for the sign post, corner bolts, and painting as required, and for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Square Tubular Steel Anchor Bases will be measured and paid for at the contract unit price per each. The payment will be full compensation for both tubes comprising the base section, all excavation, and for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

UTILITY CONNECTIONS AND UTILITY STAKEOUT

DESCRIPTION. Provide utility connections, and utility stakeout, as specified in the Contract Documents or as directed by the Engineer.

MATERIALS.

Disconnect Switches and Utility Connections 950.13.10

CONSTRUCTION. Arrange a meeting with the utility company representatives, Traffic Operations Division representatives, the Engineer and the District Utility Engineer, as specified in the Contract Documents to establish a schedule for utility connections before any equipment or material is installed.

Do not disconnect, de-energize, reconnect, tamper with, or otherwise handle any of a utility company's facilities. The Contractor shall be responsible for the utility service connections to the utility company's supplied point of service.

Make the necessary arrangements with the utility companies to insure having needed utilities available at the time of turn on. Any utility energization, connection or disconnection delays will not be considered a valid reason for any work time extension claim. Report difficulties in securing utility company services to the Engineer, at the earliest possible time.

Utility Stakeout. Notify the appropriate agencies listed in the Contract Documents, and those listed below a minimum of 72 hours (excluding weekends and holidays) prior to the Contractors anticipated beginning of any underground work.

(a) In Montgomery County, request Montgomery County (240-777-2100) to stakeout their ITS and signal facilities.

(b) Request the Statewide Operations Center (800-543-2515) to stake out SHA fibreoptic and communication cables.

(c) Request the Communications Division (410-747-8590) to stake out ITS devices.

(d) Request appropriate RME to stake out lighting.

(e) Notify the Hanover Complex Signal Shop (410-787-7652) of all requests for signal and ITS stakeouts.

Plan the work to minimize interference with any existing traffic control devices.

Existing equipment shall remain in its original condition until the new equipment has been completed, satisfactorily tested and its operation accepted by the Engineer.

MEASUREMENT AND PAYMENT.

Utility Connection. Utility Service Equipment Connections will be measured and paid for as specified in 807.04.01.

All utility company energization, connection or disconnection costs will be the responsibility of the Administration.

Utility Stakeout. Utility Stakeout will not be measured but the cost will be incidental to other pertinent items specified in the Contract Documents.

CATEGORY 800
TRAFFIC

SECTION 802 — GALVANIZED STEEL BEAM SIGN POSTS

802.02 MATERIALS.

622 **ADD:** The following to the end of the materials list.

Structural Tubing	A500, Grade B

802.04 MEASUREMENT AND PAYMENT.

DELETE: The first sentence in section 802.04.

623 **INSERT:** The following.

Galvanized Steel Beam Sign Posts and Structural Tubing Sign Posts will be measured and paid for at the Contract unit price per linear foot for the various sizes of posts specified in the Contract Documents.

CATEGORY 800
TRAFFIC

SECTION 806 — LUMINAIRES AND LAMPS

806.02 MATERIALS.

628 **ADD:** The following after the first line.

LED Roadway Luminaires	QPL

806.03 CONSTRUCTION.

806.03.05 Luminaire Photometric Data and Calculations.

(b) Photometric Calculations.

629 **ADD:** The following after the sixth paragraph, "All calculated lighting…walkways shall not exceed 0.4."

For Light Emitting Diode (LED) Roadway Luminaires, correction factors shall be applied for the lumen retention at 50 000 hours. The illuminance shall not decrease by more than 30 percent at 50 000 hours, which results in a Lamp Lumen Depreciation (LLD) factor of 0.70. Apply an additional factor of 0.9 for Luminaire Dirt Depreciation (LDD), to obtain a total maintenance factor of 0.64 for calculations. Provide a luminaire mounting height of 40 ft with light centers directly over the edge line of the roadway. Assume four poles in a straight line, parallel to the roadway, spaced at 180 ft each. Perform calculations for illuminance and luminance based on a R3 class pavement. The calculation grid shall be based on a two lane road with 12 ft lanes and shall be placed between the center two poles. Calculate two lines of points for each lane. The first and the second line of calculation points shall be 4 ft from the left and 4 ft from the right lane lines, respectively. Start each line of calculation points directly under the second luminaire and continue every 20 ft until directly under the third luminaire. Each line shall have 10 points, and a total of 40 points shall be calculated. To be acceptable, the average maintained illuminance of all 40 points shall be 0.9 ft candles or greater with an average to minimum uniformity ratio no greater than 4 to 1.

630 **ADD:** The following after the last sentence in the paragraph for **(c) High Mast Luminaires**.

(d) Fixed Aim LED Luminaires. LED Roadway Luminaires shall be a complete lighting device consisting of a cast aluminum housing, LED arrays, LED drivers, terminal blocks, associated hardware, all necessary wiring, and an optical assembly that provides an Illuminating Engineering Society of North America (IESNA) Type II,

Type III, Type IV, or Type V distribution as specified in the contract documents. If no distribution type is specified, then the Luminaire must have an IESNA Type III distribution. LED Roadway Luminaires shall meet the requirements of a Full Cutoff distribution as defined by IESNA. For 480 volt operation, an integral transformer shall be provided to reduce the voltage.

ADD: The following after the last sentence in the paragraph for **Testing**.

The Administration may waive the requirements of section 820.03.02 (d) for illuminance testing.

806.04 MEASUREMENT AND PAYMENT.

630 **ADD:** The following after the first paragraph.

LED Roadway Luminaires will be measured and paid for at the contract unit price per each. The payment will be full compensation for the LED Roadway Luminaire and drivers, mounting hardware, wiring, integral transformer, shorting cap, and all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

SECTION 806 — LUMINAIRES AND LAMPS

806.03.05 Luminaire Photometric Data and Calculations.

630 **DELETE:** 806.03.05 (c).

INSERT: The following.

(c) High Mast Luminaires. High mast luminaires shall have an IES type 5 distribution pattern or as specified in the Contract Documents. The luminous intensity shall not exceed 100 candelas per 1000 lamp lumens for any point 80 degrees, or higher, above nadir; or exceed 0 candelas per 1000 lamp lumens for any point 90 degrees, or higher, above nadir.

CATEGORY 800
TRAFFIC

SECTION 806 — LUMINAIRES AND LAMPS

806.02 MATERIALS.

628 **ADD:** The following after the first line.

LED Roadway Luminaires	QPL

806.03 CONSTRUCTION.

806.03.05 Luminaire Photometric Data and Calculations.

(b) Photometric Calculations.

629 **ADD:** The following after the sixth paragraph, "All calculated lighting…walkways shall not exceed 0.4."

For Light Emitting Diode (LED) Roadway Luminaires, correction factors shall be applied for the lumen retention at 50 000 hours. The illuminance shall not decrease by more than 30 percent at 50 000 hours, which results in a Lamp Lumen Depreciation (LLD) factor of 0.70. Apply an additional factor of 0.9 for Luminaire Dirt Depreciation (LDD), to obtain a total maintenance factor of 0.63 for calculations. Provide a luminaire mounting height of 40 ft with light centers directly over the edge line of the roadway. Assume four poles in a straight line, parallel to the roadway, spaced at 180 ft each. Perform calculations for illuminance and luminance based on a R3 class pavement. The calculation grid shall be based on a two lane road with 12 ft lanes and shall be placed between the center two poles. Calculate two lines of points for each lane. The first and the second line of calculation points shall be 4 ft from the left and 4 ft from the right lane lines, respectively. Start each line of calculation points directly under the second luminaire and continue every 20 ft until directly under the third luminaire. Each line shall have 10 points, and a total of 40 points shall be calculated. To be acceptable, the average maintained illuminance of all 40 points shall be 0.9 ft candles or greater with an average to minimum uniformity ratio no greater than 4 to 1.

For Light Emitting Diode (LED) Underpass Luminaires, correction factors shall be applied for the lumen retention at 50 000 hours. The illuminance shall not decrease by more than 30 percent at 50 000 hours, which results in a Lamp Lumen Depreciation (LLD) factor of 0.70. Apply an additional factor of 0.9 for Luminaire Dirt Depreciation (LDD), to obtain a total maintenance factor of 0.63 for calculations. Provide a luminaire mounting height of 17.5 ft with light centers directly over the edge line of the roadway. Assume four luminaires in a straight line, parallel to the roadway, spaced at 40 ft each. Perform calculations for illuminance and luminance based on a R3 class pavement. The calculation grid shall be based on one 12 ft lane and shall be placed between the center

two luminaires. Calculate two lines of points for the each lane. The first and the second line of calculation points shall be 4 ft from the left and 4 ft from the right edge lines, respectively. Start each line of calculation points directly under the second luminaire and continue every 5 ft until directly under the third luminaire. Each line shall have 9 points, and a total of 18 points shall be calculated. To be acceptable, the average maintained illuminance of all 18 points shall be 4.0 ft candles or greater with an average to minimum uniformity ratio no greater than 1.5 to 1.

630 **ADD:** The following after the last sentence in the paragraph for (c) High Mast Luminaires.

(d) Fixed Aim LED Luminaires. LED Roadway Luminaires shall be a complete lighting device consisting of a cast aluminum housing, LED arrays, LED drivers, terminal blocks, associated hardware, all necessary wiring, and an optical assembly that provides an Illuminating Engineering Society of North America (IESNA) Type II, Type III, Type IV, or Type V distribution as specified in the contract documents. If no distribution type is specified, then the Luminaire must have an IESNA Type III distribution. LED Roadway Luminaires shall meet the requirements of a Full Cutoff distribution as defined by IESNA. For 480 volt operation, an integral transformer shall be provided to reduce the voltage.

(e) Underpass LED Luminaires. LED Underpass Luminaires shall be a complete lighting device consisting of a cast aluminum housing, LED arrays, LED drivers, terminal blocks, mounting hardware, associated hardware, all necessary wiring, and an optical assembly that provides an Illuminating Engineering Society of North America (IESNA) Type II, Type III, Type IV, or Type V distribution as specified in the contract documents. If no distribution type is specified, then the Luminaire must have an IESNA Type III distribution. Glare control optics shall be utilized when available. LED Underpass Luminaires should meet the requirements of a Full Cutoff distribution as defined by IESNA. For 480 volt operation, an integral transformer shall be provided to reduce the voltage.

ADD: The following after the last sentence in the paragraph for Testing.

The Administration may waive the requirements of section 820.03.02 (d) for illuminance testing.

806.04 MEASUREMENT AND PAYMENT.

ADD: The following after the first paragraph.

LED Roadway Luminaires will be measured and paid for at the Contract unit price per each. The payment will be full compensation for the LED Roadway Luminaire and drivers, mounting hardware, wiring, integral transformer, shorting cap or photocell as required and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

LED Underpass Luminaires will be measured and paid for at the Contract unit price per each. The payment will be full compensation for the LED Underpass Luminaire and drivers, mounting hardware, wiring, integral transformer, and all materials, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

SECTION 808 — LIGHTING STRUCTURES

808.01 DESCRIPTION.

634 **DELETE:** The description paragraph in its entirety.

INSERT: The following.

Furnish and install low level steel and aluminum lighting poles, bracket arms and fittings, and steel high mast lighting structures as specified or as directed. Exclude concrete foundations.

808.02 MATERIALS.

ADD: The following at the end of the list of materials.

High mast shafts	A595 Grade A
Steel base plates and other structural steel	A709 Grade 50 including Charpy V Notch requirements for Zone 2
Galvanization for hardware	A153

Design high mast lighting structures for mounting a head frame and lowering device assemblies. Provide design in accordance with the 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" and as indicated in contract documents. Structures shall include a reinforced handhole with a hinged handhole cover that shall be padlocked. Padlocks shall be keyed alike and shall be in accordance with the Administration standards.

Contractors and/or fabricators name and logo shall not be placed on the lighting standards. Marked numbers shall appear on surface areas that will not be visible to traffic after erection.

The shaft of high mast lighting structures shall be made of tapered sections that telescope each other. Shaft diameters and tapers shall be as shown in the Contract Documents.

Telescoping sections shall be forced into place and be thoroughly wedged to produce the required engagement as listed on the Contract Documents. Submit erection plans and procedures to the Engineer for approval prior to installation of the high mast lighting structure on location. Structures shall be installed with all internal wiring, attachments,

and hoist cable assemblies in place and erected in accordance with the manufacturers recommendations. Erect the structures plumb. Check plumb using two transits set 90 degrees apart. Plumbing shall not be done in full sun to avoid deflection from radiant heat. Tolerance for plumb shall be 3 in. per 100 ft. Tighten nuts to secure the structure in place.

The loading, transporting and unloading of all parts shall be conducted to avoid injury and deformation of the metal. Repair areas damaged in transport or erection to the satisfaction of the Engineer. During the erection process, handle all materials carefully and store on platform, skids, or other supports to keep parts off of the ground. The steel shall be kept free and clean from all foreign materials, particularly grease, oil, concrete, chock marks and dirt that may affect the natural oxidation of the steel. All structures shall be treated with care given to any product such that the finished surface remains as prepared in the fabrication shop. Any foreign matter that gets on the surface after galvanizing shall be removed as soon as possible and the soiled areas shall be returned to the conditions as listed above.

Luminaire Head Assembly and Lowering Gear. Provide all zinc coated structural and sheet metal parts meeting the same structural requirements as the shaft. All bolts, nuts, washers, and lock washers shall be stainless steel. All luminaires shall be as stated in Section 806.

The luminaire support frame shall be a steel ring integrally welded together and shall serve as a raceway for electrical wiring to the luminaires. The frame shall be suspended from and held in place by three stainless steel suspension cables of 3/16 in. min diameter. These cables shall be permanently affixed through a weight equalizing spring assembly to a single sustaining raising-lowering winch. The three suspension cables securing the frame shall pass over pulleys of non-corrosive material fitted with permanently lubricated ball bearings, cable guides and cable retainers. The suspension cables, weight equalizing spring assembly, and winch shall be installed within the shaft. A means shall be provided within the shaft to prevent the three suspension cables from fouling the power cable when raising and lowering the luminaire frame. The raising-lowering winch shall be suitable for manual as well as power driven operation.

The downward travel of the lowering ring shall be sufficient to lower the lights to a position 5 ft above the base of the standard. Cushioned bumpers, or similar devices, shall be provided to absorb any shock resulting from contact between the lowering ring and pole during the up and down travel of the ring.

The lowering gear shall include a braking mechanism to prevent the luminaires from lowering without intentional operation of the winch.

Latching Mechanism. Each pole shall be provided with a latching mechanism that shall secure the suspension cables and minimize the stress on the winch cable and winch. The

latching mechanism shall be completely accessible through the access door in the pole base. Additionally, a safety chain shall be provided capable of supporting the full weight of the luminaires and lowering equipment in the event of a failure of the latching mechanism.

Electric Drive Assembly. The electric drive assembly shall be a reversible continuous heavy duty electric drill with a 240 volt universal motor, a torque clutch, a remote control station with a 35 ft long extension cord, and a mounting bracket to firmly hold the drive unit in place when it is engaged with the hoisting winch. The electric drive assembly shall be provided with a socket to fit the 1/2 in. square input shaft of the winch. The drill shall produce the necessary torque to raise and lower the lowering ring with six luminaires through 10 successive cycles with no more than one minute between each cycle and without producing excess heating or overloading of the electric drive assembly.

Provide a remote control for the electric drive assembly that allows the operator to control the raising and lowering of the luminaires while standing clear of the luminaire assembly and pole.

The electric drive assembly shall raise or lower the luminaires at a rate of not less than 10 ft per minute. As part of the electric drive assembly a transformer shall be provided to convert from the operating voltage of the luminaires to 240 volts for the electric drive assembly. The transformer shall have a 10 ft long 3/C, 600 volt, heavy duty portable cable with plug to match the drive unit receptacle in the base of the lighting mast, and a grounded weatherproof receptacle on the load side to supply the drive unit motor. All outlets shall be easily accessible from the access door.

Electric drive assemblies shall be turned over to the Engineer at the completion of construction.

Electrical Equipment for High Mast Lighting Structures.

(a) Terminal boards shall be rated 30 amperes, 600 volts, fabricated from non-tracking materials and equipped with covers. They shall be similar and equal to General Electric Company Type EB-5, Square D Class 9080, Type S or Westinghouse Type TBA.

(b) Plugs and receptacles shall be heavy duty, weather resistant, rated 20 amperes, 480 volts AC, grounded type. Receptacles shall have weatherproof cap and mating plug.

(c) Junction boxes shall be galvanized cast iron with hubs and hinged covers.

Testing. All electrical equipment shall be tested and its operation shall be demonstrated to the Engineer. Upon completion of erection and following the installation of the

luminaires and all electrical components, test the lowering device on each standard in the presence of the Engineer. The test shall consist of two complete operations, conducted on two different days, starting with the unlatching or unlocking, lowering the head assembly to its min height, raising the head assembly back to its installed height, and latching or locking. The test shall be considered satisfactory when 80 percent of the operations require no second attempts to complete any function and the remaining 20 percent of the operations require no more than three attempts to complete any function. Should the equipment fail this test, adjust or modify those components causing the failure and repeat the tests from the beginning.

808.03 CONSTRUCTION.

634 **ADD:** The following after the paragraph 'Perform all fabrication…pole is plumb'

Fabrication, welding and non-destructive testing shall conform to the contract documents and AASHTO Highway Signs, Luminaries and Traffic Signals 4th Edition 2001, unless otherwise specified.

808.04 MEASUREMENT AND PAYMENT.

635 **ADD:** The following after 808.04.04.

808.04.05 High Mast Lighting Structures, Luminaires & Lowering Gear will be measured and paid for at the contract unit price per each light pole furnished and installed. The payment will be full compensation for the high mast lighting pole, the luminaire head assembly and lowering gear, all electrical equipment including internal wiring, luminaires, testing and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

808.04.06 Electric Drive Assemblies will be measured at the contract unit price per each. The payment will be full compensation for electric drill, mounting bracket, transformers, remote controls, testing, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

SECTION 810 — ELECTRICAL CABLE, WIRE AND CONNECTORS

810.03 CONSTRUCTION.

810.03.03 Preassembled Cable Duct.

637 **DELETE:** The second paragraph beginning "After backfilling…or a rubber device." in its entirety.

INSERT: The following.

After backfilling, demonstrate that the conductors move freely within the duct by pulling the conductors out a minimum length of 2 ft. Pulling Tension shall conform to 810.03.02. Then, pull the cable back to its original position and install the cable duct end seals. Completely seal cable duct ends using a waterproof removable sealing compound, a molded plastic device, or a rubber device. After installation of the cable duct end seals, but prior to installing connector kits or splices, perform electrical circuit testing as specified in 820.03.02 (b) and record the results. Record the length of cable, locations of both ends of the cable duct, and the insulation resistance on a form acceptable to the Engineer, and forward the form to the Engineer.

810.04 MEASUREMENT AND PAYMENT.

810.04.01.

ADD: The following after the last sentence in 810.04.01.

Cable end duct seals will not be measured, but their cost will be incidental to the linear foot cost for the duct cable. Preassembled Cable Duct that has not had the required electrical tests performed and reported to the engineer will not be measured or paid for.

CATEGORY 800
TRAFFIC

SECTION 811 — ELECTRICAL HAND HOLES, MANHOLES, PULL AND JUNCTION BOXES

811.02. MATERIALS.

811.02.02 Manholes.

638 **ADD:** The following at the end of the list of materials.

PVC Underdrain	905

811.03 CONSTRUCTION.

811.03.01 Hand Holes and Manholes.

DELETE: The first paragraph "Install hand holes…other sealer as directed"

INSERT: The following.

Install hand holes and manholes flush to drain with the finished grade. Mix, place and test concrete as specified in section 420. Install aggregate or 6 in. PVC drain as required. Outlet the underdrains into drainage structures whenever possible. Outlets that empty into a drainage structure shall be at least 9 in. above the normal flow line in the structure and be constructed of solid smooth wall underdrain outlet pipe. Maintain at least 18 in. of cover over the pipe. Rodent screens are not required when an underdrain outfalls into a drainage structure. When outfalled into a slope or ditch, slope the outlet pipe at least 3 percent. Use solid smooth wall PVC pipe as specified in section 905. Excavate and backfill in accordance with Section 809.03. When installing hand holes and manholes in sidewalks, remove and reinstall the sidewalk to the nearest joint. Fill or patch spaces between conduit and the hand hole and manhole wall with concrete or other sealer as directed.

ADD: The following.

811.03.03 Adjusting Handhole or Manhole to Grade and Replace Frame and Cover. Remove existing handhole or manhole frame and cover. Adjust vertical elevation of concrete or brick handhole or manhole by removing material or installing additional bricks or concrete. Install frame and cover. Mix, place and test concrete as specified in Section 420 to be level with final grade. Install concrete collar.

For locations where handholes or manholes are installed in sidewalk, the handhole shall not create a vertical step of 0.25 in. or greater.

639 **811.04 MEASUREMENT AND PAYMENT**

ADD: The following at the end of the paragraph.

The 6 in. PVC drain shall be measured and paid for at the contract unit price per linear foot. Excavation for the 6 in. PVC drain shall be incidental to the linear foot bid item.

Adjust Handhole or Manhole To Grade and Replace Frame and Cover will be measured and paid for at the Contract unit price per each. The payment will be full compensation for all remove of existing frame and cover, adjusting vertical elevation of existing handhole or manhole, concrete repair of existing handhole or manhole, excavation, aggregate, concrete, concrete collar, frame, cover, bolts, bricks, pipes, backfill, sealer, and for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

CATEGORY 800
TRAFFIC

SECTION 813 — SIGNS

813.02 MATERIALS.

640 **ADD:** The following.

Furnish and install or install vandalism installation date (VID) stickers to the back lower right hand corner of all installed signs. The Administration will supply VID stickers with all Administration supplied signs. Supply VID stickers with all non-Administration supplied signs.

813.03 CONSTRUCTION.

ADD: The following after the third paragraph.

Use the following minimum thickness for fabricated sheet aluminum signs.

Longest Dimension of Sheet Sign in.	**Minimum Thickness in.**
≤ 12	0.040
12+ to 24	0.063
24+ to 36	0.080
36+ to 48	0.100
> 48	0.125

Install sheeting in accordance with manufacturer's recommendations. Repair/replace defects in workmanship per manufacturer's recommendation.

813.04 MEASUREMENT AND PAYMENT.

641 **ADD:** The following after 813.04.03.

813.04.04. Furnish and Install or Install Vandalism Installation Date stickers will not be measured, but the cost will be incidental to the Contract unit price for furnishing and installing the signs.

CATEGORY 800
TRAFFIC

SECTION 822 — REMOVE AND RELOCATE EXISTING SIGNS AND SIGN STRUCTURES

650 **DELETE:** 822.04.02 in its entirety

INSERT: The following.

822.04.02 Remove Signs from Existing Overhead Structure will be measured and paid for at the Contract unit price per square foot area of the sign. Removal of sign and sign luminaire supports, luminaires, catwalks, sign lighting maintenance system, conduit and cable will not be measured but the cost will be incidental to the Contract unit price for removing the signs.

CATEGORY 900
MATERIALS

GEOSYNTHETIC REINFORCEMENT FOR REINFORCED SOIL SLOPE

GEOSYNTHETIC REINFORCEMENT. Geosynthetic material for the Reinforced Soil Slopes (RSS) shall be a geotextile or geogrid. The material shall be manufactured from high strength polypropylene (PP), high density polyethylene (HDPE), or high tenacity polyester (PET). The material shall have a high resistance to damage during construction, to ultraviolet (UV) degradation, and to all forms of chemical and biological degradation. The Geosynthetic Reinforcement used for the RSS shall be in conformance with the design and construction requirements specified and the minimum properties listed below.

GEOTEXTILE. Geotextile may be woven or nonwoven, possess a high tensile strength, shall meet the following requirements:

Geotextile Property	ASTM Test Method	Minimum Geotextile Property requirements
Tensile Strength	D 4595	-
Seam Strength	D 4884	-
Puncture Resistance	D 6241	-
Ultraviolet(UV) Radiation Stability	D 4355	70% (for polypropylene and polyethylene) and 50% (for polyester) strength retained min. after 500 hours in a xenon arc device
Apparent Opening Size (AOS)	D 4751	-
Water Permittivity	D 4491	-

GEOGRID. Geogrid shall be a regular network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with surrounding soil or rock. The geogrid structure shall be dimensionally stable and able to retain its geometry under construction stresses. The long chain polymers in the geogrid tensile elements not including coatings shall consist at least 95% by mass of the material of polyolefins or polyesters. The material shall be free from defects, cuts and tears. An allowable tensile strength of 3000 lbs/ft for the geogrid is required.

The summation of the geogrid joint strengths determined in accordance with Geosynthetic Research Institute test method GRI: GG2 occurring in a 12 inch length of grid in the direction of loading (perpendicular to the RSS face) shall be greater than or equal to the ultimate strength (T_{ult}) of the grid element to which they are attached. For this determination, T_{ult} is to be

determined using Geosynthetic Research Institute test method GRI: GG1. If the joint spacing is greater than or equal to 12 inches, two joints shall be included in this summation of joint strengths.

GEOSYNTHETIC TESTING: In addition to the tests specified above, the following tests shall be used where applicable.

Geoynthetic property	Geosynthetic type	Type of Testing	Remark
Ultimate tensile strength, T_{ult}	Geotextile	ASTM D 4595	Ultimate strength values based upon Minimum Average Roll Values (MARV) determined in conformance with D 4759
	Geogrid	GRI: GG1	-
Creep Testing	Geotextile	ASTM D 5262	Test conducted for a minimum duration of 10,000 hours
	Geogrid		
Joints, Seam, and Connections	Geotextile	ASTM D 4884	-
	Geogrid	GRI: GG2	
Pullout Resistance	Geotextile	GRI – GT7	Pullout resistance of the geosynthetic defined by the lower value of: **(a)** the ultimate tensile load required to generate outward sliding of the reinforcement through the soil mass; or **(b)** the tensile load which produces a 1.5 inch displacement.
	Geogrid	GRI - GG5	
Ultraviolet(UV) Radiation Stability	Geotextile	D 4355	-
	Geogrid		

DETERMINATION OF ALLOWABLE TENSILE STRENGTH

Allowable Tensile Strength. Allowable tensile strength (Ta) of the geosynthetic shall be determined using partial factors of safety approach. The Allowable Tensile Strength shall be determined using the following formula:

$$T_a = T_{ult} / (FS_{CR} \times FS_{ID} \times FS_{CD} \times FS_{BD} \times FS_{JNT})$$

Where:

T_a = Allowable tensile strength,(plf)
T_{ult} = Ultimate tensile strength, (plf)
FS_{CR} = Partial factor of safety for creep deformation, (dimensionless);
FS_{ID} = Partial factor of safety for installation damage, (dimensionless);
FS_{CD} = Partial factor of safety for chemical degradation, (dimensionless);
FS_{BD} = Partial factor of safety for biological degradation, (dimensionless);
FS_{JNT} = partial factor of safety for joints (Seams and connection), (dimensionless).

Partial factors of safety shall be developed from the test results provided with the geosynthetic material certification. The following limitations shall also apply:

Creep. The partial factor of safety for creep shall be based on actual testing. The use of a default value for the partial factor of safety for creep shall not be allowed unless approved by the Engineer.

Durability. The combined chemical and biological durability factor used in design shall not be less than 1.2. Polymer and filler and additives used for geosynthetic shall not be susceptible to biological degradation by micro organisms such as fungi.

Joints, Seams, and Connections. The value of FS_{JNT} shall be the ratio of the unjointed specimen strength to the jointed specimen strength.

Partial Factor of Safety Values. The partial factors of safety values below shall be used as default factors for the computation of allowable tensile strength, as determined.

INSTALLATION DAMAGE	CREEP	CHEMICAL DEGRADATION	BIOLOGICAL DEGRADATION	JOINT/SEAM DAMAGE
3.0	5.0	2.0	1.3	2.0

CERTIFICATION. Provide certification in conformance with TC 1.03 that the geosynthetic reinforcement material conforms or exceeds the material properties specified and the construction and design requirements specified. The Contractor may be required to supply test data from an Administration-approved laboratory to support the certified values submitted.

The certification package shall conform to TC 1.02 and include the following:

(a) Polymer and additive composition of the geosynthetic, including polymer and additive composition of any coating materials.

(b) Practical applications of material use with descriptions and photos.

omtsp 05-03-2016

(c) Limitations of the material.

(d) Sample long-term design strength and interaction values, and index property specifications including coating thickness if applicable.

(e) Manufacturer's Quality Control plan including properties, test methods, frequency of testing, tolerances and method of resolution for out-of-specification material.

(f) The details of the secondary reinforcement, including material type, spacing, properties, and construction details.

(g) Local supplier.

(h) Laboratory test results shall document the following:

i. Creep performance over a range of load levels, for minimum duration of 10 000 hours. Along with comprehensive literature review, documenting extrapolation of creep data to a 75 year design life.

ii. A literature review documenting values for partial factor of safety for installation damage and extrapolation techniques and chemical resistance of all material components of the geosynthetic and values for partial factor of safety for chemical degradation. Along with documentation for biological resistance of all material components of the geosynthetic and values for partial factor of safety for biological degradation.

iii. The ultimate strength and supporting laboratory testing data.

iv. Joint (seam and connections) strength values for partial factor of safety for joints and seams, along with documentation showing long-term pullout interaction coefficients for various soil types or project specific soils.

v. Direct sliding coefficients for various soil types or project site specific soils.

vi. The apparent opening size for geosynthetic reinforcement.

CATEGORY 900
MATERIALS

655 **ADD:** The following after the last paragraph of 900.02 TECHNICIAN QUALIFICATION REQUIREMENTS.

900.03 RECYCLED MATERIALS.

900.03.01 CERTIFICATION. All recycled or rehandled material furnished or supplied for use may require testing and certification to ensure compliance with all State and local applicable environmental and EPA regulations. The required testing may include, but not be limited to, the EPA Toxicity Characteristic Leaching Procedure (TCLP) or its successor. Provide testing and certification for all recycled materials at no additional cost to the Administration. Evaluation and interpretation of the test data will be made by an OMT Quality Assurance Manager. The above requirements do not preclude the normal materials acceptance process, and the recycled material shall meet all applicable specifications. EPA regulations governing the use of the material, certified test results, and material safety data sheets shall accompany the source of supply letter and sample submitted for approval.

Only highway demolition materials are to be used in constructing RC stockpiles for Administration projects. The use of building materials is prohibited.

Refer to the Contract Documents for recycled materials not covered by this specification.

900.03.02 RECLAIMED/RECYCLED CONCRETE (RC).

Usage. Use RC for the following with written approval.

(a) Graded Aggregate Base (GAB).

(b) Common, Select, or Modified Borrow.

(1) At least 2 ft above saturated soil or groundwater conditions, as determined.

(2) At least 100 ft from surface waters (streams, creeks, or rivers, ponds and lakes),

(3) At least 3 ft from exposed metal surfaces, and,

(4) At least 3 ft from geotextile.

(5) At least 3 ft from any water discharge locations.

Do not use RC as Capping Borrow nor as aggregate for the following.

(a) Portland cement concrete.

(b) Hot mix asphalt.

(c) Drainage systems.

(d) Mechanically stabilized earth (MSE) systems.

(1) MSE walls.

(2) Reinforced soil slopes (RSS).

(3) Reinforced earth slopes (RES).

(e) In embankment construction as follows.

Within 1.5 ft of the top surface of any area to be vegetated.

(1) Within 2 ft of saturated soil or groundwater conditions, as determined.

(2) Within 100 ft of any surface water course (streams, creeks, or rivers, ponds and lakes).

(3) Within 3 ft of any metal pipe or shoring.

(4) Within 3 ft of any water discharge locations.

(5) Under permeable or porous surfaces.

Grading Requirements. The grading requirements for the use of RC.

(a) Table 901 A when used as GAB or for any other application within the pavement structure.

(b) 204.02 when used in embankment construction.

(c) 916.01 when used as Borrow material.

RC shall not contain more than 5 percent brick and hot mixed asphalt material by mass except when used as Common Borrow.

pH Requirements. RC pH shall be less than 12.4 for all applications. RC usage shall not cause any outfall and infiltration water leaving the site to exceed a pH of 8.5. Acid sulfate, sulfur or any other environmentally safe organic material may also be used to control the pH.

pH Testing.

(a) Plant: The producer is required to test pH at the plant per T 289 every 1,000 tons shipped or once a day, whichever yields the greater frequency. Plant pH testing shall be recorded as specified and a history shall be kept at the producer's laboratory. The producer may be required to present TCLP and any other tests conducted by an independent laboratory as directed.

The Administration reserves the right to test the producer's RC at the plant for pH. Material delivery may be terminated if the test results repeatedly meet or exceed a pH of 12.4. In case of high pH the producer is require to use shorter stock pile by spreading the material at around the plant or mixing the RC-GAB with the natural GAB to reduce the pH issue.

(b) Construction Site: The OMT representatives will perform QA testing to monitor, test, for the pH levels for any discharge associated with RC placement as directed. This includes monitoring and testing during periods of precipitation or dampness. In cases of high pH, the producer shall provide a reduction control plan for the pH.

Quality Control. The producer shall submit a Quality Control Plan and obtain approval prior to production. The plan shall include, but not be limited to, the operational techniques and procedures proposed to produce the RC product. Quality control includes the sampling, testing and data recording performed to validate the quality of the product during production operations.

Quality Assurance. OMT Quality Assurance personnel will perform quality assurance inspection, sampling, and testing at the RC plant and construction site. Additional inspection, testing and compaction control will be performed by the Project Engineer.

900.03.03 RECYCLED ASPHALT PAVEMENT (RAP).

Usage. Use RAP for Common, Select, Capping, or Modified Borrow.

Do not use RAP as aggregate for the following.

(a) Graded Aggregate Base (GAB).

(b) Portland cement concrete.

(c) Drainage systems.

(d) Embankment construction.

(1) Within 1 ft of the top surface of any area to be vegetated.

Refer to MSMT 412 and M 323 for the use of RAP in hot mix asphalt mixes.

Grading Requirements. The grading requirements for the use of RAP.

(a) 204.02 when used in embankment construction,

(b) 916.01 when used as Borrow material,

(c) 901.02.01 when used as riprap.

Quality Control. Create a captive stockpile for storing the RAP prior to use. Create a new captive stockpile and take new acceptance samples for gradation approval whenever the source of the RAP changes.

Quality Assurance. OMT Quality Assurance personnel will sample and test the RAP stockpiles to ensure that they meet the above gradation requirements. The completed test results will be reviewed by the OMT Soils and Aggregate Division for approval.

Construction of Control Test Strip. The location, equipment, and methods used to construct the control test strip shall be as directed; prior to approval. The equipment and methods used to construct the control test strip shall be the same as those used in subsequent construction. Place and test the control test strip when the RAP is 32°F or higher to establish the maximum density. RAP is temperature sensitive, which may affect the density.

Construct the control test strip that shall be at least 100 ft long, 12 ft wide and a maximum compacted lift thickness of 6 in. Prepare the subgrade for the control test strip in accordance with 204.03.07. Do not construct the control strip, or perform any subsequent construction, on frozen subgrade.

Compact the RAP for the control test strip with one pass of the roller. Measure the density after one pass with a nuclear density gauge (backscatter method) at the frequency for capping material at five random locations distributed across the length and width of the control test strip, as directed. Record the measurements and mark the locations for future reference.

Compact the RAP for the control test strip with a second pass of the roller. Measure and record the density again at the exact locations previously tested and as described above. Prepare a plot of density versus the number of roller passes. Continue this process until the maximum dry density of the control strip is established.

There should be no drop in average density during construction of the control test strip for each lift. A drop in the average density of greater than 2 pcf during construction of the control test strip is an indication that the material is not properly compacting, and a new test strip shall be constructed.

The Project Engineer may require the Contractor to cut into the control test strip for visual inspection. All material, labor, equipment, tools, and incidentals necessary to provide an approved control test strip shall be at no additional cost to the Administration.

Compaction Control. Use the roller pattern and number of passes determined from the construction of the test strip to compact the RAP for production placement. The density of the RAP compacted for production work shall be at least 97 percent of the maximum density obtained from the control test strip. Recheck the density of the production work if it is less than 97 percent of the maximum density obtained from the control test strip. Construct a new control test strip if the second density does not meet the 97 percent requirement. Construct a new control test strip if the measured density of the compacted RAP for production work exceeds 105 percent.

Establish one rolling pattern to achieve maximum density for each use based on the control test strips. Samples or results produced prior to the construction of any new stockpiles will not be considered**.**

CATEGORY 900
MATERIALS

SECTION 901 — AGGREGATES

655 **DELETE: 901.01 -** Tables 901 A, 901 B, 901 C, and 901 D in their entirety.

INSERT: The following.

TABLE 901 A
AGGREGATE GRADING REQUIREMENTS
TEST METHOD T 27

MATERIAL		SIEVE SIZE															
		2-1/2"	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 10	No. 16	No. 30	No. 40	No. 50	No. 100	No. 200
		63 mm	50 mm	37.5 mm	25 mm	19 mm	12.5 mm	9.5 mm	4.75 mm	2.36 mm	2.0 mm	1.18 mm	600 µm	425 µm	300 µm	150 µm	75 µm
CRUSHER RUN AGGREGATE CR -6 (f)(g)		—	100	90–100	—	60–90	—	—	30–60	—	—	—	—	—	—	—	0–15
BANK RUN GRAVEL — SUBBASE		100	—	—	90–100	—	60–100	—	—	—	35–90	—	—	20–55	—	—	5–25
GRADED AGGREGATE — BASE DESIGN RANGE (a)		—	100	95–100	—	70–92	—	50–70	35–55	—	—	—	12–25	—	—	—	0–8
TOLERANCE (b)		—	–2	±5	—	±8	—	±8	±8	—	—	—	±5	—	—	—	±3(c)
BANK RUN GRAVEL — BASE		100	—	—	85–100	—	60–100	—	—	—	35–75	—	—	20–50	—	—	3–20
COARSE AGGREGATE - PORTLAND CEMENT CONCRETE	57 and UNDERDRAIN (h)	—	—	100	95–100	—	25–60	—	0–10	0–5	—	—	—	—	—	—	—
	67	—	—	—	100	90–100	—	20–55	0–10	0–5	—	—	—	—	—	—	—
	7	—	—	—	—	100	90–100	40–70	0–15	0–5	—	—	—	—	—	—	—
FINE AGGREGATE — PORTLAND CEMENT CONCRETE, UNDERDRAIN, and PNEUMATIC MORTAR (d)		—	—	—	—	—	—	100	95–100	—	—	45–85	—	—	5–30	0–10	—
COARSE AGGREGATE — LIGHTWEIGHT PORTLAND CEMENT CONCRETE		—	—	—	100	90–100	—	10–50	0–15	—	—	—	—	—	—	—	—
FINE AGGREGATE — LIGHTWEIGHT PORTLAND CEMENT CONCRETE (d)		—	—	—	—	—	—	100	85–100	—	—	40–80	—	—	10–35	5–25	—
FINE AGGREGATE/SAND MORTAR and EPOXIES (d)		—	—	—	—	—	—	—	100	95–100	—	—	—	—	—	0–25	0–10
MINERAL FILLER		—	—	—	—	—	—	—	—	—	—	—	100	—	95–100	—	70–100

(a) To establish target values for design.
(b) Production tolerance.
(c) ±2 for field grading (omitting T 11).
(d) Fine aggregate includes natural or manufactured sand.
(e) Crushed glass shall not contain more than one percent contaminants by weight.
(f) Not to be used in the structural part of any Administration project.
(g) Recycled asphalt pavement may be used as a component not to exceed 15 percent and is not subject to aggregate physical property requirements in TABLE 901 B.
(h) Recycled concrete is prohibited in drainage applications.

TABLE 901 B

AGGREGATE PHYSICAL PROPERTY REQUIREMENTS

MATERIAL	TEST METHOD				
	SPECIFICATION	T 90	T 11	T 96	T 104
		PI	MATERIAL FINER THAN No. 200 SIEVE	LOS ANGELES ABRASION	SODIUM SULFATE SOUNDNESS
		max	% max	% max	% max
CRUSHER RUN AGGREGATE CR-6	D 1241(a)	6	—	50	—
BANK RUN GRAVEL — SUBBASE	D 1241	6	—	50	—
GRADED AGGREGATE — BASE	D 1241	6	—	50	—
BANK RUN GRAVEL — BASE	D 1241	6	—	50	—
COARSE AGGREGATE — PCC (b)	M 80 CLASS A	—	1.0(c)	50	12
FINE AGGREGATE — PCC (b)(d)	M 6 CLASS B	—	4.0(e)	—	10
COARSE AGGREGATE — LIGHTWEIGHT PCC	M 195	—	—	—	—
FINE AGGREGATE — LIGHTWEIGHT PCC (f)	M 195	—	—	—	—
FINE AGGREGATE/SAND MORTAR and EPOXIES	M 45	—	—	—	10
MINERAL FILLER (g)	M 17	4	—	—	—
GLASS CULLET (h)	M 318	—	—	—	—

(a) Other approved inert materials of similar characteristics may be used provided they meet these provisions. For crushed reclaimed concrete, the soundness loss shall not exceed 18 percent after magnesium sulfate testing as specified in T 104.
(b) Test coarse and fine aggregate for PCC for alkali silica reactivity (ASR) per MSMT 212.
(c) 1.5 if material passing No. 200 sieve is dust of fracture, free of clay or shale.
(d) In areas exposed to traffic, manufactured sand shall have a minimum ultimate Dynamic Friction Value (DFV) of 40, based on the parent rock.
(e) 5.0 for concrete not subject to surface abrasion.
(f) Fine aggregate meeting M 6 may be used if the lightweight concrete does not exceed the maximum unit weight specified in the Contract Documents.
(g) Fly ash shall not exceed 12 percent loss on ignition.
(h) For use as a granular road base material. Not intended for use in locations where surfacing will not be placed over the base.

TABLE 901 C

ASPHALT MIXES

AGGREGATE GRADING REQUIREMENTS, % PASSING FOR MIX DESIGN

TEST METHOD T 27

MATERIAL		SIEVE SIZE									
		3/4in.	1/2in.	3/8in.	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
		19.0 mm	12.5 mm	9.5 mm	4.75 mm	2.36 mm	1.18 mm	600 µm	300 µm	150 µm	75 µm
GAP GRADED STONE MATRIX ASPHALT MIX - 9.5mm		100	100	75–90	30–50	20–30	—	—	—	—	8–13
GAP GRADED STONE MATRIX ASPHALT MIX - 12.5mm		100	90–99	70–85	28–40	18–30	—	—	—	—	8–11
GAP GRADED STONE MATRIX ASPHALT MIX - 19.0mm		100	82–88	60 max	22–30	14–20	—	—	—	—	9–11
OPEN GRADED FRICTION COURSE – 9.5mm (a)		—	100	85–100	20–40	5–10	—	—	—	—	2–4
OPEN GRADED FRICTION COURSE – 12.5 mm (a)		100	85–100	55–75	15–25	5–10	—	—	—	—	2–4
OPEN GRADED FRICTION COURSE – 12.5mm (b)		100	80–100	35–60	10–25	5–10	—	—	—	—	1–4
SLURRY SEAL (SS) AND MICRO -SURFACING (MS)	TYPE II	—	—	100	90–100	65–90	45–70	30–50	18–30	10–21	5–15
	TYPE III	—	—	100	70–95	45–70	28–50	19–34	12–25	7–18	5–15
CHIP SEAL SURFACE TREATMENT	7	100	90–100	40–70	0–15	0–5	—	—	—	—	—
	8	—	100	85–100	10–30	0–10	0–5	—	—	—	—

(a) Less than Design Level 4 (ESAL)
(b) Porous European Mix (PEM) – Design Level 4 (ESAL)

TABLE 901 D

AGGREGATE PHYSICAL PROPERTY REQUIREMENTS FOR ASPHALT MIXES

MATERIAL	SPECIFICATION	TEST METHOD					
		T 11	T 96	T 104	D 4791	MSMT 216	T 279
		MATERIAL FINER THAN No. 200 SIEVE	LOS ANGELES ABRASION (LA)	SODIUM SULFATE SOUNDNESS	FLAT and ELONGATED (a)	DYNAMIC FRICTION VALUE (DFV) (b) (c)	BRITISH PENDULUM NUMBER (BPN) (c)
		% max	% max	% max	% max	min	min
SURFACE COURSE 4.75mm, 9.5mm, 12.5mm, and 19.0mm	M323	—	45	12	10	25	—
SURFACE COURSE — HIGH DFV 4.75mm, 9.5mm, 12.5mm, and 19.0mm	M323	—	45	12	10	40 (e)	—
BASE COURSE 19.0mm, 25.0mm and 37.5mm	M323	—	45	12	10	—	—
GAP GRADED STONE MATRIX ASPHALT 9.5mm, 12.5mm, and 19.0mm	M323	—	30	12	20/5 (g)	40 (e)	—
OPEN GRADED FRICTION COURSE 9.5 mm, 12.5 mm, 12.5 mm PEM (h)	MSMT 409	0.5	30	12	20/5 (g)	40 (e)	—
SLURRY SEAL (SS) and MICRO-SURFACING (MS)	—	—	—	12	—	40 (f)	30
CHIP SEAL SURFACE TREATMENT	M 80, CLASS A	1.0 (d)	45	—	—	—	—

(a) Testing for flat and elongated particles shall be conducted on the blended aggregates. Dimensional ratio of calipers shall be 5:1.
(b) The minimum Dynamic Friction Value (DFV) shall be based on a single aggregate source or a blend of aggregates used. Determine proportions of blended aggregates using MSMT 416.
(c) DFV and British Pendulum Number (BPN) determined on parent rock. Reclaimed asphalt pavement (RAP) shall have a DFV of 30.0.
(d) 1.0 for samples taken at the point of production. Samples taken at any point after shipment shall have no more than 1.5 percent finer than 0.075 mm sieve.
(e) Carbonate rock shall have a minimum of 25 percent insoluble residue retained on the 0.075 mm sieve.
(f) No blending allowed.
(g) Testing conducted on particles retained on the 4.75 mm sieve. . Dimensional ratio of calipers shall be 3:1/5:1.
(h) Porous European Mix

CATEGORY 900
MATERIALS

SECTION 901 — AGGREGATES

664 **DELETE: 901.05 STONE FOR GABIONS** in its entirety.

INSERT: The following.

901.05 STONE FOR GABIONS. Meet the quality requirements specified in 901.03 except the loss by sodium sulfate shall not be greater than 12 percent:

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

*Size of pieces will be determined visually.

CATEGORY 900
MATERIALS

665 **DELETE:** SECTION 902 — PORTLAND CEMENT CONCRETE AND RELATED PRODUCTS in its entirety.

INSERT: The following.

SECTION 902 — PORTLAND CEMENT CONCRETE AND RELATED PRODUCTS

902.01 STORAGE. Storage of materials shall conform to the Contract Documents and as directed by the Engineer.

902.02 CERTIFICATION OF PORTLAND CEMENT AND BLENDED HYDRAULIC CEMENT. The manufacturer shall furnish certification as specified in TC-1.03. The certification shall also include:

(a) The mill shall report its quality control procedures, and submit a new report whenever there is a procedural change.

(b) The mill's control laboratory shall be inspected by the Cement and Concrete Reference Laboratory of the National Institute of Standards and Technology on their regularly scheduled visits. The Engineer shall be provided with copies of the reports of these inspections along with an account of the action taken to correct cited deficiencies.

(c) Records of data accumulated by the quality control procedures shall be produced upon request.

(d) A certified document shall accompany each shipment stating that the contents conform to all applicable requirements. Additionally, the document shall show the producer's name, mill location, carrier number, date loaded, weight contained in carrier, silo number, consignee, destination, Contract number, and type of cement. The signature and title of the signer shall be shown on the document.

(e) The mill shall, upon request, supply certified chemical and physical test values that can be associated with any sample representing cement drawn from a particular silo on a given date.

(f) Acceptance of cement by certification will be terminated if test results differ from mill results by more than the precision limits given in the test method. The acceptance procedure will then revert to storage testing and approval prior to shipment.

902.03 HYDRAULIC CEMENT.

902.03.01 Portland Cement. M 85, with the fineness and the time of setting determined using T 153 and T 131, respectively.

902.03.02 Ground Iron Blast Furnace Slag. M 302, Grade 100 or 120. The Contractor may request to substitute a maximum of 50 percent of the weight of cement with ground iron blast furnace slag. When ground iron blast furnace slag is used, the minimum cement factor and water/cement ratio will be determined on the basis of the combined weight of the portland cement and ground iron blast furnace slag. When ground iron blast furnace slag is used to control alkali silica reactivity, see Table 902 B for percentage.

902.04 BLENDED HYDRAULIC CEMENT. M 240, Type I (PM) or a Type IP containing 15 to 25 percent pozzolan by weight of cement. Maximum loss on ignition is 3.0 percent. Do not use ground iron blast furnace slag for blending. The requirement for a manufacturer's written statement of the chemical composition is waived.

902.05 MASONRY CEMENT. C 91, except the water retention and staining tests are waived.

902.06 CONCRETE ADMIXTURES. Do not use concrete admixtures that contribute more than 200 ppm of chlorides based on the cement content when tested per MSMT 610. Use only prequalified admixtures.

Do not use pozzolan and Type I (PM) or Type IP cement in the same mix. Since the strength gains are delayed with these materials, a longer period of time may be required for curing and form removal.

902.06.01 Air Entraining Admixtures. M 154.

902.06.02 Chemical Admixtures. M 194, Type A, D, or nonchloride C.

902.06.03 High Range Water Reducing Admixtures. M 194, except that it shall be a liquid, the water content shall be a maximum of 85 percent of that of the control, and the durability factor shall be a minimum of 90. Use Type F for early strength, which shall produce a minimum compressive strength in 12 hours of 180 percent of that of the control. Use Type G when early strength is not specified. The manufacturer shall furnish certification as specified in TC-1.03. The certification shall include curves indicating the fluid ounces of admixture per 100 lb of cement as related to water reduction and strength gain for 12 hours when used with a minimum cement factor of 700 lb.

902.06.04 Pozzolans. The use of pozzolans may be requested to control alkali silica reactivity or for other reasons. When a pozzolan is used, determine the minimum cement factor and water/cement ratio on the basis of the combined weight cement and pozzolan. See Table 902 B for percentage of fly ash, and microsilica.

(a) Fly Ash. M 295, pozzolan Class C or F, except that the maximum permissible moisture content shall be 1.0 percent, and when used in concrete Mix Nos. 3 and 6 the maximum loss on ignition 3.0 percent.

(b) Microsilica. C 1240, except that the oversize requirement is waived.

902.06.05 Corrosion Inhibitors. Corrosion inhibitors shall be calcium nitrite based and contain a minimum of 30 percent active ingredients by mass. The gallonage of corrosion inhibitor used in the concrete mixture shall be included as water when determining the water/cementitious materials ratio.

902.07 PORTLAND CEMENT CONCRETE CURING MATERIALS. Use burlap cloth, sheet materials, liquid membrane forming compounds, or cotton mats.

902.07.01 Burlap. M 182, Class 1, 2, or 3.

902.07.02 Sheet Materials. M 171 with the following exceptions:

(a) White Opaque Burlap Polyethylene Sheeting. Tensile strength and elongation requirements are waived. Use sheeting having a finished product weight of not less than 10 oz/yd^2.

(b) White Opaque Polyethylene Backed Nonwoven Fabric. 902.07.02(a), with the thickness requirement waived. Use material having a finished product weight of not less than 5 oz/yd^2.

(c) White Opaque Polyethylene Film. Tensile strength and elongation requirements are waived.

902.07.03 Liquid Membrane. C309. Field control testing of the white pigmented curing compounds is on the basis of weight per gallon. The samples shall not deviate more than ± 0.3 lb/gal from the original source sample.

902.07.04 Cotton Mats. Cotton mats consist of a filling material of cotton bats or bats covered with unsized cloth and tufted or stitched to maintain the shape and stability of the unit under job conditions of handling.

Use coverings of either cotton cloth, burlap or jute having the following properties:

(a) Cotton cloth covering shall weigh not less than 6.0 oz/yd^2 and have an average of not less than 32 threads/in. of warp and not less than 28 threads/in. of filling. Use raw cotton, cotton comber waste, cotton card strip waste, or combinations thereof as the raw material used in the manufacture of the cotton cloth.

(b) Burlap or jute covering for cotton mats shall weigh not less than 6.4 oz/yd^2 and shall have not less than of 8 threads/in. of warp and not less than 8 threads/in. of filling. Use the grade known commercially as "firsts" and they shall be free from avoidable imperfections in manufacture and from defects or blemishes affecting the serviceability.

Use a cotton bat, or bats made of raw cotton, cotton waste, cotton linters, or combinations thereof, as the filling material for the mats. Mats shall weigh not less than 12 oz/yd^2.

902.08 FORM RELEASE COMPOUNDS. Use form release compounds that effectively prevent the bond of the concrete to the forms. Form release compounds shall not cause discoloration of the concrete or adversely affect the quality or rate of hardening at the interface of the forms.

The flash point of the form release compound shall not be less than 100 F when tested per T 73.

902.09 PARAFFIN WAX. Use clear paraffin wax for use as a bond breaker for concrete. The flash point shall not be less than 380 F when tested under D 92.

902.10 PORTLAND CEMENT CONCRETE. Section 915 and as specified herein.

902.10.01 Proportioning. Prior to the start of construction, submit to the AME the source and proportions of materials to be used for each concrete mix. The mixture shall meet 902.10.03.

The concrete, with the exception of water and chemical admixtures, shall be proportioned by weight. Water and chemical admixtures may be proportioned by volume or weight. The mix shall be uniform and workable.

902.10.02 Materials.

Coarse Aggregate	901.01
Fine Aggregate	901.01
Cement	902.03 and 902.04
Concrete Admixtures	902.06
Synthetic Fibers	902.15
Water	921.01

902.10.03 Portland Cement Concrete Mixtures.

The concrete mixes shall conform to the following:

TABLE 902 A

PORTLAND CEMENT CONCRETE MIXTURES									
MIX NO.	28 DAY SPECIFIED COMPRESSIVE STRENGTH psi	STANDARD DEVIATION psi	CRITICAL VALUE psi	MIN CEMENT FACTOR lb/yd^3	COARSE AGGREGATE SIZE M 43 / M 195	MAX WATER/ CEMENT RATIO by wt	SLUMP RANGE in.	TOTAL AIR CONTENT %	CONCRETE TEMPERATURE F
1	2500	375	2430	455	57, 67	0.55	2 — 5	5 — 8	70 ± 20
2	3000	450	3010	530	57, 67	0.50	2 — 5	5 — 8	70 ± 20
3	3500	525	3600	580	57, 67	0.50	2 — 5	5 — 8	70 ± 20
4	3500	525	3600	615	57, 67	0.55	4 — 8	N/A	70 ± 20
5	3500	525	3600	580	7	0.50	2 — 5	5 — 8	70 ± 20
6	4500	675	4770	615	57, 67	0.45	2 — 5	5 — 8	65 ± 15
7	4200	630	4420	580	57	0.50	1½ — 3	5 — 8	70 ± 20
8	4000	600	4180	750	7	0.42	2 — 5	5 — 8	65 ± 15
9	3000 (a)	N/A	N/A	800	57, 67	0.45	4 — 8	5 — 8	70 ± 20
10	4500	675	4770	700	¾" – No. 4	0.45	2 — 5	6 — 9	65 ± 15
11	4200	630	4420	—	57, 67	0.45	2 — 5	5 — 8	65 ± 15
12	4200	630	4420	—	¾" – No. 4	0.45	2 — 5	6 — 9	65 ± 15

Note 1: When concrete is exposed to water exceeding 15,000 ppm sodium chloride content, Type II cement shall be used. In lieu ofType II cement, a Type I cement may be used in combined form with an amount of up to 50 percent replacement with ground iron blast furnace slag, or an amount of up to 25 percent replacement with Class F fly ash. The Contractor shall submit to the Engineer the proposed mix proportions and satisfactory test results per C 1012 showing a sulfate resistance expansion not exceeding 0.10 percent at 180 days

Note 2: The temperature of Mix No. 6 when used for other than superstructure work as defined in TC-1.03 shall be 70 ± 20 F.

Note 3: Type A or D admixture shall be added to bridge, box culvert, and retaining wall concrete.

Note 4: Nonchloride Type C admixtures may be used when approved by the Engineer.

Note 5: Other Slump Requirements:
When a high range water reducing admixture Type F or Type G is specified, the slump shall be 4 to 8 in.
When synthetic fibers are specified, the slump shall be 5 in. maximum.
When concrete is to be placed by the slip form method, the slump shall be 2-1/2 in. maximum.
When the absorption of the coarse aggregate is greater than 10 percent, the slump shall be 3 in. maximum.

Note 6: Mix 9 shall contain a Type F high range water reducing admixture.

Note 7: Mix 10 and 12 shall be proportioned as specified in 211.2 of the ACI's Recommended Practices for Selection Proportions for. Structural Lightweight Concrete. The maximum average Density of Cured Concrete shall be 118 lb/ft^3. Control testing for Density of Cured Concrete shall be two companion cylinders for each 100 yd^3, or fraction thereof, as specified in M 195.

Note 8: Mix 11 and 12 shall also conform to all requirements as specified in Table 902 C.

(a) Acceptance will be based on a minimum compressive strength of 3000 psi in 24 hours. Design approval will be given based on trial batch obtaining a minimum compressive strength of 2500 psi in 12 hours. Testing shall conform to 902.10.08 except that cylinders shall remain in the molds until tests are conducted.

Coarse and fine aggregate having an expansion up to 0.10 percent when tested for alkali silica reactivity (ASR) MSMT 212 may be used without restriction. Aggregates having an expansion greater than 0.10 but less than 0.35 percent are considered reactive and may only be used when one of the options in table 902 B are employed. Those having an expansion of 0.35 percent and greater are prohibited.

TABLE 902 B

OPTION	ALKALI CONTENT OF CEMENT % max	REPLACE CEMENT WITH		SPECIFICATION
		MATERIAL	% BY WEIGHT	
1	1.50	Class F Fly Ash	15 – 25	M 295
2	1.50	Ground Iron Blast Furnace Slag	25 – 50	M 302 Grade 100 or 120
3	1.50	Microsilica	5 – 7	C 1240
4	—	Blended Cement (a)	100	M 240
5	0.60 (b)	Low Alkali Cement	100	M 85

(a) Pozzolan content of 15 – 25 percent by weight of cement
(b) For mix 9 used for Portland cement concrete pavement repairs; the maximum allowable percentage of alkalies in Portland cement shall be 0.70.

When reactive aggregate is used, designate which option will be used to control the formation of the ASR gel. If an option other than option 5 in Table 902 B above is chosen, conduct tests per MSMT 212 using the reactive aggregate and the proposed cementitious material. The expansion test results shall not be greater than 0.10 percent. When more than one reactive aggregate is used in a concrete mix, each shall be tested individually and the maximum amount of pozzolan required to reduce the expansion of all the aggregates to 0.10 percent or less shall be used. Submit the aggregate source, test results, and the percent and type of replacement cement to the Engineer. The Engineer may withhold source approval pending verification testing.

TABLE 902 C

MIX PHYSICAL PROPERTIES		
TEST PROPERTY	**TEST METHOD**	**SPECIFICATION LIMITS**
Minimum Cementitious Materials Factor, lb/yd^3	—	580
Maximum Content of Portland Cement, lb/yd^3	—	550
Water/Cementitious Materials Ratio by Wt.	—	0.45
Corrosion Inhibitor, gal/yd^3	902.06.05	2.0
Synthetic Fibers, lb/yd^3	902.15	1.5
Permeability of Field Concrete, moving average of three tests, coulombs max	T 277 Modified	2500
Permeability of Field Concrete, individual test, coulombs max	T 277 Modified	3000
Shrinkage at 28 days, microstrains	C 157	400

Note 1: Only Type I or II Portland cement shall be used.

Note 2: Mixes shall contain ground iron blast furnace slag, fly ash or microsilica.

Note 3: The water to cement ratio shall be based upon the total water to cementitious materials ratio. The gallonage of the corrosion inhibitor shall be included in the water/cementitious materials ratio.

Note 4: The permeability test value of field concrete shall be the average of two test specimens representing production concrete. Test specimens shall be molded on the project site in 4 x 8 in. molds conforming to M 205. Test specimens shall be handled under same conditions as compressive strength test specimens in conformance with C 31 for the first seven days. When seven days old, they shall be cured in a 100 F water bath for the remainder of the 28 day curing. The 28 day rapid chloride permeability of the specimens will be determined in conformance with T 277. Test for the geometry of test specimens will be waived.

Note 5: Shrinkage tests will be performed on trial mixes only.

Note 6: High range water reducing admixture may be used except the water reducing requirements will be waived.

Note 7: A sealer conforming to 902.12 shall be used on the finished surface.

902.10.04 Trial Batch. A trial batch shall be prepared to certify that each mix meets 902.10.05 and 902.10.06. Approval will be given when the test results meets the minimum required average strength.

Make arrangements with the AME at least two weeks in advance, to have an authorized representative present during the batching and testing. Each trial batch shall consist of at least 3 yd^3 of concrete. Supply all equipment, and labor required to produce the trial batches and conduct the required tests at no additional cost to the Administration.

The AME may waive the requirement for a trial batch when past performance records show that the required average strength requirement has been met.

902.10.05 Design Required Average Strength.

Specified compressive strength, f_c', psi	Required average compressive strength, f_{cr}', psi
$f_c' \leq 5000$	Use the larger value computed from Eq. (A-1) and (A-2) $f_{cr}' = f_c' + 1.34s$ (A-1) $f_{cr}' = f_c' + 2.33s - 500$ (A-2)
Over 5000	Use the larger value computed from Eq. (A-1) and (A-3) $f_{cr}' = f_c' + 1.34s$ (A-1) $f_{cr}' = 0.90 f_c' + 2.33s$ (A-3)

where:

f_c' = the 28 day specified compressive strength.
s = the standard deviation as specified in 902.10.06.

A test is defined as the average strength of two companion cylinders.

902.10.06 Standard Deviation.

(a) When past performance records are available, a standard deviation will be established from documented performance records of the producer consisting of a minimum of 15 consecutive 28 day compressive strength tests obtained within the last 12 months.

The standard deviation will be established as the product of the calculated standard deviation and multiplier.

NUMBER OF TESTS	MULTIPLIER FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03
30 or more	1.00

Interpolate for intermediate number of tests.

(b) When past performance records are not available, the required average strength shall meet to the following:

Specified compressive strength, f_c', psi	Required average compressive strength, f_{cr}', psi
$f_c' < 3000$	$f_{cr}' = f_c' + 1000$
$3000 \leq f_c' \leq 5000$	$f_{cr}' = f_c' + 1200$
$f_c' > 5000$	$f_{cr}' = 1.10 f_c' + 700$

902.10.07 Standard of Control. The average of all sets of three consecutive strength tests shall equal or exceed the critical value as specified in 902.10.03 which shall be computed using the following formula:

Critical Value = fc' + (1.14 X S) – 500

Failure to conform to this criteria shall be cause for immediate investigation and remedial action up to and including suspension of production. A design standard deviation equal to 15 percent of the specified strength shall be used for calculation until a minimum of 15 test results are obtained.

The actual average strength and standard deviation shall be computed upon the availability of 28 day strength data comprising a minimum of 15 tests. Should this determination indicate an excessive margin of safety, the concrete mix may be modified to produce lower average strength as approved by the Engineer. If these calculations indicate a coefficient of variation greater than 15, the quality of the concrete and testing will be evaluated.

902.10.08 Testing. Sampling per T 141. Testing as follows:

TEST	METHOD	MINIMUM TEST FREQUENCY	RESPONSIBILITY
Temperature (e)	T 309	1 per 50 yd^3 (or fraction thereof)	Project Engineer
Slump (a)(e)	T 119	1 per 50 yd^3 (or fraction thereof)	Project Engineer
Air Content (a)(e)	T 152 T 196	1 per 50 yd^3 (or fraction thereof)	Project Engineer
Compression (b)(c)(d)	T 23	1 per 50 yd^3 (or fraction thereof)	Project Engineer
Compression (b)(c)(d) Mix No. 7 Only	T 23	3 per Day	Project Engineer

(a) A second test will be made when the first slump or air content test fails. Acceptance or rejection will be based on the results of the second test.
(b) Compressive strength tests are defined as the average of two companion cylinders.
(c) The Contractor shall be responsible for the making of all early break cylinders and furnishing the molds, stripping, curing/delivery of all cylinders, including 28 day cylinders, to the testing laboratory.
(d) The Project Engineer will be responsible for making, numbering and signing the 28 day cylinders.
(e) When constructing plain and reinforced concrete pavements, the testing frequency for slump, air content, and temperature shall be 1 per 100 yd^3 or fraction thereof.

902.10.09 Acceptance. Concrete will be acceptable if both of the following requirements are met:

(a) The average of all sets of three consecutive strength tests equal or exceed the specified design strength.

(b) No individual strength test (average of two companion cylinders) falls below the specified design strength by more than 500 psi.

902.10.10 Price Adjustment. A price adjustment will be based on the Contract unit price per cubic yard of concrete. If the unit is a lump sum item, the price per cubic yard for the concrete will be determined by dividing the cubic yards into the Contract lump sum price.

(a) Test Results More Than 500 psi Below the Specified Design Strength. Failing strength tests will be considered individually with a price adjustment being applied on the percentage basis as shown below.

(Price per yd^3) X (quantity of yd^3 represented by the failing concrete strength) X (percent of failure).

Example:

$400.00 per yd^3 X 50 yd^3 X [1-(3600/ 4500 psi)] = $4,000.00

No payment will be allowed when the test results fall below 50 percent of the specified design strength for structural concrete or 40 percent for incidental concrete.

The Engineer will determine when the strength of the concrete represented by the failing tests is sufficient to remain in place or whether it must be removed and replaced with Specification concrete.

(b) Test Results 500 psi or Less than the Specified Design Strength. Strength failures 500 psi or less than the specified design strength will be averaged with the next two consecutive tests. If those two tests include a failure greater than 500 psi, those tests will be evaluated as in 902.10.10(a) and replaced with the next consecutive test. If the resulting average falls below the specified design strength, a price adjustment will be applied as specified in the table below. Any failure will only be included in one grouping.

STRENGTH BELOW THE SPECIFIED (avg of 3 tests) DESIGN LEVEL, psi	ADJUSTMENT FACTOR
MIX NO. 1 THRU MIX NO. 7	
1 – 100	0.005
101 – 200	0.01
201 – 300	0.02
301 – 400	0.04
401 – 500	0.08

Adjustment price equals (price per yd^3) X (quantity of yd^3 represented by the failing cylinders) X (the adjustment factor).

Example:

$400.00 per yd^3 X 50 yd^3 X 0.01 = $200.00

902.11 MORTAR FOR GROUT. Mortar used for grouting anchor bolts, pipe, handrail posts, and miscellaneous items shall be composed in accordance with one of the following:

(a) One part Portland cement or blended hydraulic cement and one part mortar sand by dry loose volume.

(b) Prepared bag mixes consisting of Portland cement or blended hydraulic cement and mortar sand. The prepared mixes shall produce a mortar meeting the strength requirements specified in the Contract Documents.

(c) Use nonshrink grout when specified. The grout shall have a minimum compressive strength of 5000 psi in seven days when tested as specified per T 106, except that the cube molds shall remain intact with a top firmly attached throughout the curing period. The nonshrink grout shall have a minimum expansion of 0.0 percent after seven days when tested as specified per T 160.

(d) Epoxy grout shall consist of sand and epoxy mixed by volume in per the manufacturer's recommendations. The grout shall be capable of developing a minimum compressive strength of 6500 psi in 72 hours when tested per MSMT 501. Sand for epoxy grout as specified in 901.01.

(e) An epoxy or polyester anchoring system may be used when approved by the Engineer in accordance with the manufacturer's recommendations. Strength values shall be as specified in the Contract Documents.

902.12 LINSEED OIL. Shall consist of a 50-50 mixture (by volume) of boiled linseed oil meeting Federal Specification TT-L-190 and kerosene per D 3699.

902.13 LATEX MODIFIED CONCRETE. Portland cement concrete containing prequalified Laboratory approved styrene butadiene latex emulsion is defined as Latex Modified Concrete (LMC).

Latex emulsion shall have a minimum of 90 percent of the nonvolatiles as styrene butadiene polymers. The latex emulsion as specified in Table 902.13 A. The material shall be stored in suitable containers and be protected from freezing and exposure to temperatures in excess of 85 F.

LMC shall be proportioned using volumetric mixing and designed as follows:

LATEX MODIFIED CONCRETE	
MATERIAL	**SPECIFICATION LIMITS**
Portland Cement, CWT/yd^3, min	6.6
Latex Emulsion/Cement Ratio	0.31 – 0.34
Water/Cement Ratio, max	0.22
Entrained Air, %	6.0 ± 3
Slump, in.	5 ± 1

The physical properties of LMC shall conform to Table 902.13 B. The Contractor shall furnish the necessary 3 X 6 in. molds per M 205 to be used for the fabrication of compressive strength cylinders.

Control and Acceptance Sampling.

(a) Submit a two qt minimum sample, of the styrene butadiene latex emulsion to the AME daily for each lot of material used in a day's production.

(b) A batch for LMC is defined as the capacity of the equipment being used on the project. Slump and air samples will be taken and tested before the placement of a batch is permitted. The slump shall be measured four to five minutes after discharge from the mixer. The test material shall be deposited off the deck and not be disturbed during this

waiting period. One additional sample for slump and air will be taken randomly during the placement of each batch. For seven day compressive strength, two tests each per batch are required. A test is defined as consisting of two companion cylinders. The samples for these tests will be taken at random while the placement is in progress.

TABLE 902.13 A

REQUIREMENTS FOR CHEMICAL PROPERTIES OF LATEX EMULSION MATERIALS

PROPERTY	SPECIFICATIONS		QUALITY ASSURANCE TESTS	
	LIMITS	TOLERANCE	PREQUALIFICATION TESTS	CONTROL AND ACCEPTANCE
Color	White	—	X	X
pH	9.0 – 11.0	—	X	X
Weight, lb/gal	8.40 – 8.47	—	X	X
Solids Content, %	46 – 53	—	X	X
*Butadiene Content, % of polymer	30 – 40	—	—	—
Viscosity @ 10 rpm-cps	Match Original	± 20	X	X
*Surface Tension, dynes/cm max	50	—	—	—
*Mean Particle Size, polymer – Å	1400 – 2500	—	—	—
Coagulum, % max	0.10	—	X	X
*Freeze-Thaw Stability, coagulum, % max	0.10	—	X	X
Infrared Spectra of Latex Film	Match Original	—	X	X
Infrared of Alcohol, Soluble Portion of Latex	Match Original	—	X	X
Shelf Life, min	1 yr	—	X	—

Note 1: Quality assurance tests shall be conducted as specified in MSMT 612 except those denoted by an * shall be conducted as specified in FHWA RD – 78-35.

Note 2: The original or prequalification sample shall be accompanied by the producer's certification on all of the tests and properties noted above and as specified in TC-1.03. The certification shall contain actual test values of the product and the infrared spectrograph.

Note 3: A separate certification is required for each lot of material. The certification shall note the date of manufacture, lot size, and whether or not the material is identical to the formulation of the original sample.

TABLE 902.13 B

LATEX MODIFIED CONCRETE PHYSICAL PROPERTIES			
TEST PROPERTY	**TEST VALUES**	**QUALITY ASSURANCE TESTS**	
		PREQUALIFIED TESTS	**CONTROL AND ACCEPTANCE**
7 Day Compressive Strength, psi min	3000	X	X
28 Day Compressive Strength, psi min	3500	X	—
42 Day Compressive Strength, psi min	3500	X	—
7 Day Flexural Strength, psi min	550	X	—
28 Day Flexural Strength, psi min	650	X	—
42 Day Shear Bond Strength, psi min	2000	X	—
Durability Factor, 300 cycles, % min	85	X	—
Chloride Permeability, Ppm max	510	X	—
Scaling Resistance, 50 cycles, max	3	X	—

Note 1: Quality assurance tests shall be conducted as specified in MSMT 721.

Note 2: Seven Day Compressive Strength Test will be used for Control & Acceptance of the material. The minimum specified design strength is 3000 psi at seven days. The mix design approval and acceptance will be based on a coefficient of variation of 10 percent with a probability of 1 in 10 tests falling below the specified strength. Only test values 80% or greater than the specified strength will be accepted

902.14 RAPID HARDENING CEMENTITIOUS MATERIALS FOR CONCRETE PAVEMENT REPAIRS. Materials shall be a dry, packaged cementitious mortar having less than 5 percent by weight of aggregate retained on the 3/8 in. sieve and meet the following requirements:

Classification.

Class I — For use at ambient temperatures below 50 F.
Class II — For use at ambient temperatures of 50 to 90 F.
Class III — For use at ambient temperatures above 90 F.

Chemical Requirements. C 928 except that no organic compounds such as epoxy resins or polyesters as the principal binder.

Physical Requirements. Meet the following when tested per MSMT 725:

COMPRESSIVE STRENGTH, psi min				
CLASSIFICATION	**< 2 hr**	**2-6 hr**	**6 hr**	**28 days**
Type I — Slow	—	—	2000	4500
Type II — Rapid	—	2000	—	4500
Type III — Very Rapid	2500	—	—	4500

TEST RESULTS	
TEST PROPERTY	**LIMITS**
Bond Strength, 7 days, psi min	2000
Length Change, increase after 28 days in water, based on length at 3 hr, % max	+ 0.15
Length Change, decrease after 28 days, % max	- 0.15
Freeze Thaw, loss after 25 cycles in 10% $CaCl_2$ solution, % max	8
Initial Setting Time, minutes min	10

Marking. All packages delivered to the project shall be marked with the following information:

(a) Date material was packaged.

(b) Approximate setting time.

(c) Recommended dosage of water or liquid component.

(d) Mixing instructions.

(e) Class or temperature range.

Certification. The manufacturer shall furnish certification as specified in TC-1.03 showing the actual test results for each class and type of material submitted to the Laboratory.

902.15 SYNTHETIC FIBERS. When synthetic fibers are specified in the Contract Documents, the fibers shall be 1/2 to 1-1/2 in. long and conform to C 1116, Type III. The manufacturer shall furnish certification as specified in TC-1.03. The quantity of fibers used and their point of introduction into the mix shall conform to the fiber manufacturer's recommendations.

902.16 CONTROLLED LOW STRENGTH MATERIAL.

902.16.01 Usage. Controlled Low Strength Material (CLSM) shall consist of the types described below:

TYPE A – Used where future excavation of the CLSM may be necessary (e.g. utility trenches, pipe trenches, bridge abutments, and around box culverts).

TYPE B – Used where future excavation of the CLSM is not anticipated (e.g. filling abandoned conduits, pipes, tunnels, mines, etc. and replacing unsuitable soils below roadway and structure foundations where extra strength is required).

902.16.02 Materials.

Coarse Aggregate	901.01*
Fine Aggregate	901.01
Cement	902.03 and 902.04
Concrete Admixtures	902.06
Fly Ash	902.06.04
Water	921.01

*maximum size of 3/4 in.

Produce CLSM in conformance with the applicable portions of Section 915 and the following:

902.16.03 Proportioning. Submit the sources and proportions of materials, and test data for each CLSM mixture prior to construction. CLSM shall be proportioned, on the basis of field experience and/or laboratory trial mixtures, to produce a flowable and self-compacting mixture meeting the requirements of 902.16.04.

CLSM shall be proportioned by weight; with the exception of water and chemical admixtures. Water and chemical admixtures may be proportioned by volume or weight.

902.16.04 CLSM Mixtures. Proportion CLSM with sufficient amounts of Portland cement, fly ash, or ground granulated blast furnace slag; individually or in combination, to produce a cohesive, non-segregating mixture that conforms to the physical properties in the following table:

CLSM Mix	28 Day Compressive Strength, (psi) ASTM D4832	Flow Consistency, (in.) ASTM D6103
Type A	50 - 200	8 min.
Type B	500 min.	8 min.

SECTION 900
MATERIALS

SECTION 902 — PORTLAND CEMENT CONCRETE AND RELATED PRODUCTS

SELF CONSOLIDATING CONCRETE (SCC). SCC concrete mixes shall meet the following:

SSC Properties	Test Method	Prestressed Beams	Precast
Compressive Strength	T23	As specified	As specified
Min. Cement Factor lb/yd^3	-	700	615
Water/Cement ratio	-	0.32 - 0.45	0.32 - 0.50
Total Air Content	T 152/T 196	5.5 +/- 1.5	6.5 +/- 1.5
Concrete Temperature, F	C1064	70 +/- 20	70 +/- 20
Slump Flow	C1611	20-30 in.	20-30 in.
Rate of Flow	C1611 Appendix X1	20 inches in 2-10 sec.	20 inches in 2-10 sec.
Visual Stability Index (VSI)		0 to 1	0 to 1
J-Ring	C1621	0-2 inches of slump flow	0-2 inches of slump flow
Column Segregation	C1610	12 % max.	12 % max.
Rapid Chloride Permeability	-	2500	n/a

Note 1: Column Segregation and Rapid Chloride Permeability at 28 days are required on the trial batch for mix approval or any time there is a change in materials.
Note 2: Report water/cement ratio, aggregate moisture and cement temperature on each batch ticket.
Note 3: Mold a minimum of one set of compressive strength cylinders for each trial batch and for each day's production or each 50CY lot or part thereof. Provide enough cylinders for early age testing, 7 day testing, and at least 3 cylinders per set for 28 day testing..
Note 4: Take the temperature of the mix once for each day's production or each 50CY lot or part thereof.
Note 5: Conduct Slump Flow, Rate of Flow and VSI testing on the trial batch and at the beginning of each day's production or each 50CY lot or part thereof.
Note 6: Conduct J-Ring testing during each trial batch or following a failure of either the Rate of Flow or VSI test.
Note 8: ASR Mitigation – per Table 902 B.
Note 9: High Range Water Reducing admixtures must meet M194, Type F or Type G.
Note 10: Slump flows below 20 inches may be permitted when the producer specifies a lower slump flow in their mix design and demonstrates by trial batch that the mix design meets all other specifications.

CATEGORY 900
MATERIALS

SECTION 902 – PORTLAND CEMENT CONCRETE AND RELATED PRODUCTS

670 **DELETE: 902.10.03 -** Table 902 A in its entirety.

INSERT: The following.

TABLE 902 A

PORTLAND CEMENT CONCRETE MIXTURES

MIX NO.	SPECIFIED COMPRESSIVE STRENGTH psi	COMPRESSIVE STRENGTH TEST AGE days	STANDARD DEVIATION psi	CRITICAL VALUE psi	MIN CEMENT FACTOR lb/yd^3	COARSE AGGREGATE SIZE M 43 / M 195	MAX WATER/ CEMENT RATIO by wt	SLUMP RANGE in.	TOTAL AIR CONTENT %	CONCRETE TEMPERATURE F
1	2500	28	375	2430	455	57, 67	0.55	2 — 5	5 — 8	70 ± 20
2	3000	28	450	3010	530	57, 67	0.50	2 — 5	5 — 8	70 ± 20
3	3500	28	525	3600	580	57, 67	0.50	2 — 5	5 — 8	70 ± 20
4	3500	28	525	3600	615	57, 67	0.55	4 — 8	N/A	70 ± 20
5	3500	28	525	3600	580	7	0.50	2 — 5	5 — 8	70 ± 20
6	4500	28	675	4770	615	57, 67	0.45	2 — 5	5 — 8	65 ± 15
7	4200	28	630	4420	580	57	0.50	1½ — 3	5 — 8	70 ± 20
8	4000	28	600	4180	750	7	0.42	2 — 5	5 — 8	65 ± 15
9	3000	(a)	N/A	N/A	800	57, 67	0.45	4 — 8	5 — 8	80 ± 20
10	4500	28	675	4770	700	¾" – No. 4	0.45	2 — 5	6 — 9	65 ± 15
11	4200	28	630	4420	—	57, 67	0.45	2 — 5	5 — 8	65 ± 15
12	4200	28	630	4420	—	¾" – No. 4	0.45	2 — 5	6 — 9	65 ± 15
HE	3000	(b)	N/A	N/A	N/A	N/A	N/A	3 — 9	5 — 8	80 ± 20
PC (c)	N/A	N/A	N/A	N/A	450	7, 8	0.45	N/A	15-25	N/A
WT	2500	(d)	NA	NA	650	57	0.45	5 max	5— 8	70 ± 20

Note 1: When concrete is exposed to water exceeding 15,000 ppm sodium chloride content, Type II cement shall be used. In lieu of Type II cement, a Type I cement may be used in combined form with an amount of up to 50 percent replacement with ground iron blast furnace slag, or an amount of up to 25 percent replacement with Class F fly ash. The Contractor shall submit to the Engineer the proposed mix proportions and satisfactory test results per C 1012 showing a sulfate resistance expansion not exceeding 0.10 percent at 180 days

Note 2: The temperature of Mix No. 6 when used for other than superstructure work as defined in TC-1.03 shall be 70 ± 20 F.

Note 3: Type A or D admixture shall be added to bridge, box culvert, and retaining wall concrete.

Note 4: Non-chloride Type C admixtures may be used when approved by the Engineer.

Note 5: Other Slump Requirements:
When a high range water reducing admixture Type F or Type G is specified, the slump shall be 4 to 8 in.
When synthetic fibers are specified, the slump shall be 5 in. maximum.
When concrete is to be placed by the slip form method, the slump shall be 2-1/2 in. maximum.
When the absorption of the coarse aggregate is greater than 10 percent, the slump shall be 3 in. maximum.

Note 6: Mix 9 shall contain a Type F high range water reducing admixture.

Note 7: Mix 10 and 12 shall be proportioned as specified in 211.2 of the ACI's Recommended Practices for Selection Proportions for Structural Lightweight Concrete. The maximum average Density of Cured Concrete shall be 118 lb/ft^3. Control testing for Density of Cured Concrete shall be two companion cylinders for each 100 yd^3, or fraction thereof, as specified in M 195.

Note 8: Mix 11 and 12 shall also conform to all requirements as specified in Table 902 C.

Note 9: Add Polyolefin Macro Fibers to Mix No. 9 and High Early Strength Patch Mix (HE). The dosage rate shall be per the manufacturer's recommendations.

(a) Mix 9 is for concrete pavement repair only . Match cure of the samples is permissible in accordance with AASHTO PP 54. Strength tests shall be scheduled accordingly on weekdays and acceptance will be based on a minimum compressive strength of 3000 psi in 24 hours or 3600 psi in 3 days. Acceptance testing shall conform to 902.10.08 except that cylinders shall be field cured and remain in the molds until tests are conducted. Mix 9 when specified for incidental work and not requiring traffic control in conformance with 522.03.15 will not require the addition of fibers.

(b) Match cure the samples in accordance with AASHTO PP 54. Design approval will be given based on trial batch obtaining a minimum compressive strength of 2500 psi in 6 hours. Strength tests shall be scheduled accordingly on weekdays and acceptance will be based on a minimum compressive strength of 3000 psi in 24 hours or 3600 psi in 3 days. Acceptance testing shall conform to 902.10.08 except that cylinders shall be field cured and remain in the molds until tests are conducted.

(c) Pervious Concrete (PC) shall be proportioned as specified in 522R of the ACI's Recommended Practices for Pervious Concrete Mixture Proportions. Acceptance of freshly mixed Pervious Concrete shall be made based on Density and Total Void Content. Density and Total Air Voids of Freshly Mixed Pervious Concrete shall be performed per ASTM C1688.

(d) Whitetopping (WT) mix shall contain a high range water reducing admixture, macro-fibers at 3 lbs/yd^3 Max, and acceptance will be on a minimum compressive strength of 2500 psi in 24 hours.

672 **DELETE:** 902.10.04 Trial Batch in its entirety.

INSERT: The following.

902.10.04 Trial Batch. Prepare a trial batch to certify that each mix meets 902.10.05 and 902.10.06 except for Mix 9. Approval will be given when the test results meets the minimum required average strength. Mix 9 design approval will be given based on the trial batch obtaining a minimum compressive strength of 2500 psi in 12 hours.

Make arrangements with the AME to have an authorized representative present during the batching and testing at least two weeks in advance. Each trial batch shall consist of at least 3 yd^3 of concrete. Supply all equipment and labor required to produce the trial batches and conduct the required tests at no additional cost.

The requirement for a trial batch may waived when past performance records show that the required average strength requirement has been met.

ADD: The following after 902.15 Synthetic Fibers.

902.15.01 Macro Polyolefin Fibers. D 7508 with a minimum length of 1-1/2 in.

CATEGORY 900
MATERIALS

SECTION 904 — PERFORMANCE GRADED ASPHALT BINDERS AND ASPHALT MIXES

683 **DELETE:** SECTION 904 — PERFORMANCE GRADED ASPHALT BINDERS AND HOT MIX ASPHALT.

INSERT: The following.

SECTION 904 — PERFORMANCE GRADED ASPHALT BINDERS AND ASPHALT MIXES

904.01 CERTIFICATION. The manufacturer and hauler shall furnish certifications as specified in TC-1.03 and the following:

The manufacturer shall certify:

(a) Date and time of loading.

(b) Tank or blending system.

(c) Identification of hauling unit.

(d) Binder grade, temperature, and quantity of materials.

(e) Complete certified analysis.

(f) Lot number, if applicable.

The hauler shall certify:

(a) Identification of hauling unit.

(b) Binder grade and source of last delivery.

(c) The date of the last delivery using this hauling tank and volume of material remaining in the tank at the time of current loading.

904.02 PERFORMANCE GRADED ASPHALT BINDERS. M332 Table 1, for mixes containing all virgin materials, recycled asphalt pavement materials, or roofing shingles from

manufacturing waste. The Office of Materials Technology's (OMT) Asphalt Technology Division (ATD) will approve all PG binders. Submit certification from an approved supplier per M332 showing the final product meets specifications.

Chemical or organic additive suppliers shall supply the dosage rate and provide certification of the resultant PG binder.

The PG binder for asphalt mixes shall be achieved by the use of Neat Asphalt with elastomer polymer modifications when needed. Modifications to PG binder shall be as approved.

902.02.01 Warm Mix Asphalt (WMA) PG Binders. Include the PG binder performance grade test data over the range of WMA additive percentages proposed for WMA use. An AASHTO accredited laboratory shall be employed to perform all required WMA binder laboratory testing.

904.03 EMULSIFIED ASPHALTS. M140 or M208, and M316 with the following exceptions:

(a) Cement mixing tests are waived.

(b) Maximum of 3.0 percent by volume of oil distillate.

(c) The sieve test requirement for field samples shall be a maximum of 0.4 percent.

904.04 ASPHALT MIXES. Section 915. Asphalt mixes shall be produced as specified.

904.04.01 Aggregates. M323 and Section 901. Test the aggregate retained on the 4.75 mm sieve for flat and elongated particles per D4791. Recycled asphalt pavement used in an asphalt mix shall be considered an aggregate source per 900.03.

904.04.02 Mix Design. Develop asphalt mix designs in conformance with R35, M323 and MSMT 416, except replace "Table 6, Superpave HMA Design Requirements" in M323 with the following:

DESIGN LEVEL	20-Year Design Traffic, ESALs	N_{design}
1	<300,000	50
2	300,00 to <3,000,000	65
3	3,000,000 to <10,000,000	80
4	10,000,000 to <30,000,000	80
5	≥30,000,000	100

Design asphalt mixes for the Equivalent Single Axle Loading (ESAL) range specified.

Asphalt mixes designed with Reclaimed Asphalt Pavement (RAP) and/or Reclaimed Asphalt Shingles (RAS) shall also conform to MSMT 412.

904.04.03 Mix Design Approval. Submit data from the laboratory study to OMT for tentative approval at least 30 days prior to paving operations. Submit mix designs in an approved format. Include the following:

(a) Mix designation.

(b) Source, percentage, and grade of performance graded asphalt binder.

(c) Source, gradation, and proportion of each component aggregate.

(d) Target aggregate gradation.

(e) Plant where the asphalt mix will be produced.

(f) Plant target mixing temperature based on viscosity of 0.22 Pa·s.

(g) Ratio of dust to binder material on effective asphalt.

(h) Maximum specific gravity at the target binder content.

(i) Mix design grading plotted on 0.45 power gradation chart.

(j) Tensile strength ratio and worksheets.

(k) The bulk specific gravity and gyratory weight at Ndesign gyrations.

(l) The air void content (percent Va) at N Design gyrations.

(m) The voids in the mineral aggregate (percent VMA) and the voids filled with asphalt (percent VFA) at N Design gyrations (T 312).

(n) All consensus and source properties.

(1) Coarse aggregate angularity.

(2) Flat and elongated.

(3) Sand eq**u**ivalent.

(4) Uncompacted void content of fine aggregate.

(5) Bulk and apparent specific gravity of coarse and fine aggregate.

(6) Absorption of coarse and fine aggregate.

Include the quantity of job mix formula aggregate and appropriate amount of required PG binder for ignition oven calibration with each mix design submitted for approval.

When previous construction or performance experience has shown the proposed mix design to be unsatisfactory, OMT may require submission of a more suitable design.

(a) When a change to the source of aggregate used in the mix is proposed, submit a revised mix design as specified.

(b) Notify OMT two working days in advance if a change in the PG binder source becomes necessary.

(c) Conduct a stripping test per MSMT 410 and submit an initial PG binder sample for testing and approval. OMT may require an anti-stripping additive test per D4867 before approval.

904.04.04 WMA Mix Design Approval. 904.04.03 and the following:

(a) Warm Mix technology and/or additive information.

(b) WMA manufacturer's established target rate for water and additives and the acceptable variation for production.

(c) Producer's compaction temperature of gyratory specimens.

(d) The producer shall follow the manufacturer's recommendation for incorporating additives and WMA technologies into the mix per the manufacturer's recommendations.

When a foaming, chemical or organic additive is used, submit the appropriate job mix formula (JMF) per R35 for approval.

(a) All WMA technology methods shall require a mix design/field placement demonstration on a non-Administration project once the JMF is approved and before verification, or as approved. Notify OMT two working days prior to shipment.

(b) A technical representative from the product supplier must be present during the initial shipment and placement of the WMA when a chemical or organic additive is used.

(c) If all specification requirements are met, this is a one-time demonstration per product, per plant, or with a combination of products.

(d) The demonstration may be waived if the asphalt producer has successfully placed WMA on other projects with the same aggregates and can provide testing data and contact information.

904.04.05 Verification of Mix Design. Conduct a verification of the mix at the beginning of production in each plant after receiving tentative approval for the design.

(a) Notify the Engineer and OMT at least two working days in advance of the scheduled verification. Verification shall be performed by certified personnel per 504.03.

(b) Prepare the verification samples per R35. All verification samples will be split with the OMT laboratory.

(c) Compare and evaluate the verification test r**e**sults per MSMT 735.

904.04.06 Verification Evaluation. MSMT 735.

(a) Initial verification consists of four split samples tested as specified. Begin random sampling with the first day's production, with at least one split sample witnessed by an OMT representative.

(b) If the first day of production is less than 2 000 tons, verification testing may be spread over no more than five working days with production of 200 tons or more. Complete verification testing no later than the fifth working day with production in excess of 200 tons or on the day when production has reached 2 000 tons, whichever occurs first.

(c) Production may proceed without any changes when the Contractor's and Administration's test results conform to a Percent within Specification Limit (PWSL) of at least 85. If the mixes submitted have identical aggregate combinations and differing asphalt contents associated with changes in ESAL loads, verification may be limited to volumetric analysis, as determined.

(d) If all test results do not conform to the parameters with a PWSL of at least 85, then an adjustment to the asphalt content or gradation may be made to bring the mix design requirements within acceptable levels. Permissible adjustment limitations between the approved Mix Design and Adjusted Mix Design are as follows:

TEST PROPERTY	PERMISSIBLE ADJUSTMENT % (*)
Larger than 1/2 in. (12.5 mm) sieve	± 5
1/2 in. (12.5 mm) thru No. 4 (4.75 mm) sieves	± 4
No. 8 (2.36 mm) thru No. 100 (1.50 µm) sieves	± 3
No. 200 (75 µm) sieve	± 1.0
Binder Content	± 0.20

*The permissible adjustment for all mixes shall be within control points

(e) Perform a second verification to ensure that the modified mix conforms to all design requirements when an adjustment outside the permissible adjustment percentage is made to the mix design. Conform to the time and tonnage limitations as specified. Production may proceed when the adjusted mix is within control points and meets the PWSL. Suspend mix production and submit a new mix design for approval if the mix does not meet specifications. Design the new mix as specified.

(f) Suspend mix production if subsequent designs submitted due to nonconformance do not meet specifications during the initial verification until corrective action is taken, as approved.

If an adjustment to a verified mix is necessary due to aggregate changes, the mix design must meet all specification requirements before a new mix design number is issued. Verification will be based on the last 4 QA and QC production samples.

904.04.07 Thin Lifts. As specified in 504.03.12. Lift thicknesses shall be designated as thin lifts when the lift thickness specified does not meet 3-times nominal maximum aggregate size for fine graded mix designs or 4-times nominal maximum aggregate size for coarse graded mix designs.

Determine fine and coarse graded thin lift mix designs per M 323 and in accordance with the table below.

Thin Lift Mix Design Identification Table

	Gradation Classification Control Sieve Mix Design Target (%Passing)	
Mix Designation	Fine Graded	Coarse Graded
4.75mm	A thin lift is a specified pavement thickness < 1 inch.	A thin lift is a specified pavement thickness < 1 inch.
9.5mm	When the 2.36mm (#8) is ≥ 47%, a thin lift is a specified pavement thickness < 1 1/8 inches	When the 2.36mm (#8) is < 47%, a thin lift is a specified pavement thickness < 1 1/2 inches
12.5mm	When the 2.36mm (#8) is ≥ 39%, a thin lift is a specified pavement thickness < 1 1/2 inches	When the 2.36mm (#8) is < 39%, a thin lift is a specified pavement thickness < 2 inches
19.0mm	When the 4.75mm (#4) is ≥ 47%, a thin lift is a specified pavement thickness < 2 1/4 inches	When the 4.75mm (#4) is < 47%, a thin lift is a specified pavement thickness < 3 inches
25.0mm	When the 4.75mm (#4) ≥ 40%, a thin lift is a specified pavement thickness < 3 inches	When the 4.75mm (#4) < 40%, a thin lift is a specified pavement thickness < 4 inches
37.5mm	When the 9.50mm (3/8) ≥ 47%, a thin lift is a specified pavement thickness < 4 1/2 inches	When the 9.50mm (3/8) < 47%, a thin lift is a specified pavement thickness < 6 inches

904.04.08 Anti-stripping Additives. D4867. Asphalt mixes shall have a Tensile Strength Ratio (TSR) of at least 0.85.

(a) The freeze-thaw conditioning cycle is required. OMT testing of TSR's will be performed randomly.

12-03-14

(b) Asphalt mixes not meeting the minimum TSR require the use of an approved anti-stripping additive.

(c) The producer shall determine the exact quantity of anti-stripping additive required per D4867 based on a minimum TSR of 0.85.

(d) The dosage rate when a heat stable anti-stripping additive is used shall be at least 0.20 percent of the total weight of asphalt. The additive shall be introduced by the PG binder supplier or at the plant by line blending, metering, or otherwise measuring to ensure accurate proportioning and thorough mixing.

(e) Hydrated lime (when used) shall conform to C 1097. Add hydrated lime in slurry form at the rate of 1.0 to 1.5 percent by weight of total aggregate. The lime slurry shall be sprayed uniformly on the aggregate on the feed belt prior to entry into the asphalt plant dryer.

(f) Plant control and acceptance of the mix will be based on MSMT 410 per its stripping potential.

904.04.09 Plant Control. The following tolerances shall apply:

TABLE 904 A – DENSE-GRADED MIX TOLERANCES

PHYSICAL PROPERTIES	PLANT	PROJECT SITE
	Site or Hauling Unit Samples	Behind the Paver Samples
Passing No. 4 (4.75 mm) sieve and larger, %	± 7	± 7
Passing No. 8 (2.36 mm) thru No. 100 (150 μm) sieve, %	± 4	± 5
Passing No. 200 (75 μm) sieve, %	± 2	± 2
Asphalt content, %	± 0.4	± 0.5
Ratio of dust to binder material	0.6 to 1.6 (a)	0.6 to 1.6 (a)
Mix temperature leaving plant vs.mix design temperature, F	± 25	NA
Deviation of maximum specific gravity per lot versus design maximum specific gravity	± 0.030	± 0.040
Voids, total mix, (VTM), %	4.0 ± 1.2	4.0 ± 1.2
Voids, total mix, 4.75 mm mix (VTM), %	3 ± 2	3 ± 2
Voids in mineral aggregate, (VMA), %	± 1.2 from design target	± 1.2 from design target
Voids filled asphalt (VFA), %	Within spec	Within spec
Bulk specific gravity, Gmb, %	± 0.022	± 0.022

(a) Not applicable to 4.75 mm.

12-03-14

904.04.10 PWSL Computations. As specified in 504.04.02. Perform PWSL computations for maximum specific gravity, voids in the total mix, voids in the mineral aggregate, and voids filled with asphalt. Use the moving average of the last three consecutive test values for each parameter.

(a) If the PWSL for the three test values falls below 85, take corrective action to bring the PWSL to at least 85.

(b) If the PWSL drops below 68, production shall be suspended until corrective action is taken as approved.

CATEGORY 900
MATERIALS

SECTION 905 – PIPE

694 **DELETE:** Sections 905.01 and 905.02 in their entirety.

INSERT: The following.

905.01 CERTIFICATION. Furnish certification for pipe as specified in TC-1.03.

MATERIAL	SPECIFICATION	REMARKS
Nonreinforced Concrete Pipe	M 86, Class 3	–
Reinforced Concrete Pipe	M 170, Class 4 and 5	60 in. and smaller diameter, Load bearing option. Larger than 60 in. diameter, Material option.
Reinforced Concrete Elliptical Pipe	M 207, Class 4, Horizontal installation only	60 in. and smaller equivalent diameter, Load bearing option. Larger than 60 in. equivalent diameter, Material option.
Concrete End Sections	M 170	Class 3 pipe reinforcement required
Reinforced Concrete Arch Culvert	M 206	–
Concrete Drain Tile	M 178	–
Non-Asbestos Fiber-Cement Storm Drain Pipe	C 1450	–
Reinforced Concrete Low-Head Pressure Pipe	C 361	–
Corrugated Polyethylene Pipe	M 294	–
Corrugated Polyethylene Drainage Pipe	M 252	Perforated underdrain and underdrain outlet pipe.
Corrugated Polypropylene Drainage Pipe	MP 21	–
Polyvinyl Chloride (PVC) Profile Wall Pipe	M 304	–
Polyvinyl Chloride (PVC) Pipe	M 278	Underdrain outlet pipe
	M 278 (a)	Perforated underdrain
Joints for Concrete Pipe and Manholes Using Rubber Gaskets	C 443	–
Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants	C 990	Not for use with circular pipe
Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals	D 3212	
Corrugated Steel Pipe, Pipe Arches and Underdrain	M 36 (b), (c)	End finish shall be annular corrugations
Corrugated Aluminum Alloy Pipe	M 196 (b)	End finish shall be annular corrugations
Structural Plate for Pipe, Pipe Arches and Arches	M 167	–
Copper Pipe	Fed Spec WW – T–799, Type K	–
Polyethylene (PE) Precoated Corrugated Steel Pipe	M 245 and M 246	Minimum thickness 10 mil on each of the surfaces.

(a) Perforations shall conform to the requirements of F 758.
(b) Bands with dimples are prohibited.

07-02-13

(c) All Corrugated Steel Pipe shall be aluminum-coated Type 2 conforming to M 274 unless otherwise specified.

905.02 CERTIFIED REINFORCED CONCRETE PIPE PLANTS. Reinforced concrete pipe (RCP) will be accepted on certification based on TC-1.03 and the requirements outlined below. This includes the sampling, testing, documentation, and certification of the product by the manufacturer in combination with an Administration monitoring program.

Annual Inspections. Plants producing material for SHA, or an SHA inspected contract, for the first time or after a break in production longer than one calendar year will be subject to a comprehensive inspection of its production, testing, storage facilities, materials used and applicable documentation prior to production. Each plant will be subject to another comprehensive inspection at the beginning of each calendar year thereafter. The Administration will determine whether plant equipment and personnel conform to all applicable specifications and that suitable testing facilities are available. Submit a Quality Control Plan (QCP) for review and approval prior to inspection. The producer is responsible for ensuring timely delivery of the QCP. The QCP shall include the following:

(a) The manner in which the materials will be handled including.

(1) Locations of stockpiles.

(2) Methods of weighing and batching material into mixers.

(3) Sources of materials and certifications that those materials meet these Specifications.

(4) Methods to be used to heat or cool materials during periods of extreme temperature.

(b) The following Quality Control (QC) procedures.

(1) The names, qualifications, responsibilities and a unique identification number for each of the QC personnel and the designation of a QC manager.

(2) Sampling and testing methods and frequencies.

(3) Method used for inspecting reinforcement cages prior to and during production.

(4) Method of curing.

(5) Method of maintaining accurate QC records.

(6) Samples of forms approved by the Administration.

(7) Patching procedure.

(8) Method of preparation of units for shipping.

(9) Method of identification of each unit as tested and approved.

Certification by a Professional Engineer registered in the State of Maryland attesting the plant's facilities conform to all applicable specifications will be accepted in lieu of Administration inspection. However, final determination of conformance will be as determined.

905.02.01 Responsibilities of the Concrete Pipe Producer. Perform Quality Control operations at the plant to ensure that the material conforms to specifications. The QC process will be subject to unannounced periodic Quality Assurance (QA) verification and the plant's QC personnel shall fully participate in the verification process. Submit any change in personnel, production, testing facility and policy as a supplement to the QCP in writing within 10 days.

905.02.02 Lot Size. A pipe lot is defined as a maximum 14-day production run of concrete pipe of like size, material, strength designation, and manufacturing process. The 14 days need not be consecutive, as long as they occur within a period of 30 consecutive days and the manufacturing process is not altered in any way between production days. Lot size may include up to 1000 pieces for 12 to 36 in. pipe and 18 to 36 in. equivalent elliptical diameter pipe, or 500 pieces for 42 in. and larger pipe and 42 in. and larger equivalent elliptical diameter pipe.

905.02.03 Acceptance Testing. Perform a three-edge bearing test to produce a 0.01 in. crack for each lot in conformance with M 170, section 5.1.1 except as modified for pipe diameter per Table 905. Pipe that have been tested only to the formation of a 0.01 in. crack and that meet the 0.01 in. or lesser load requirement will be considered acceptable for use.

905.02.03 Quality Control Testing. Perform one three-edge bearing test to ultimate load at least once very twelve months in conformance with M 170, Section 5.1.1 for each size and class of pipe shipped to SHA inspected contracts. Also, perform an absorption test on each size and class of pipe manufactured and shipped to Administration projects at least once every twelve months. Specify in the QCP the method selected to test the lots for ultimate load and absorption.

905.02.04 Test Facilities. The producer's facilities, equipment, and quality control personnel shall be capable of conducting the tests specified in T 280 and will be approved as part of the Annual Inspection. Identify all QC personnel in accordance with 905.02 (b) (1) with a unique number used for testing and stamping or stenciling pipe for shipping. Record that number in the QCP and include the individual's printed name and signature. Maintain yearly calibration certificates on all equipment used for testing. The

producer may elect to use the services of an independent commercial testing laboratory as approved in lieu of conducting their own tests.

905.02.05 Shipment. Pipe may be shipped to Administration projects only after the required testing for all pipe in the lot have been completed with acceptable results and all pipe to be shipped is at least the age of the test specimens at testing. Visual inspection of the pipe and the accompanying documentation will be made when pipe is received on the project to verify compliance with certification requirements.

Prior to shipping, mark the following information on the inside of each pipe.

(a) Plant name.

(b) Plant location.

(c) Size of pipe.

(d) Class of pipe.

(e) Date of manufacture.

(f) Quality control stamp.

(g) Quality control personnel number.

905.02.06 Certification. Manufacturer's certification shall accompany each shipment of pipe. Deliver a copy of the certification to the Engineer, the Administration's laboratory, the Contractor, and maintain a copy at the plant. Certification shall include the following:

(a) The plant name, address, and location.

(b) Size and class of the pipe.

(c) Date of manufacture and shipment.

(d) Number of pieces.

(e) Administration Contract number.

(f) Statement of Specification compliance.

(g) Signature and number of the quality control personnel that inspected the shipment.

905.02.07 Records. Maintain all testing and inspection documents at the production plant for at least three years from the manufacture date and make available upon request. Collect and maintain conformance certificates and mill test reports for aggregates, cement, fly ash, joint material, reinforcing steel, and other materials intended for use in products used on Administration projects.

905.02.08 Quality Control Forms. Maintain an Administration approved quality control form for all pipe produced for use on Administration projects. Include the following on the forms for each lot:

GENERAL INFORMATION	PIPE DIMENSIONS	REINFORCEMENT	TESTS
Plant Name Lot Identification Production Dates Pipe Class Units Per Lot Technician Signature <u>Material Sources</u> Cement Fine Aggregate Reinforcement	Diameter Length Wall Thickness Joint Style	Size Spacing Area: Specification and Test Results Adequacy and Quality of Welds and Splices	Visual Inspection Absorption: Specification and Test Results: Once per year **THREE EDGE BEARING** **0.01 in. Crack Strength**: Specification and Test Results **Ultimate Strength:** Specification and Test Results: Once per year

905.02.09 Responsibilities of the Administration. The Administration will notify each plant when to present its Quality Control Plan. Thirty days will be provided to make arrangements for delivery after the Administration is notified of the plan's completion. Verification of certification by Quality Assurance Audit will be performed a minimum of once per year, as determined.

The Administration reserves the right to discontinue acceptance of RCP if the verification process indicates that materials, test procedures, or finished pipe do not conform to the specifications, Contract Documents or QCP. Producers will be notified of any type of non-compliance revealed during Quality Assurance Audits and provided with a resolution procedure to resolve any deficiencies.

CATEGORY 900
MATERIALS

SECTION 906 — GABIONS

701 **DELETE:** SECTION 906 — GABIONS in its entirety.

INSERT: The following.

SECTION 906 — GABIONS

906.01 WIRE FOR GABIONS. A370. All wire including tie and connecting wire shall have a tensile strength of at least 60 000 psi. All wire sizes and mesh spacing shall be as recommended by the manufacturer.

Stainless steel interlocking fasteners meeting A313 may be substituted for wire ties. Fasteners shall remain in a closed and locked condition when subjected to directional tension along its axis at a minimum force of 900 lb.

906.01.01 Galvanized Coating for Gabions. A123. Galvanize fabric, ties, and connecting wire to at least 0.8 oz/ft^2.

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

CATEGORY 900
MATERIALS
SECTION 908 — REINFORCEMENT STEEL

703 **DELETE:** SECTION 908 — REINFORCEMENT STEEL in its entirety.

INSERT: The following.

SECTION 908 — REINFORCING STEEL

908.01 DEFORMED REINFORCEMENT. A615, Grade 60 or A 706, Grade 60. Use A706 Grade 60 when welding of the reinforcement is required. Deformed bars shall be epoxy powder coated per 917.02 when specified.

908.02 PLAIN REINFORCEMENT. A36 or A615, Grade 60. Bars used as ties in portland cement concrete pavement expansion and contraction joints shall be plain round steel bars unless otherwise specified. Bars shall be epoxy powder coated per 917.02. Bars used for traverse joints shall not exceed the maximum pullout strength per M 254.

908.03 STAINLESS STEEL BARS. A276, Type SM-29. Stainless steel bars may be used in lieu of epoxy powder coated plain bars. Deformed stainless steel bars shall meet A615 for cross sectional area and deformations.

908.04 SLEEVES FOR DOWEL BARS IN PAVEMENT EXPANSION JOINTS. Sleeves for dowel bars shall be sheet metal and capable of fitting over 2 ± 1/4 in. of the bar. Sleeves shall have a closed end with a stop to hold the end of the sleeve a minimum distance of 1 in. from the end of the dowel bar.

908.05 WELDED STEEL WIRE REINFORCEMENT, PLAIN. A185. Reinforcement shall be furnished in flat sheets.

908.06 WELDED STEEL WIRE REINFORCEMENT, DEFORMED. A497.

908.07 WELDED DEFORMED STEEL BAR MATS. A184.

908.08 STEEL WELDED WIRE REINFORCEMENT FOR PNEUMATICALLY APPLIED MORTAR AND CONCRETE ENCASEMENT. A185, galvanized per A123. The reinforcement shall be fabricated from size W1.4 wire on 3 in. centers in each direction or from W0.9 wire on 2 in. centers in each direction.

908.09 COLD DRAWN STEEL WIRE. M32 for concrete reinforcement.

908.10 TIE DEVICES FOR CONCRETE PAVEMENT. Tie device sizes shall be as specified and made from deformed bar meeting 908.01 with a threaded connection. Tie devices shall have a minimum tensile strength of 48000 psi.

908.11 STEEL STRAND. M203, Grade 70, Low Relaxation Strand.

908.12 CERTIFICATION. TC1.03. The steel manufacturer shall furnish certification for each heat of steel supplied.

CATEGORY 900
MATERIALS

SECTION 909 — METALS

703 **DELETE:** SECTION 909 — METALS in its entirety.

INSERT: The following.

SECTION 909 — METALS

909.01 STRUCTURAL STEEL. Structural steel shall meet all specified requirements.

(a) All primary load carrying members shall meet the supplementary toughness requirements per. M270, Zone 2.

(b) Primary load carrying members are as follows or as specified.

(1) Finger joint steel from which saw tooth configurations have been cut, all stringers, cover plates, bearing stiffeners, splice plates, pins and pin links for straight rolled steel beam bridges; all flanges, webs, bearing stiffeners, splice plates, pins and pin links for straight steel girder bridges.

(2) Additionally, on curved rolled steel beam and steel girder bridges; all diaphragms, cross frames, lateral bracing, including connection plates to main stringers.

909.02 STEEL FOR MISCELLANEOUS USE. A36, A72 or A709, Grade 36 or 50. Steel for bearings on structures shall conform to A709, Grade 50.

909.03 WELDING MATERIALS. AWS D1.5 or D1.1 per design criteria.

909.04 GRAY IRON CASTINGS. A48, Class 30B.

909.05 STEEL STUD SHEAR DEVELOPERS. AWS D1.5 or D1.1 per design criteria

909.06 BOLTS, NUTS, AND WASHERS FOR GENERAL USE.

(a) Bolts, A307.

(b) Bridge anchor bolts A709, Grade 36.

(c) Washers, F436.

(d) Nuts, A563, Grade A. Galvanize per F2329 when required. High temperature galvanizing is not allowed.

909.07 HIGH STRENGTH FASTENERS, BOLTS, NUTS, AND WASHERS.

(a) Bolts, A325.

(b) Washers, F436.

(c) Nuts, heavy hex A194, Grade 2H or A563, Grade DH. Galvanize per F2329. High temperature galvanizing is not allowed.

(d) Use A490, Type 3 fasteners on unpainted weathering steel.

Rotational capacity testing shall be performed on all high strength fasteners. Provide test results per 909.01.

909.08 ANCHOR BOLTS, NUTS, WASHERS FOR TRAFFIC SIGNALS, HIGHWAY LIGHTING, AND SIGNS. F1554, Grade 55 S1.

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(a) Anchor bolts, galvanized for the full length of the threads and 3 in. below the threads.

(b) Nuts, heavy hex, A194, Grade 2H or A563, Grade DH.

(c) Flat washers, heavy washers, F436.

(d) Galvanize all hardware per F2329. High temperature galvanizing is not allowed.

909.09 CAST WASHERS. Cast washers, ogee washers, and special cast washers per A47. Hot dip galvanize per A153.

909.10 HARDWARE. F1667. Spikes, wood screws, staples, brads, lag screws, carriage bolts, and other parts under general hardware shall be composed of carbon steel.

909.11 STEEL FORMS. A653, Designation SS, Grades 33 through 80S. Steel bridge deck forms and deck form supports that remain in place shall be fabricated as specified. Steel forms shall be coated per Coating Designation G 165. The minimum thickness of uncoated steel shall be 0.0359 in.

909.12 CERTIFICATION. TC-1.03. The metal producer shall furnish certification as specified. Certification shall include actual mill test results and the chemical and physical properties of the finished metal products.

CATEGORY 900
MATERIALS

SECTION 914 — CHAIN LINK FENCE

725 **DELETE:** 914.03 POSTS, BRACES, FITTINGS, AND HARDWARE in its entirety.

INSERT: The following.

914.03 POSTS, BRACES, FITTINGS, AND HARDWARE. M 181. When PVC coating is specified, PVC shall be thermally fused and bonded. The PVC thickness shall be 10 to 15 mil except that bolts, nuts, and washers shall be metallic coated steel. Polyester powder coating material for galvanized metal meeting 465.03.02(b) may be used in lieu of PVC.

Round posts shall meet industry standards for Class 1 or 2.

CATEGORY 900
MATERIALS

SECTION 915 — PRODUCTION PLANTS

915.01 GENERAL.

727 **DELETE: 915.01.05 Sampling Equipment** in its entirety.

INSERT: The following.

915.01.05 Sampling Equipment. The producer shall provide all personnel and equipment for obtaining samples.

(a) Refer to M156 and D140. Sample liquid binder from a tap located at the last practical and safe point between the binder control unit and the plant.

(b) Sample and split asphalt mixes per R47.

(c) Sample and process aggregate per T2.

DELETE: 915.01.06 Quality Control Laboratory in its entirety.

INSERT: The following.

915.01.06 Quality Control Laboratory. The producer shall provide an Administration-approved laboratory at proportioning or batching plants suitable for conducting the various tests required. An off-site laboratory may be used with Administration approval. Approval of the QC laboratory and testing personnel will be subject to periodic inspection. Correct any deficiencies to the satisfaction of the Administration or approval will be withdrawn.

728 **DELETE: 915.02 HOT MIX ASPHALT (HMA) PLANTS** in its entirety.

INSERT: The following.

915.02 ASPHALT PLANTS. M156. Asphalt plants shall be equipped with Automatic Batching and Recording of Batching except as modified in 915.01 and the following:

(a) Dryer. Dry the aggregates per the plant manufacturer's recommendations.

(b) Hot Aggregate Bins. M 156.

(c) Mixer Unit for Batch Method. Minimum dry and wet mixing times shall be 5 and 15 seconds, respectively.

(d) Truck Scales. Per the National Institute for Standards and Technology (NIST).

(e) Delivery Records and Tickets.

(1) Maintain a delivery record showing the Contract number, truck identification (ID) number, identification of the type of mix being produced, number of truck loads, and total tons of mix.

(2) Use an approved plant automatic weighing and printing system. Provide a printed delivery ticket for each load with the cumulative total weight of mix in each truck.

Delivery tickets for each load shall also contain the truck ID number, Contract number, identification of the type of mix, date, time loaded, gross and tare weights, and net weight of the mix.

(3) Record the temperature of the mix on the delivery ticket when requested. The temperature may be handwritten.

(f) Hauling Units.

(1) Transport the mix to the work site in units cleaned of all foreign material. Treat the inside surface of all hauling units with an approved asphalt release agent that will not contaminate the mix nor alter its characteristics. The use of petroleum derivatives is prohibited.

(2) Cover the contents of each load with suitable material of sufficient size to completely protect it from the weather. Each unit shall have convenient access from ground level to insert thermometers to determine mix temperature.

(g) Drum Mixer Plants.

(1) Refer to MSMT 453 for calibration approval.

(2) Provide a monitoring station for the purpose of controlling the entire operation. If any part of the control system fails, an alternative control system may be used for a maximum of two working days.

(3) Determine the moisture content of all aggregates per MSMT 251.

915.02.01 Certified Asphalt Plant. The producer is responsible for quality control of plant operations to ensure that the material meets specifications. The quality control

process will be subject to unannounced periodic inspection when project production is in progress. The plant's certified technician shall fully participate in the inspections.

Initial Inspection. Plants initially setting up and starting production will be subject to a comprehensive inspection to determine whether the plant equipment and personnel meet all applicable specifications. Certification by a professional engineer registered in the State of Maryland that the plant facilities meet as specified will be accepted. Final acceptance will be as determined.

915.02.02 Responsibilities of the Asphalt Producer.

Notification. Notify the Engineer one working day prior to producing materials for Administration projects. Report total tons shipped one business day after completed daily shipments. Send report to Superpave@sha.state.md.

Quality Control (QC). Refer to 504.03. Perform additional sampling and testing when directed. Provide the Engineer with the opportunity to witness all sampling and testing. Report QC test results within 24 hours of production.

Reports. Furnish test results on Administration-approved documents. Retain all original QC source documents for five years.

915.02.03 Responsibilities of the Administration.

Technician Certification. Conducted per the Mid-Atlantic Region Technician Certification Program (MARTCP) and the Maryland Technician Certification Program.

Independent Assurance Audits (**IAA**). The Administration will evaluate the equipment and the proficiency of QC technicians through audits performed on a random basis. The QC technician shall cooperate with the IAA technician in the evaluations.

Split Samples to Evaluate the Effectiveness of the Plant Quality Control Operation. Take a mix sample at the plant or project and split per R47. Sample a minimum of once per ten days of production and when daily production exceeds 200 tons. Provide one of the split samples to the Administration for testing. Test the other split sample per MSMT 735 and submit the results within 72 hours. Approval may be withdrawn if split sample data is not submitted as specified.

(a) Effective Plant Quality Control Operations. Plant QC operations will be evaluated as effective when both split sample results compare within AASHTO Acceptable Range of Two Test Results, Multi-Laboratory Precision parameters for binder content, percent passing the 4.75mm, 2.36 mm, 0.075mm gradation sieves, and maximum specific gravity (G_{mm}).

After three consecutive split samples compare within the AASHTO parameters and have been evaluated, the split sample frequency may be decreased to a minimum of once every 15 days of production.

(b) Ineffective Plant Quality Control Operations. When two consecutive QC and Administration split samples do not compare, a three-way split will be taken and evaluated. If the results of the three-way split compare, the QC Lab will be considered effective and monitored. If the three-way split evaluation does not compare for all the indicated tests, the QC operation will be evaluated by the Administration and approval may be withdrawn if equipment or procedural deficiencies are determined to exist.

Recertification of Plant QC Laboratory. Documentation of corrective action shall be submitted by the QC Plan Administrator. A comprehensive inspection will be conducted to recertify the plant once the documentation is approved.

Dispute Resolution. Following is a general procedure to resolve conflicts resulting from discrepancies between test results from the Engineer and producer, and non-test related disputes of sufficient magnitude to impact payment.

(a) When a dispute arises, the producer or Engineer will file a written complaint to the Chief Engineer describing the nature of the dispute along with the pertinent information.

(b) The Chief Engineer will appoint a panel of three members to resolve the conflict. The panel will include a member selected by the asphalt industry.

(c) The panel will make recommendations to the Chief Engineer.

(d) The Chief Engineer will decide the disposition of the dispute based on the panel's recommendations.

(e) A written report from the panel describing all subsequent actions and final disposition of the dispute shall be included in the project records.

(f) If subsequent disputes arise on the same issue, the written report will be included as a resource during the resolution process.

CATEGORY 900
MATERIALS

740 **DELETE:** SECTION 916 — SOIL AND SOIL-AGGREGATE BORROW in its entirety.

INSERT: The following.

SECTION 916 — SOIL AND SOIL-AGGREGATE BORROW

916.01 BORROW EXCAVATION. A soil or soil aggregate mixture meeting the following:

Maximum dry density and optimum moisture content of the material per T 180, Method C unless the material has more than 35 percent retained on the No. 4 sieve, in which case Method D shall be used. Material with a maximum dry density of less than 100 lb/ft^3 is unsatisfactory and shall not be used in embankments. Potentially expansive materials, such as steel slag, are prohibited.

Refer to the Recycled Materials Special Provisions located elsewhere in the Contract Documents.

BORROW REQUIREMENTS						
Class Borrow	**Max Dry Density Minimum P.C.F. T 180**	**LL Maximum T 89**	**PI Maximum T 90**	**Gradation Requirements T 88**	**Reference MSMT Soil Classification**	**Reference AASHTO Classification**
Select Borrow	105	34	7	30% max passing No. 200 sieve	A-2,A-3, A-2-4	A-1-a, A-1-b, A-3, A-2-4
Capping Borrow	105	34	7	30% max passing No. 200 sieve*	A-2,A-3, A-2-4	A-1-a, A-1-b, A-3, A-2-4
Modified Borrow	125	30	9	50% min.retained on No. 4 sieve	Any material except A-5	A-2-4, A-4**
Common Borrow	100	N/A	N/A	N/A	N/A	N/A

* When material has no liquid and plastic limit, and the amount of material that passes the No 4 sieve and retained on the No. 10 sieve is less that 10 percent of the total sample mass, the material shall have at least 15 percent passing the No. 200 sieve.
** When A-4, the material has to be a manufactured product.

CATEGORY 900
MATERIALS

SECTION 916 — SOIL AND SOIL-AGGREGATE BORROW

916.01 Borrow Excavation.

741 **ADD:** The following at the end of the section.

916.01.05 Stormwater Management (SWM) Facility Embankment Clay Core Borrow. A-2-7, A-7-2, A-4-7, A-7-4 or A-7 material and free of roots, stumps, wood, rubbish or other objectionable materials, having a maximum particle size of three inches, having a minimum dry density not less than 95 percent of the maximum dry density, and having a moisture content within plus or minus 2 percent when using T 99.

CATEGORY 900
MATERIALS

SECTION 917 — MISCELLANEOUS PROTECTIVE COATINGS

741 **DELETE:** SECTION 917 — MISCELLANEOUS PROTECTIVE COATINGS in its entirety.

INSERT: The following.

SECTION 917 — MISCELLANEOUS PROTECTIVE COATINGS

917.01 EPOXY PROTECTIVE COATINGS FOR CONCRETE. Protective coatings shall be two component epoxy systems for use in conjunction with concrete. One component shall be a clear or pigmented condensation product of the reaction of epichlorohydrin with bisphenol A, the resin of which shall be composed of 100 percent reactive constituents. The other component shall be a clear polyamide hardener.

The producer shall submit a sample of each component for laboratory analysis. The sample shall be coded as the original sample. The original and all subsequent samples shall conform to the following:

TEST PROPERTY	TEST METHOD	SPECIFICATION LIMITS
Pot Life, hr min	Fed. Spec TT-C-535	8
Color	Fed. Std. 595	Gray No. 26440
Dry Film Thickness 1st coat, mil min 2nd coat, mil min	D 1005	 2 3
Sagging	D 4400	Must pass test for Recommended film Thickness
Flexibility	Federal Spec TT-P-115	Must not crack, check or delaminate
Infrared Spectrogram	Equipment Manufacturer's Procedure	Each component shall match original sample
Tensile Strength, psi min	MSMT 609	400

917.02 FUSION BONDED EPOXY POWDER COATINGS FOR STEEL. A775. The epoxy protective coating shall be a one-coat, heat curable, thermosetting powdered coating that is electrostatically applied on metal surfaces as specified. For reinforcement steel, the color shall

be bright, in order to contrast with the normal color of reinforcement and rust (e.g. orange, red, green, yellow etc. and not brown or any color in the rust family). Reinforcement steel coated before fabrication shall have all hairline cracks and minor damage on fabrication bends patched, even if there is no bond loss. Select epoxy coating material from the Qualified Products List (QPL) maintained by the Office of Materials Technology (OMT).

917.02.01 Touch Up System. D3963. Material used for the touch up system shall be a two part epoxy system designated and color matched for patching the epoxy coating used.

Patching material shall be available through the manufacturer of the epoxy powder. The patching material shall be fully cured one hour after application at 35 F ambient.

917.02.02 Certification. The manufacturer shall furnish certification as specified in TC-1.03.

917.03 FUSION BONDED POLYESTER POWDER.

917.03.01 Materials. The polyester powder shall be super durable TGIC (Triglycidyl Isocyanurate) polyester conforming to 917.03.03. The polyester powder shall be selected from the QPL maintained by OMT.

917.03.02 Polyester Qualification Requirements. The following physical tests will only be required to qualify the polyester, and will not be required for certification:

TEST PROPERTY	TEST METHOD	SPECIFICATION LIMITS
Abrasion Resistance	D 1044 - Taber Abraser CS-10, 1000 gm load, 1000 cycles,	100 mg max weight loss
Adhesion	D 3359, Method A (Bonderite 1000 panel)	Rating 5A
Gloss	D 525, 60° initial	30 - 45 per Fed. Std 595
Hardness	D 3363	Min 2H - No gouge
Impact	D 2794	Pass 80 in.·lb
Salt Spray Resistance	B 117, D 1654 1000 hr (Bonderite 1000 panel)	Table 2, Rating 7
Thickness	G 12	7 ± 2 mils
Color	E 1331 or E 1338	As specified in the Contract Documents from Fed. Std. 595 Color No. 20040
Infrared Spectrogram	Equipment manufacture's procedures	Manufacturer's IR
Weather Resistance	D4587, test condition D. Test shall be conducted with a UVA lamp (340 nm peak) for 1000 hr	50 % min gloss retention
Specific Gravity	D 5965	Manufacturer's result

Chloride Permeability	A775, A 1.3.4	<0.0001*M*

917.03.03 Certification. The polyester powder manufacturer shall furnish production batch certification as specified in TC-1.03 showing conformance to the following:

TEST PROPERTY	TEST METHOD	SPECIFICATION LIMITS
Infrared Spectrogram	D 2621	Match Qualification sample
Taber Abrasion Resistance, mg loss, max	D 4060	100
Specific Gravity	D 5965 (Method A)	Qualification sample ± 0.02
Color	E 1331 or E 1338	Match Fed. Std. 595 color no. specified in Contract Documents

917.03.04 Acceptance. Acceptance will be based on the quality control test results required on the manufacturer's certification. The coating applicator shall be responsible for reviewing certifications to ensure conformance to TC-1.03. The coating applicator shall also maintain a file of all reviewed certifications.

CATEGORY 900
MATERIALS

SECTION 918 — TRAFFIC BARRIERS

747 **DELETE: 918.01 TRAFFIC BARRIER W BEAM** in its entirety.

INSERT: The following.

918.01 TRAFFIC BARRIER W BEAM/THRIE-BEAM. M 180, Type II for rail elements and end treatments. Coat galvanized rail and end treatment elements designated for fusion bonded polyester powder coating in accordance with 465. Galvanized rail and end treatments to be fusion bonded powder coated shall be fabricated and have holes punched prior to being hot dipped galvanized.

DELETE: 918.02 TRAFFIC BARRIER POSTS in its entirety.

INSERT: The following.

918.02 TRAFFIC BARRIER POSTS. A36 for steel and M 111 for galvanized coating. Coat galvanized post elements designated for fusion bonded polyester powder coating in accordance with Section 465. Galvanized posts to be fusion bonded powder coated shall be fabricated and have holes punched prior to being hot dipped galvanized.

CATEGORY 900
MATERIALS

SECTION 920 — LANDSCAPING MATERIALS

748 **DELETE:** Section 920 — Landscaping Materials, in its entirety.

INSERT: The following:

SECTION 920 — LANDSCAPING MATERIALS

920.01 SOILS. Topsoil, Subsoil, and Bioretention Soil Mix shall conform to requirements of this section. Soils shall be sampled, tested and approved per specifications of MSMT 356 by the Soils and Aggregates Technology Division of the Office of Materials Technology, or by other approved tests or laboratories. Soils shall be amended as specified by the Nutrient Management Plan (NMP).

920.01.01 Existing Topsoil and Salvaged Topsoil.

(a) Existing Topsoil. Existing topsoil is the surface material of existing landscaped areas on SHA property that will be used for seeding or other landscape construction without excavation or significant grading.

(b) Salvaged Topsoil. Salvaged topsoil is the surface material of existing landscaped areas on SHA property that will be used for seeding or other landscape construction after being excavated, stockpiled, and placed in designated areas.

(c) Composition. Existing topsoil and salvaged topsoil shall conform to the following:

<table>
<tr><th colspan="6">COMPOSITION - EXISTING TOPSOIL & SALVAGED TOPSOIL</th></tr>
<tr><th>TEST PROPERTY</th><th>TEST [1] METHOD</th><th colspan="4">TEST VALUE AND AMENDMENT</th></tr>
<tr><td>Prohibited Weeds</td><td>—</td><td colspan="4">Free of live stems or roots of Shattercane, Johnsongrass, Canada Thistle, Bull Thistle, Plumeless Thistle, Musk Thistle, and Common Reed when inspected before transportation.</td></tr>
<tr><td>Debris</td><td>—</td><td colspan="4">1.0 % or less by weight of cement, concrete, asphalt, crushed gravel or construction debris when inspected.</td></tr>
<tr><td rowspan="4">Grading Analysis</td><td rowspan="4">MSMT 356</td><td colspan="2">Sieve Size</td><td colspan="2">Passing by Weight Minimum %</td></tr>
<tr><td colspan="2">2 in.</td><td colspan="2">100</td></tr>
<tr><td colspan="2">No. 4</td><td colspan="2">90</td></tr>
<tr><td colspan="2">No. 10</td><td colspan="2">80</td></tr>
<tr><td rowspan="5">Textural Analysis</td><td rowspan="5">MSMT 356</td><td colspan="2">Particle</td><td colspan="2">% Passing by Weight</td></tr>
<tr><td>Size</td><td>mm</td><td>Minimum</td><td>Maximum</td></tr>
<tr><td>Sand</td><td>2.0 – 0.050</td><td>15</td><td>77</td></tr>
<tr><td>Silt</td><td>0.050 – 0.002</td><td rowspan="2">Combined Silt and Clay 23</td><td>80</td></tr>
<tr><td>Clay</td><td>less than 0.002</td><td>30</td></tr>
<tr><td>Soil pH</td><td>MSMT 356</td><td colspan="4">pH of 4.8 to 7.6. Apply limestone to topsoil with pH 4.8 to 6.1 per NMP. Apply sulfur to topsoil with pH 7.1 to 7.6 per NMP.</td></tr>
<tr><td>Organic Matter</td><td>MSMT 356</td><td colspan="4">1.0 to 8.0 % OM by weight. Apply compost to topsoil with 1.0 to 1.7% OM per NMP.</td></tr>
<tr><td>Nutrient Content</td><td>MSMT 356</td><td colspan="4">Administration will assess. Apply fertilizer per NMP for nitrogen requirement and optimum fertility index values (FIV) for phosphorus and potassium.</td></tr>
<tr><td>Soluble Salts</td><td>MSMT 356</td><td colspan="4">800 ppm (1.25 mmhos/cm) or less. Apply gypsum to topsoil with 500 to 800 ppm (0.78 to 1.25 mhos/cm) per NMP.</td></tr>
<tr><td>Harmful Materials</td><td>—</td><td colspan="4">Topsoil shall not contain substances in concentrations that are harmful to human health, water quality, or plant growth. Industrial waste such as ash, slag, raw sludge, dredge spoil, or similar materials shall not be soil components.</td></tr>
<tr><td colspan="6">Note:
[1] Materials Standards and Materials Testing 356 (MSMT 356) published by the Administration defines the approved test methods; other materials shall be approved by visual inspection or methods defined by the Landscape Operations Division.</td></tr>
</table>

920.01.02 Furnished Topsoil. A natural, friable, surface soil that is uniform in color and texture, and not derived from the project. Producers shall be included in the Qualified Products List maintained by the Administration for Furnished Topsoil.

(a) Composition. Furnished topsoil shall conform to the following.

COMPOSITION - FURNISHED TOPSOIL					
TEST PROPERTY	**TEST [1] METHOD**	**TEST VALUE AND AMENDMENT**			
Prohibited Weeds	—	Free of live stems and roots of species in 920.01.01 as well as live stems and roots of Bermudagrass, Quackgrass, and Yellow Nutsedge.			
Debris	—	920.01.01			
Grading Analysis	MSMT 356	920.01.01			
Textural Analysis	MSMT 356	**Particle**		**% Passing by Weight**	
		Size	**mm**	**Minimum**	**Maximum**
		Sand	2.0 – 0.050	20	75
		Silt	0.050 – 0.002	Combined Silt and Clay 25	75
		Clay	less than 0.002		20
Soil pH	MSMT 356	pH of 5.2 to 7.6 Apply limestone to topsoil with pH 5.2 to 6.1 per NMP. Apply sulfur to topsoil with pH 7.1 to 7.6 per NMP.			
Organic Matter	MSMT 356	920.01.01			
Nutrient Content	MSMT 356	920.01.01			
Soluble Salts	MSMT 356	500 ppm (1.25 mmhos/cm) or less.			
Harmful Materials	—	920.01.01			

Note:

[1] Materials Standards and Materials Testing 356 (MSMT) published by the Administration defines the approved test methods; other materials shall be approved by visual inspection or methods defined by the Landscape Operations Division.

(b) Storage. Furnished topsoil shall be a homogenous mixture stored at a specific, identifiable site in a stockpile constructed as specified in 308.03.28 and 701.03.02(c).

(c) Approval. Tests shall be completed and approval will be granted before furnished topsoil is delivered. Ensure that Form 27B has been completed and that a source of supply letter for the furnished topsoil soil has been submitted and approved.

(d) Delivery. Certification shall be submitted that the furnished topsoil is delivered from an approved stockpile. A bill of lading or other acceptable documentation that identifies the approved source of supply shall be submitted when furnished topsoil is delivered.

920.01.03 Salvaged Subsoil. Salvaged subsoil is the subsurface material of existing areas that will be used for landscape construction after being excavated, stockpiled, and placed in designated areas.

(a) Composition. Salvaged topsoil shall conform to the following:

COMPOSITION - SALVAGED SUBSOIL					
TEST PROPERTY	**TEST [1] METHOD**	**TEST VALUE AND AMENDMENT**			
Prohibited Weeds	—	920.01.01			
Debris	—	5.0 % or less by weight of any combination of cement, concrete, asphalt, or other construction debris when inspected.			
Grading Analysis	MSMT 356	**Sieve Size**		**Passing by Weight Minimum %**	
		2 in.		90	
		No. 4		85	
		No. 10		60	
Textural Analysis	MSMT 356	**Particle**		**% Passing by Weight**	
		Size	**mm**	**Minimum**	**Maximum**
		Sand	2.0 – 0.050	10	85
		Silt	0.050 – 0.002	10	85
		Clay	less than 0.002	5	40
Soil pH	MSMT 356	pH of 4.5 to 7.8.			
Organic Matter	MSMT 356	0.1 to 5.0 % by weight.			
Soluble Salts	MSMT 356	1000 ppm (1.56 mmhos/cm) or less.			
Harmful Materials	—	920.01.01			

Note: [1] Materials Standards and Materials Testing 356 (MSMT) published by the Administration defines the approved test methods; other materials shall be approved by visual inspection or methods defined by the Landscape Operations Division.

920.01.04 Furnished Subsoil. A natural subsurface soil that is uniform in texture and not derived from the project. Furnished subsoil shall conform to the following:

(a) Composition. Furnished subsoil shall conform to the following:

COMPOSITION - FURNISHED SUBSOIL		
TEST PROPERTY	**TEST [1] METHOD**	**TEST VALUE AND AMENDMENT**
Prohibited Weeds	—	920.01.01
Debris	—	920.01.03
Grading Analysis	MSMT 356	920.01.03
Textural Analysis	MSMT 356	920.01.03
Soil pH	MSMT 356	920.01.03
Organic Matter	MSMT 356	920.01.03
Soluble Salts	MSMT 356	700 ppm (1.09 mmhos/cm) or less
Harmful Materials	—	920.01.01

Note:

[1] Materials Standards and Materials Testing 356 (MSMT) published by the Administration defines the approved test methods; other materials shall be approved by visual inspection or methods defined by the Landscape Operations Division.

(b) Storage. Refer to 920.01.02(b).

(c) Approval. 9Refer to 20.01.02(c).

(d) Certification and Delivery. Refer to 920.01.02(d).

920.01.05 Bioretention Soil Mix (BSM). BSM shall be a homogenous mixture as follows:

(a) Components. BSM shall be composed of Sand, Furnished Topsoil, and Hardwood Mulch. BSM may include approved soil amendments. No other components shall be used.

(1) Sand. Sand shall be washed silica sand that conforms to ASTM C-33 or ASTM M-6 with less than 1 percent by weight of any combination of diabase, greystone, calcareous, or dolomitic sand.

(2) Furnished Topsoil. Refer to 920.01.02.

(3) Hardwood Mulch. Hardwood Mulch shall be the bark and wood of hardwood trees that is milled and screened to a uniform particle size of 2 in. or less. Hardwood Mulch

shall be composted and aged for 6 months or longer, with negligible quantity of sawdust and no foreign materials.

(4) Amendments. Refer to 920.02. Limestone, Sulfur, and Iron Sulfate may be used to adjust pH of BSM. No other amendments shall be used.

(b) Composition. BSM shall conform to the following:

COMPOSITION- BIORETENTION SOIL MIX (BSM)				
TEST PROPERTY	**TEST VALUE**			
Weeds	Free of seed and viable plant parts of species in 920.06.02(a)(b)(c) when inspected.			
Debris	No observable content of cement, concrete, asphalt, crushed gravel or construction debris.			
Hardwood Mulch	20% of the loose volume of BSM when inspected.			
Textural Analysis	**Particle**		**% Passing by Weight**	
	Size	**mm**	**Minimum**	**Maximum**
	Sand	2.0 – 0.050	55	85
	Silt	0.050 – 0.002	1	20
	Clay	less than 0.002	1	8
Soil pH	pH of 5.7 to 7.4.			
Organic Matter	Minimum 1.5 % by weight.			
Soluble Salts	500 ppm (1.25 mmhos/cm) or less.			
Harmful Materials	920.01.01(a).			

(c) Storage. Refer to 920.01.02(b).

(d) Approval. Refer to 920.01.02(c).

(e) Certification and Delivery. Refer to 920.01.02(d).

920.02 SOIL AMENDMENTS.

920.02.01 Limestone. Limestone shall be an agricultural product manufactured and labeled for sale in Maryland for increasing soil pH. Limestone shall contain at least 85 percent calcium and magnesium carbonates. Dolomitic limestone shall contain at least 10 percent magnesium as magnesium oxide and 85 percent calcium and magnesium carbonates.

Limestone shall be supplied as a fine powder, or as pellets produced from fine powder, that conforms to the following:

LIMESTONE GRADING ANALYSIS	
SIEVE Size Number	**PASSING BY WEIGHT Minimum %**
10	100
20	98
100	50

920.02.02 Sulfur. Sulfur shall be an agricultural product manufactured and labeled for sale in Maryland for reducing soil pH. Sulfur labeled as a fertilizer may also be used to supply sulfur as a plant nutrient. Sulfur shall be supplied as a fine powder or pelletized powder with a minimum purity of 90 percent elemental sulfur.

920.02.03 Iron Sulfate. Iron sulfate shall be an agricultural product manufactured and labeled for sale in Maryland for reducing soil pH. Iron sulfate labeled as a fertilizer may also be used to supply sulfur or iron as a plant nutrient. Iron sulfate shall be supplied as a fine powder or pelletized powder with a minimum purity of 15 percent water soluble iron derived from ferrous sulfate.

920.02.04 Gypsum. Gypsum shall be an agricultural product manufactured and labeled for sale in Maryland as an aid for improving soil structure and removing soil soluble salts, or as a fertilizer to supply calcium and sulfate. Gypsum shall be supplied as a fine powder or pelletized powder with a minimum purity of 68 percent calcium sulfate dihydrate.

920.02.05 Compost.

(a) Compost Types. Compost shall be an agricultural product of biosolids or source-separated materials manufactured and labeled for sale in Maryland.

(b) Stability. Compost shall be biologically mature and no longer able to reheat to thermophilic temperatures.

(c) pH. Compost shall have a pH of 6.0 to 7.5.

(d) Soluble Salts. Compost shall have a soluble salt concentration less than 10.0 mmhos/cm.

(e) Moisture. Compost shall have a moisture content of 30 to 55 percent. When delivered, compost shall have a weight of 1,400 lb per cubic yard or less.

(f) Particle Size and Grading. Compost shall be screened so that it has a uniform particle size of 0.5 in. or less, with grading analysis as follows.

COMPOST GRADING ANALYSIS	
SIEVE SIZE mm	**PASSING BY VOLUME Maximum %**
4.75	90
0.425	25
0.75	2.2

920.02.06 Peat Moss. A milled sphagnum peat moss with negligible woody substances.

920.02.07 Aged Pine Bark Fines. Derived from the bark of pine trees that have been composted and milled to a fineness approved for use by the Landscape Operations Division.

920.02.08 Water Absorbent Gel. A cross linked polyacrylamide agricultural product used to maintain moisture around bare root plants and as a soil conditioner. Formulas used shall conform to the manufacturer's recommendations.

920.03 FERTILIZERS.

920.03.01 Composition. Standard Fertilizers and Special Fertilizers shall be commercial grade products labeled for sale and use as agricultural fertilizer, and shall conform to Federal and Maryland State regulations and the Standards of the Association of Official Analytical Chemists. All analyses are subject to approval by the Landscape Operations Division prior to application.

(a) Standard Fertilizer. Standard fertilizers shall be produced of ingredients, analysis, and composition as follows:

(1) Ingredients. Standard fertilizers shall include one or more of the following:

FERTILIZER INGREDIENTS	
ammonium nitrate	polymer coated urea
ammonium sulfate	potassium chloride
biosolids	potassium nitrate
calcium nitrate	potassium sulfate (SOP)
diammonium phosphate (DAP)	sulfur coated urea
isobutylidene diurea	triple super phosphate
methylene urea	urea
monoammonium phosphate (MAP)	ureaform (UF)

(2) Analysis and Composition. Standard fertilizers shall contain nitrogen (N), phosphorus (P), potassium (K), and sulfate (SO_4) derived from ingredients above.

STANDARD FERTILIZER ANALYSIS ANDCOMPOSITION	
FERTILIZER	**USE**
0-0-50 SOP [a]	Source of phosphorus (P) and sulfate (SO_4) fertilizer
11-52-0 MAP [a]	Source of nitrogen (N) and phosphorus (P) fertilizer
38-0-0 UF [a]	Source of slow-release nitrogen (N) fertilizer
20-16-12 (83% UF with MAP & SOP)	Turfgrass Establishment and other seeding and refertilizing
15-30-15 [b]	Temporary Seed
Notes: [a] Purity shall be at least 98% UF, MAP, or SOP as indicated. [b] Mixture of ingredients in 920.03.01(a)(1) with no more than 2% of any combination of other materials. [c] Mixture of UF, MAP, and SOP with no more than 2% of any combination of other materials.	

(b) Special Fertilizers. Special fertilizers shall be of ingredients, analysis, and composition as follows:

(1) Ingredients. Special fertilizers shall provide label analysis guaranteeing nitrogen, phosphorus, and potassium from ingredients in 920.03.01(a) and also include plant micronutrients, coatings, or materials to augment their performance.

(2) Analysis and Composition. As follows:

SPECIAL FERTILIZER ANALYSIS AND COMPOSITION	
FERTILIZER [a]	**USE**
14-14-14 Polymer-coated fertilizer with minor nutrients	Slow-release fertilizer used to install trees, shrubs, perennials and other plant materials.
14-14-14 Granular fertilizer with minor nutrients	Slow-release fertilizer used to install trees, shrubs, perennials and other plant materials.
20-10-5 21 to 23 grams per fertilizer tablet. 13% water insoluble and 7% water soluble N, with minor nutrients	Slow release fertilizer tablet used to install trees, shrubs, perennials and other plant materials.
20-20-20 Water soluble powder fertilizer with minor nutrients	Fertilizer solution used to refertilize trees, shrubs, perennials and other plant materials
Note: [a] Shall be a mixture of any ingredients listed in 920.03.01(a)(1) and (b)(1) with no more than 5% by weight of any combination of other materials.	

920.04 MULCHES. Materials used as mulch shall have a uniform texture and be free from foreign materials or concentrations of metals, chemicals, or other substances that are harmful to human health, water quality, or plant growth.

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

02-03-15

920.04.02 Wood Cellulose Fiber Mulch. A uniformly processed wood product that is able to form a homogenous slurry with seed, fertilizer, and other materials under agitation with water.

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

The manufacturer shall furnish certification as specified in TC-1.03 of the Technical Association of Pulp and Paper Industry (TAPPI) in conformance with the following:

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

The material shall be delivered in packages of uniform weight, which shall not exceed 75 lb net weight and shall bear the name of the manufacturer, the net weight, and a supplemental statement of the net weight content.

920.04.03 Shredded Hardwood Bark (SHB) Mulch. Shall consist of natural bark derived from hardwood trees that has been milled and screened to a maximum 4 in. particle size. SHB mulch shall contain negligible quantities of sawdust or other non-bark woody materials.

920.04.04 Composted Wood Chip (CWC) Mulch. Shall consist of natural wood mechanically reduced to a maximum size of 2 x 2 x 0.5 in. by a chipping machine before being composted. Grading analysis of CWC mulch shall be as follows:

COMPOSTED WOOD CHIP MULCH	
SIEVE SIZE in.	**PASSING BY VOLUME Maximum %**
2	100
1	30
0.5	10

920.05 SOIL STABILIZATION MATTING.

920.05.01 Soil Stabilization Matting (SSM). SSM products shall be selected from the Office of Materials Technology's Qualified Products List (QPL) for Soil Stabilization Matting Manufacturers.

SSM shall consist of machine-produced matting of uniform thickness, weave, or distribution of fibers, supplied in rolls at least 40 in. wide. SSM shall be smolder resistant.

The chemical components shall be nonleaching, nontoxic to vegetation and germinating seed, and noinjurious to the skin.

(a) Type A. Degradable; excelsior or nonwoven coconut fibers with degradable, synthetic netting on top and bottom; netting shall not be permanent or quick break down. Type A soil stabilization matting products shall be listed in the current AASHTO National Transportation Product Evaluation Program (NTPEP) Report for Erosion Control Products. Large scale results shall be obtained by a Geosynthetic Institute Accredited or other approved laboratory for Criteria marked *.

COMPOSITION - TYPE A SSM		
CRITERIA	**METHOD**	**MEASUREMENT**
Thickness	D 6525	At least 0.25 in.
Weight	D 6475	At least 7.9 oz per yd^2
Tensile Strength – MD	D 6818	At least 6.25 lb per in.
Tensile Strength – TD	D 6818	At least 4.7 lb per in.
Light Penetration	D 6567	At least 5%
Slope Erosion – C Factor*	D 6459	No more than 0.2
Shear for 0.5 in Soil Loss*	D 6460	At least 1.75 lb per ft^2
Netting Opening		No more than 2.0 x 1.0 in.
Thread		Degradable
Stitching and Spacing		No more than 4.0 in apart

(b) Type B. Permanent; non-woven, nondegradable, UV stabilized, synthetic fibers; with non-degradable, UV stabilized, synthetic netting on top and bottom. Type B soil stabilization matting products shall be listed in the current AASHTO National Transportation Product Evaluation Program (NTPEP) Report for Erosion Control Products. Large scale results shall be obtained by a Geosynthetic Institute Accredited or other approved laboratory for Criteria marked *.

COMPOSITION - TYPE B SSM		
CRITERIA	**METHOD**	**MEASUREMENT**
Thickness	D 6525	At least 0.3 in.
Weight	D 6655	At least 10.0 oz per yd^2
Tensile Strength – MD	D 6818	At least 12.5 lb per in.
Tensile Strength – TD	D 6818	At least 12.5 lb per in.
Tensile Strength > 500 hr. exp.	D 4355	At least 80 % of original
Light Penetration	D 6567	At least 10 %
Slope Erosion – C Factor*	D 6459	No more than 0.2
Shear for 0.5 in Soil Loss*	D 6460	At least 2.25 lb per ft^2
Netting Opening		No more than 1.0 x 0.75 in.
Thread		Nondegradable, UV stabilized, synthetic
Stitching and Spacing		No more than 4.0 in. apart

(c) Type C. Permanent; nondegradable, synthetic lattice; and easily filled with soil.

COMPOSITION - TYPE C SSM		
CRITERIA	**METHOD**	**MEASUREMENT**
Thickness	D 6525	At least 0.4 in.
Weight	D 6655	At least 7.0 oz per yd^2
Tensile Strength – MD	D 6818	At least 12.5 lb per in.
Tensile Strength – TD	D 6818	At least 9.5 lb per in.
Tensile Strength > 500 hr. exp.	D 4355	At least 80 % of original
Porosity or Open Area		At least 80 %

(d) Type D. Degradable; woven coir.

COMPOSITION - TYPE D SSM		
CRITERIA	**METHOD**	**MEASUREMENT**
Thickness	D 6525	At least 0.30 in.
Weight	D 6475	At least 19.0 oz per yd^2
Porosity or Open Area		At least 35 %

(e) Type E. Degradable; excelsior, straw, or straw/coconut blend fibers; with degradable, synthetic netting on top and bottom; netting shall not be permanent or quick break down. Type E soil stabilization matting products shall be listed in the current AASHTO National Transportation Product Evaluation Program (NTPEP) Report for Erosion Control Products. Large scale results shall be obtained by a Geosynthetic Institute Accredited or other approved laboratory for Criteria marked *.

COMPOSITION - TYPE E SSM		
CRITERIA	**METHOD**	**MEASUREMENT**
Thickness	D 6525	At least 0.25 in.
Weight	D 6475	Excelsior: 6.0 to 7.9 oz per yd^2
		Straw; Straw & Coconut: At least 6.0 oz per yd^2
Tensile Strength – MD	D 6818	At least 6.25 lb per in.
Tensile Strength – TD	D 6818	At least 2.5 lb per in.
Light Penetration	D 6567	At least 5 %
Slope Erosion – C Factor*	D 6459	No more than 0.2
Shear for 0.5 in Soil Loss*	D 6460	At least 1.5 lb per ft^2
Netting Opening		Excelsior: 2.0 x 1.0 in. or less
		Straw; Straw & Coconut: 0.75 x 0.75 in. or less
Thread		Degradable
Stitching and Spacing		Excelsior: 4.0 in. apart or less
		Straw, or Straw & Coconut: 2.0 in apart or less

920.05.02 Fasteners for Soil Stabilization Matting and Turfgrass Sod. Fasteners shall selected as specified in Section 709.03.06 and conform to the following:

(a) Wood Peg. Wood, biodegradable, Untreated; single leg is driven into the soil so that wider top is flush with turfgrass sod and SSM.

6 Inch. Approx. 6 in. long, 3/8 in. thick; top 1 in. wide, tapered to base.

(b) T-Head Pin. Molded plastic; biodegradable. Single leg with barbs is driven into the soil so that molded T-Head top is flush with turfgrass sod and SSM.

6 Inch. Approx. 6 in. long, 3/8 in. thick; head 1 in. wide.

8 Inch. Approx. 8 in. long, 3/8 in. thick; head 1 in. wide.

(c) Circle-Top Pin. Steel wire; single leg is driven into the soil so that coil or loop top is flush with turfgrass sod and SSM.

6 Inch. 11 gauge; leg 6 in long.

8 Inch. 11 gauge; leg 8 in. long.

(d) Round-Head Pin. Molded plastic; biodegradable. Single leg with barbs is driven into the soil so that molded disk top is flush with turfgrass sod and SSM.

6 Inch. Approx. 6 in long; head 1 in. diameter.

8 Inch. Approx. 8 in long; head 1 in. diameter.

(e) U-Shape Staple. Steel wire; two main legs are driven into the soil so that top of staple is flush with turfgrass sod and SSM.

6 Inch. 11 gauge bent into U shape; legs 6 in. long; top 1 to 1-1/2 in. wide.

8 Inch. 8 gauge bent into U shape; legs 8 in. long; top 1 to 1-1/2 in. wide.

12 Inch. 8 gauge bent into U shape.; legs 12 in. long; top 1 to 1-1/2 in. wide.

(f) Fabric Pin. Steel nail; single leg is driven into the soil so that steel washer top is flush with SSM.

12 Inch. 11 gauge approx. 12 in. long.

18 Inch. 3/16 in. approx 18 in. long.

920.06 SEED AND TURFGRASS SOD STANDARDS.

920.06.01 Names and Naming. The authority for common and scientific names shall be the USDA NRCS The Plants Database website at http://plants.usda.gov. Cultivar names shall be those of the registered cultivar.

Plant and seed identification, tags, and labels shall correspond to the common name and scientific name of the species in The Plants Database. Any conflict in names or naming shall be resolved by the Engineer in consultation with the Landscape Operations Division.

920.06.02 Prohibited Weeds.

(a) Weeds Prohibited in Turfgrass Sod and SHA Seed Mixtures. Turfgrass Sod, SHA Turfgrass Seed Mix, SHA Temporary Seed Mix, and Additive Seed shall be free from seed or viable parts of the following species:

WEEDS PROHIBITED IN TURFGRASS SOD & SHA SEED MIXTURES	
COMMON NAME	**SCIENTIFIC NAME**
Annual Bluegrass	*Poa annua* L.
Balloonvine	*Cardiospermum halicacabum* L.
Bermudagrass	*Cynodon dactylon* (L.) Pers. (approved for Bermudagrass sod)
Canada Thistle	*Cirsium arvense* (L.) Scop.
Carolina Horsenettle	*Solanum carolinense* L.
Common Corncockle	*Agrostemma githago* L.
Common Reed = Phragmites	*Phragmites australis* (Cav.) Trin. ex Steud.
Crested Anoda = Spurred Anoda	*Anoda cristata* (L.) Schltdl.
Dodder	*Cuscuta spp.* L.
Field Bindweed	*Convolvulus arvensis* L.
Japanese Bristlegrass = Giant Foxtail	*Setaria faberi* Herrm.
Java-Bean = Sicklepod	*Senna obtusifolia* (L.) Irwin and Barneby
Johnsongrass	*Sorghum halepense* (L.) Pers. and hybrids
Meadow Garlic = Wild Onion	*Allium canadense* L.
Plumeless Thistle, Musk Thistle	*Carduus* L.
Quackgrass	*Elytrigia repens* (L.) Gould
Rough Cocklebur	*Xanthium strumarium* L.
Serrated Tussock	*Nassella trichotoma* (Nees) Hack.
Wild Garlic	*Allium vineale* L.
Yellow Nutsedge	*Cyperus esculentus L.*

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

WEEDS PROHIBITED IN MEADOW & WILDFLOWER SEED	
COMMON NAME	**SCIENTIFIC NAME**
Asiatic Tearthumb = Mile-a-Minute	*Polygonum perfoliatum* L.
Burdock and related species	*Arctium* L.
Canarygrass = Reed Canarygrass and related spp.	*Phalaris* L.
Common Wormwood = Mugwort	*Artemisia vulgaris* L. var. *vulgaris*
Dogbane and related spp.	*Apocynum* L.
Eastern Poison Ivy	*Toxicodendron radicans* (L.) Kuntze
Fig Buttercup = Lesser Celandine	*Ranunculus ficaria* L. var. *bulbifera* Marsden-Jones
Garlic Mustard	*Alliaria petiolata* (M. Bieb.) Cavara and Grande
Giant Hogweed	*Heracleum mantegazzianum* Sommier and Levier
Japanese Honeysuckle, Tatarian Honeysuckle, related spp.	*Lonicera* L.
Japanese Knotweed	*Polygonum cuspidatum* Siebold and Zucc.
Lesser Knapweed = Spotted Knapweed	*Centaurea nigra* L.
Multiflora Rose	*Rosa multiflora* Thunb.
Nepalese Browntop = Japanese Stiltgrass	*Microstegium vimineum* (Trin.) A. Camus
Poison Hemlock	*Conium maculatum* L.
Purple Loosestrife and related spp.	*Lythrum* L.
Silvergrass and related spp.	*Miscanthus* Andersson
Thistle and related spp.	*Cirsium* Mill., *Onopordum L.*

(c) Weeds Prohibited in Shrub Seed. Shrub Seed shall be free of species listed in (a) and (b) and the following species:

WEEDS PROHIBITED IN SHRUB SEED	
COMMON NAME	**SCIENTIFIC NAME**
Burningbush	*Euonymus alatus* (Thunb.) Siebold
Common Buckthorn	*Rhamnus cathartica L.*
Japanese Barberry	*Berberis thunbergii* DC.
Oriental Bittersweet	*Celastrus orbiculatus* Thunb.
Oleaster; Russian Olive, Autumn Olive, and related spp.	*Elaeagnus L.*
Privet, and related species	*Ligustrum L.*
Tree of Heaven	*Ailanthus altissima* (Mill.) Swingle

920.06.03 Turfgrass Sod. Turfgrass sod shall be Maryland Certified Tall Fescue Sod unless Bermudagrass Sod or Zoysiagrass Sod is specified.

Sod shall be field grown in the State of Maryland in compliance with the Maryland Turfgrass Law and Regulations of the State of Maryland. Each load of tall fescue sod shall bear a Maryland State Certified Label.

Sod shall be sufficiently knitted when harvested to resist breakage under normal handling and be in good health at the time of delivery. Sod shall be machine cut in strips at least 14 in. wide. Tall Fescue Sod shall be uniform thickness of 0.75 to 1.25 in., excluding top growth, with thatch thickness less than 3/8 in.

Prior to harvest, Tall Fescue Sod shall be mowed to a height of 2.0 to 3.5 in. Bermudagrass Sod and Zosiagrass Sod shall be mowed to a height of 0.75 to 3.0 in.

920.06.04 Approved Cultivars. Refer to 'University of Maryland Turfgrass Technical Update TT-77 Recommended Turfgrass Cultivars for Certified Sod Production and Seed Mixtures in Maryland'. Only cultivars included in TT-77 may be used. When no cultivar is specified, any common type cultivar of the species may be used.

920.06.05 Seed Testing and Sampling. Seed shall comply with the Maryland Seed Law and Regulations of the State of Maryland. Seed suppliers shall assume charges for seed inspections and testing.

(a) Certified Seed. Component cultivars of SHA Turfgrass Seed Mix, SHA Special Purpose Seed Mix, SHA Temporary Seed Mix, and any seed used as additives for these mixes, shall be certified and carry the tags of their state of origin that show the percent purity, percent germination, percent weed seed, and types and content of noxious weed seed.

(b) SHA Seed Mixtures. Turfgrass Seed Mix, SHA Special Purpose Seed Mix, and SHA Temporary Seed Mix shall be sampled and tested by an inspector of the Maryland Department of Agriculture, Turf and Seed Section (MDA) for percent purity, percent germination, percent weed seed, and types and content of noxious weed seed. These seed mixtures shall conform to MDA Standards for Maryland Certified Seed and carry the certified tag of the State of Maryland.

(c) Unmixed Seed. Seed supplied for use as Meadow Seed, Wildflower Seed, and Shrub Seed shall be supplied in containers of a single species, unmixed. Each species shall be tested by the producer or supplier and carry a tag that shows the percent purity, percent germination, percent weed seed; and types and content of noxious weed seed.

920.06.06 Standards for Seed Species. Seed supplied in lots of individual species or used to produce mixes shall conform to the requirements of this section for minimum percent germination, minimum purity, and maximum percent of weed seed.

Meadow seed, wildflower seed, and shrub seed that does not conform to these standards may be used after review and approval by the Engineer in consultation with the Landscape Operations Division. The seed will be subject to use at increased seeding rates or measures to compensate for substandard seed purity, germination. weed content.

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

TURFGRASS SEED SPECIES			
COMMON NAME, and SCIENTIFIC NAME	**PURITY Min %**	**WEED Max %**	**GERM Min %**
Chewings Fescue *Festuca rubra* L. ssp. *fallax* (Thuill.) Nyman	98	0.5	85
Red Fescue *Festuca rubra* L. ssp. *rubra*	98	0.5	85
Hard Fescue *Festuca brevipila* Tracey	98	0.5	85
Kentucky Bluegrass *Poa pratensis* L. ssp. *pratensis*	95	0.4	80
Sheep Fescue *Festuca ovina* L.	98	0.5	85
Tall Fescue *Schedonorus phoenix* (Scop.) Holub = *Festuca elatior* L.	98	0.5	85

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

TEMPORARY AND GRASS ADDITIVE SEED SPECIES			
COMMON NAME, and SCIENTIFIC NAME	**PURITY Min %**	**WEED Max %**	**GERM Min %**
Cereal Rye *Secale cereale* L.	98	0.1	85
Common Barley, winter type *Hordeum vulgare* L.	98	0.3	85
Common Oat, winter type *Avena sativa* L.	98	0.5	85
Common Wheat, winter type *Triticum aestivum* L.	98	0.1	85
Foxtail Bristlegrass = Foxtail Millet *Setaria italica* (L.) P. Beauv.	99	0.1	80
Perennial Ryegrass *Lolium perenne* L. ssp. *perenne*	97	0.5	85

(c) Meadow Forb Seed. Seed shall be supplied in lots of individual species, unmixed, labeled with common name and scientific name in conformance with the following:

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

(2) Origin. Seed shall either be collected from native sources in USDA Hardiness Zone 5b, 6a, 6b and 7a in the States of Maryland, Pennsylvania, New York, New Jersey, Delaware, Virginia, West Virginia, or North Carolina, or shall be grown and produced from seed certified to have been collected from sites in the USDA Hardiness Zones of those States.

Seed that does not conform to origin requirements may be used after review and approval by the Engineer in consultation with the Landscape Operations Division.

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

MEADOW FORB SEED SPECIES	
COMMON NAME	**SCIENTIFIC NAME**
Allegheny Monkeyflower = Square Stem Monkeyflower	*Mimulus ringens* L. var. *ringens*
Bearded Beggarticks = Showy Tickseed	*Bidens aristosa* (Michx.) Britton
Blackeyed Susan	*Rudbeckia hirta* L. var. *hirta* *Rudbeckia hirta* L. var. *pulcherrima* Farw.
Browneyed Susan	*Rudbeckia triloba* L. var. *triloba* *Rudbeckia triloba* L. var. *pinnatiloba* Torr. and A. Gray
Common Boneset	*Eupatorium perfoliatum* L. var. *perfoliatum*
Common Evening Primrose	*Oenothera biennis* L.
Crimsoneyed Rose Mallow	*Hibiscus moscheutos* L.
Eastern Purple Coneflower	*Echinacea purpurea* (L.) Moench
Flat-top Goldenrod = Grass-Leaved Goldenrod	*Euthamia graminifolia* (L.) Nutt. *Euthamia graminifolia* (L.) Nutt. var. *graminifolia* *Euthamia graminifolia* (L.) Nutt. var. *hirtipes* (Fernald) C.E.S. Taylor and R.J. Taylor
Gray Goldenrod	*Solidago nemoralis* Aiton var. *nemoralis*
King of the Meadow = Tall Meadow Rue	*Thalictrum pubescens* Pursh
Lanceleaf Tickseed = Lanceleaf Coreopsis	*Coreopsis lanceolata* L.
Maryland Senna	*Senna marilandica* (L.) Link
Maximilian Sunflower	*Helianthus maximiliani* Schrad.
New England Aster	*Symphyotrichum novae-angliae* (L.) G.L. Nesom
New York Aster	*Symphyotrichum novi-belgii* (L.) G.L. Nesom var. *elodes* (Torr. and A. Gray) G.L. Nesom *Symphyotrichum novi-belgii* (L.) G.L. Nesom var. *novi-belgii* *Symphyotrichum novi-belgii* (L.) G.L. Nesom var. *villicaule* (A. Gray) J. Labrecque and L. Brouillet
New York Ironweed	*Vernonia noveboracensis* (L.) Michx.
Partridge Pea	*Chamaecrista fasciculata* (Michx.) Greene *Chamaecrista fasciculata* (Michx.) Greene var. *fasciculata* *Chamaecrista fasciculata* (Michx.) Greene var. *macrosperma* (Fernald) C.F. Reed
Seedbox	*Ludwigia alternifolia* L.
Smooth Blue Aster	*Symphyotrichum laeve* (L.) A. Löve and D. Löve var. *laeve* *Symphyotrichum laeve* (L.) A. Löve and D. Löve var. *concinnum* (Willd.) G.L. Nesom
Smooth Oxeye = Ox-eye Sunflower	*Heliopsis helianthoides* (L.) Sweet var. *helianthoides* *Heliopsis helianthoides* (L.) Sweet var. *scabra* (Dunal) Fernald
Spotted Trumpetweed = Spotted Joe Pye Weed	*Eupatoriadelphus maculatus* (L.) King and H. Rob.

	var. *maculatus*
Stiff Goldenrod	*Oligoneuron rigidum* (L.) Small var. *rigidum*
Sundial Lupine = Wild Blue Lupine	*Lupinus perennis* L. ssp. *perennis* *Lupinus perennis* L. ssp. *perennis* var. *perennis* *Lupinus perennis* L. ssp. *perennis* var. *occidentalis* S. Watson
Swamp Milkweed	*Asclepias incarnata* L. *Asclepias incarnata* L. ssp. *incarnata* *Asclepias incarnata* L. ssp. *pulchra* (Ehrh. ex Willd.) Woodson
Swamp Sunflower = Narrow-Leaved Sunflower	*Helianthus angustifolius* L.
Swamp Verbena = Blue Vervain	*Verbena hastata* L. var. *hastata*
Talus Slope Penstemon = Tall White Beardtongue	*Penstemon digitalis* Nutt. ex Sims
Trumpetweed = Joe Pye Weed	*Eupatoriadelphus fistulosus* (Barratt) King and H. Rob.
Wild Bergamot	*Monarda fistulosa* L. ssp. *fistulosa* *Monarda fistulosa* L. ssp. *fistulosa* var. *mollis* (L.) Benth. *Monarda fistulosa* L. ssp. *fistulosa* var. *rubra* A. Gray *Monarda fistulosa* L. ssp. *brevis* (Fosberg and Artz) Scora, ined.

(d) Meadow Grass, Sedge, and Rush Seed. Seed shall be supplied in lots of individual species, unmixed, labeled with common name, scientific name, and cultivar in conformance with the following:

(1) Purity. Refer to 920.06.06(c)(1). Grasses with awns shall be debearded or deawned.

(2) Origin. Refer to 920.06.06(c)(2). Cultivars may be produced in any state east of the Mississippi River.

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

MEADOW GRASS, SEDGE AND RUSH SEED SPECIES	
COMMON NAME and CULTIVARS	**SCIENTIFIC NAME**
Big Bluestem cv. Niagara	*Andropogon gerardii* Vitman
Broomsedge Bluestem = Broomsedge	*Andropogon virginicus* L. *Andropogon virginicus* L. var. *virginicus* *Andropogon virginicus* L. var. *decipiens* C.S. Campbell
Common Rush = Soft Rush = Lamp Rush	*Juncus effusus* L. var. *conglomeratus* (L.) Engelm. *Juncus effusus* L. var. *decipiens* Buchenau *Juncus effusus* L. var. *pylaei* (Laharpe) Fernald and Wiegand *Juncus effusus* L. var. *solutus* Fernald and Wiegand
Deertongue cv. 'Tioga'	*Dichanthelium clandestinum* (L.) Gould
Fowl Bluegrass	*Poa palustris L.*
Fox Sedge	*Carex vulpinoidea* Michx. var. *vulpinoidea*
Gamagrass cv. 'Meadowcrest', 'Pete'	*Tripsacum dactyloides* (L.) L.
Indiangrass cv. 'Rumsey'	*Sorghastrum nutans* (L.) Nash
Little Bluestem cv. 'Aldous'	*Schizachyrium scoparium* (Michx.) Nash var. *scoparium* *Schizachyrium scoparium* (Michx.) Nash var. *divergens* (Hack.) Gould
Longhair Sedge = Bristly Sedge	*Carex comosa* Boott
Rattlesnake Mannagrass	*Glyceria canadensis* (Michx.) Trin.
Shallow Sedge = Lurid Sedge	*Carex lurida* Wahlenb.
Switchgrass cv. 'Blackwell', 'Shelter'	*Panicum virgatum* L. var. *virgatum* *Panicum virgatum* L. var. *spissum* Linder
Virginia Wildrye	*Elymus virginicus L., Elymus virginicus* L. var. *halophilus* (E.P. Bicknell) Wiegand
Woolgrass	*Scirpus cyperinus* (L.) Kunth

(e) Wildflower Seed. Seed shall be supplied in lots of individual species, unmixed, labeled with common name, scientific name, and cultivar in conformance with the following:

(1) Purity. Species shall be 98 percent purity or greater, with 75 percent germination or greater, and with weed and/or other crop seed content of 2.5 percent or less by weight. Seed that does not conform to purity requirements may be used after approval by the Engineer in consultation with the Landscape Operation Division at increased seeding rates, or with measures to compensate for increased weed or crop seed content.

(2) Origin. Any State of the United States.

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

WILDFLOWER SEED SPECIES	
COMMON NAME and CULTIVARS	**SCIENTIFIC NAME**
Blackeyed Susan	*Rudbeckia hirta* L. var. *hirta* *Rudbeckia hirta* L. var. *pulcherrima* Farw.
Calendula	*Calendula officinalis* L.
Common Sunflower cv. 'Autumn Beauty'	*Helianthus annuus* L.
Doubtful Knight's-spur = Rocket Larkspur	*Consolida ajacis* (L.) Schur
Firewheel = Annual Gaillardia	*Gaillardia pulchella* Foug. *Gaillardia pulchella* Foug. var. *pulchella*
Garden Cornflower = Bachelors Button	*Centaurea cyanus* L.
Garden Cosmos = Pink Cosmos, cv. 'Sensation'	*Cosmos bipinnatus* Cav.
Lemon Beebalm	*Monarda citriodora* Cerv. ex Lag.
Moroccan Toadflax = Spurred Snapdragon	*Linaria maroccana* Hook. f.
Siberian Wallflower	*Erysimum ×marshallii* (Henfr.) Bois
Sulphur Cosmos = Yellow Cosmos, cv. 'Bright Lights'	*Cosmos sulphureus* Cav.

(f) Shrub Seed. Seed shall be supplied in lots of individual species, unmixed, labeled with common name and scientific name in conformance with the following:

(1) Purity. Weed and/or other crop seed content shall be 0.5 percent or less by weight. Minimum purity and minimum germination shall conform to the requirements of (3), below.

(2) Origin. Refer to 920.06.06(c)(2).

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

SHRUB SEED SPECIES		
SPECIES **Including Subspecies and Variety**	**PURITY** **Min %**	**GERM** **Min %**
American Black Elderberry *Sambucus nigra* L. ssp. *canadensis* (L.) R. Bolli	98	60
American Cranberrybush *Viburnum opulus* L. var. *americanum* Aiton	99	70
Black Chokeberry *Photinia melanocarpa* (Michx.) K.R. Robertson and Phipps	99	70
Bristly Locust *Robinia hispida* L. var. *fertilis* (Ashe) R.T. Clausen *Robinia hispida* L. var. *hispida*	99	90
Chokecherry *Prunus virginiana* L. var. *viginiana*	99	70
Common Buttonbush *Cephalanthus occidentalis*	98	60
Common Ninebark *Physocarpus opulifolius* (L.) Maxim., orth. cons.	99	75
Common Winterberry	99	60

Ilex verticillata (L.) A. Gray		
Desert False Indigo *Amorpha fruticosa* L.	98	70
Fragrant Sumac *Rhus aromatica* var. *aromatica*	99	85
Gray Dogwood *Cornus racemosa* Lam.	99	70
Inkberry *Ilex glabra* (L.) A. Gray	98	60
Mapleleaf Viburnum *Viburnum acerifolium* L.	99	70
Maryland Senna Senna marilandica (L.) Link	99	70
Nannyberry *Viburnum lentago* L.	99	75
Red Chokeberry *Photinia pyrifolia* (Lam.) K.R. Robertson and Phipps	85	60
Red Elderberry *Sambucus racemosa* L. var. *racemosa*	95	70
Redosier Dogwood *Cornus sericea* L. ssp. *sericea*	99	70
Silky Dogwood *Cornus amomum* Mill.	98	70
Smooth Sumac *Rhus glabra* L.	99	80
Southern Arrowwood *Viburnum dentatum* L. var. *dentatum* *Viburnum dentatum* L. var. *venosum* (Britton) Gleason *Viburnum recognitum* Fernald	99	70
Spicebush *Lindera benzoin* (L.) Blume var. benzoin	95	60
Staghorn Sumac *Rhus typhina* L.	99	85
Steeplebush *Spiraea tomentosa* L.	85	70
Swamp Rose *Rosa palustris* Marsh.	99	65
Witch Hazel *Hamamelis virginiana* L.	99	70

920.06.07 Seed Mixes. Refer to 920.06.01 thru .06 and the document 'Specifications for Seed and Seed Mixes' maintained by the Landscape Operations Division, which includes lists of approved cultivars.

(a) SHA Turfgrass Seed Mix.

SHA TURFGRASS SEED MIX		
MIX %	**SPECIES**	
	Common Name	**Scientific Name**
95	Tall Fescue	*Schedonorus phoenix* (Scop.) Holub
5	Kentucky Bluegrass	*Poa pratensis* L. ssp. *pratensis*

02-03-15

(b) SHA Special Purpose Seed Mix.

SHA SPECIAL PURPOSE SEED MIX		
MIX %	**SPECIES**	
	Common Name	**Scientific Name**
75	Hard Fescue	*Festuca brevipila* Tracey
25	Chewings Fescue	*Festuca rubra* L. ssp. *fallax* (Thuill.) Nyman

Note: When pre-mixed seed is not available, a small quantity exception will allow the mix to be performed at the seeding location using Certified seed of the required species.

(c) SHA Temporary Seed Mix.

SHA TEMPORARY SEED MIX		
MIX %	**SPECIES**	
	Common Name	**Scientific Name**
95	One or more of the following: Common Wheat, winter type Common Barley, winter type Common Oat, winter type Cereal Rye, winter type	 *Triticum aestivum* L. *Hordeum vulgare* L. *Avena sativa* L. *Secale cereale* L.
5	Foxtail Bristlegrass = Foxtail Millet	*Setaria italica* (L.) P. Beauv.

920.07 PLANT MATERIALS.

920.07.01 Certificate and Licenses. Sellers, distributors, installers or producers of nursery stock shall possess the Plant Dealer License, Plant Broker License, or Nursery Inspection Certificate of the Maryland Department of Agriculture, or substitute a similar certificate or licenses from another State where they do business.

920.07.02 Plant Material Inspection. Plant material will be inspected for conformance with 920.07.03 thru .05, and tagged with Administration Plant Material Inspection Seals (Seals) as follows:

(a) Inspection. The Plant Material Inspection will be conducted in Maryland at the nursery where the plant material is grown, or at the brokerage where the plant material is sold. When plant material is produced by a nursery outside Maryland, the Inspection will be conducted at the Contractor's holding area, or at the project site before planting, unless otherwise specified in the Contract Documents.

The Contractor shall ensure that the plant material is present for inspection on the scheduled date, and that it meets the requirements of 920.07. The condition and identity of plant material will be subject to re-inspection for the duration of the Contract.

(b) Scheduling. The Inspection will be scheduled by the Engineer in consultation with the Landscape Operations Division. At least 14 days notice to schedule an Inspection within Maryland, and at least 45 days notice to schedule an Inspection outside Maryland.

(c) Seals. The Administration will determine which plants, if any, will be tagged with Seals. When Seals are placed upon representative plants within a block of plant material, the plant material delivered for installation shall be similar in size, shape and character to the plant material that received Seals. Plant material that is delivered with broken or missing Seals, or that is not similar to the plant material within the block that was tagged with Seals will be rejected.

(d) Rejected Plants. Plant materials which do not meet these requirements will be rejected. Plant material rejected at the nursery or holding area shall not be delivered to the project; if delivered, it shall immediately be removed. Plants shall not be installed until the Plant Material Inspection has been completed and satisfactory identification has been provided.

920.07.03 Plant Material Standards. Plant material shall be grown, identified, graded, and delivered in good condition as specified in this section.

(a) Hardiness Zones and Origin. Trees, shrubs, perennials and ornamental grasses shall be nursery grown within plant hardiness zones 5, 6, or 7 according to the 'USDA Plant Hardiness Zone Map' in the following states, unless specified otherwise: Maryland, Ohio, Pennsylvania, New York, New Jersey, Delaware, Virginia, West Virginia, North Carolina, Tennessee, Kentucky, Georgia. Annuals and bulbs shall be nursery grown.

(b) Names and Identification. Refer to 920.06.01. Plant material shall be clearly and correctly identified by the grower or distributor. Plant materials that are misidentified, or not satisfactorily tagged or labeled, or do not conform to the accepted characteristics of the species or cultivar, will be rejected.

(c) ANSI Standards. Plant material shall conform to 'American Standard for Nursery Stock (ANSI Z60.1) of the American Nursery and Landscape Association. Plant grades shall be those established in ANSI Z60.1, and shall include plants from that size up to but not including the next larger grade size. When specimen plants are specified by the Contract documents, the specimen requirement shall also be met. Plant material which does not meet the standards of this section shall be rejected.

(d) Health and Sanitation. Plant material shall be dug and transported in conformance ANSI Z60.1. Bare root deciduous plants shall be delivered in a dormant condition. Roots shall be adequately protected and kept moist.

Plant material shall be in good health and be declared and certified free from disease and insects as required by law for transportation, and shall be free from pest-related stress and pest damage.

Plants shall be healthy, free from physical defects and stresses, and have well-developed branches and a vigorous root system. Plants that exhibit wilt, shriveling, insufficient root mass, broken or loose root balls, or inadequate protection will be rejected.

Container grown plants shall be well rooted, vigorous and established in the size pot specified, shall have well balanced tops for their pot size, and shall not be root bound. Plants grown in fields or containers which include Ailanthus, Canada Thistle, Johnsongrass, or Yellow Nutsedge will be rejected.

(e) Shade and Flowering Trees. Shade and flowering trees shall be symmetrically balanced. Major branch unions shall not have 'V' shaped crotches, bark inclusion or unions derived from water sprouts (epicormic growth) capable of causing structural weakness.

Trees shall be free of unhealed branch removal wounds greater than 1 in. diameter, or wounds or scars caused by staking, wire or ties, or any other defect which could cause structural failure or disfigurement.

Shade trees and central leader flowering trees shall have a single main trunk. Trunk height to the lowest branch shall conform to the following:

HEIGHT TO LOWEST BRANCH	
CALIPER in.	**HEIGHT ft**
1-1/2 and 1-3/4	4
2 to 2-1/2	5
3	6

(f) Unacceptable Plants. Plant material that becomes unacceptable after installation shall be rejected as specified in 710.03.18.

920.07.04 American Holly (*Ilex opaca* Aiton*)*.** Unless other cultivars or ratios are specified in the Contract document, each lot of plants shall include 90 percent female plants and 10 percent male plants of cultivars selected from the following list, unless specified otherwise.

AMERICAN HOLLY CULTIVARS		
FEMALE		**MALE**
Angelica	Miss Helen	David
Arlene Leach	Old Heavy Berry	Jersey Knight
B and O	Patterson	Leather Leaf
Dan Fenton	Satyr Hill	Nelson West
Jersey Princess	Wyetta	North Wind

920.07.05 Plant Storage and Handling. Adequate facilities shall be provided for plant storage. Plants shall be handled with care to avoid damage.

(a) Bulbs. Bulbs shall be stored under appropriate climate control.

(b) Perennials, Ornamental Grasses, Plug Plans and Annuals. Perennials, ornamental grasses, plug plants and annuals shall be kept moist.

(c) Bare Root Plants and Live Stakes. Bare root plants and live stakes shall be kept moist and heeled into moist soil or other suitable material until installed. During transport, the roots shall be covered with canvas, burlap or straw.

(d) Balled and Burlapped and Container Grown Plants. Balled and burlapped plants and container grown plants shall be kept moist and installed within seven days of delivery, or the root balls or containers shall be covered with mulch or straw until removed for installation.

920.08 MARKING AND STAKING MATERIALS.

920.08.01 Outline Stakes. Outline stakes shall be full cut 1.75 x 1.75 in. sound hardwood, 48 in. long, as approved.

920.08.02 Stakes. Stakes for supporting trees shall be rough sawn, straight grain hardwood reasonably free from bark, knot holes, excessive warping, or other imperfections. Stakes shall be full cut 2.0 x 2.0 in. thickness.

920.08.03 Wire. Wire shall be No. 12 and 14 gauge new annealed galvanized wire.

920.08.04 Wire Rope. Wire rope shall be 0.25 in. zinc coated steel wire seven strand as commonly used for guying large trees.

920.08.05 Cable Clamps. Cable clamps shall be zinc galvanized steel.

920.08.06 Hose. Hose shall be 5/8 in. inside diameter corded synthetic rubber hose.

920.08.07 Turnbuckles. Turnbuckles shall be zinc galvanized with 4.5 in. openings and 5/16 in. threaded ends with screw eyes.

920.08.08 Anchors. Tree anchors shall be earth anchors of a type commonly used for anchoring large trees.

920.09 WATER, PESTICIDES, AND ADJUVANTS.

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

920.09.02 Seed Carrier. Seed carrier shall be one or more inert, horticultural-grade materials used to improve seed mixing and distribution through a spreader or drill. Seed carriers shall be free flowing, easily mixable with seed, and nontoxic to seed, plants, humans, and wildlife. Seed carrier shall include one or more of the following:

(a) Calcined Clay. Calcined clay shall be a furnace-baked clay product.

(b) Cocoa Shell. Cocoa shell shall be processed cocoa seeds.

(c) Oyster Shell. Oyster shell shall be crushed shells of oyster or other mollusk.

(d) Vermiculite. Vermiculite shall be heat-expanded mineral mica.

(e) Perlite. Perlite shall be heat-expanded mineral perlite.

920.09.03 Pesticides. Pesticides shall be EPA-approved and registered for use in Maryland to control plants, fungi, insects or other pests. Pesticides shall be approved for use, and acceptable application rates established by the Landscape Operations Division as follows:

(a) Herbicide. Herbicide shall control or prevent regrowth of plants or vegetation.

(b) Insecticide. Insecticide shall control or protect against insect or other arthropod pests.

(c) Fungicide. Fungicide shall control or protect against fungal or bacterial pests.

(d) Other Pesticides. Other pesticides shall control or protect against other pests such as deer, beaver, etc.

920.09.04 Marking Dye. Marking dyes shall be used to color spray solutions, be nonphytotoxic, oil or water soluble, and compatible with the pesticide products they are applied with. Marking dye products and application rates shall be approved by the Landscape Operations Division.

920.09.05 Spray Adjuvant and Wetting Agent. Spray adjuvant and wetting agents shall be compatible with the pesticides or other products they are applied with.

920.09.06 Antidesiccant. Antidesiccant and antitranspirant products shall be materials that provide a film over plant surfaces to limit water loss. These products and application rates shall be approved by the Landscape Operations Division.

CATEGORY 900
MATERIALS

SECTION 920 — LANDSCAPING MATERIALS

780 **REPLACE:** The following under 920.09.03 Pesticides:

(a) Herbicide. Herbicide shall be organic and shall not contain neonicotinoides for control or prevent regrowth of plants or vegetation. Herbicides with Glyphosate shall only be used as a last resort.

777 INSERT: The following under 920.07.03(e) Plant Materials:

(f) Shrubs, herbaceous plants, and seeds shall be obtained from nurseries employing best IMP practices and shall be neonicotinoid-free.

CATEGORY 900
MATERIALS

SECTION 921 — MISCELLANEOUS

784 **DELETE:** SECTION 921.09.01 — GEOTEXTILES in its entirety.

INSERT: The following.

921.09.01 Geotextile Requirements. Geotextiles used on Administration projects shall participate in the National Transportation Product Evaluation Program (NTPEP) and conform to the Contract Documents and MSMT 732. Geotextiles shall be manufactured from fibers consisting of long chain synthetic polymers, composed of a minimum 95 percent by weight of polyolefins or polyesters, and formed into a stable network so the filaments or yarns retain their dimensional stability relative to each other, including selvages. Geotextiles used on Administration projects shall conform to the following:

MARYLAND APPLICATION CLASS		TYPE OF GEOTEXTILE	GRAB STRENGTH lb	PUNCTURE STRENGTH lb	PERMITTIVITY sec^{-1}	APPARENT OPENING SIZE, MAX mm	TRAPEZOID TEAR STRENGTH (MD***) lb
			D 4632	D 6241	D4491	D 4751	D 4533
SD	TYPE I	NONWOVEN	160	310	0.50	0.43	55
		WOVEN, MONOFILAMENT	250	495	0.50	0.43	90
	TYPE II	NONWOVEN	160	310	0.20	0.25	55
		WOVEN, MONOFILAMENT	250	495	0.20	0.25	90
PE	TYPE I	NONWOVEN	200	430	0.70	0.43	80
		WOVEN, MONOFILAMENT	250	620	0.70	0.43	90
	TYPE II	NONWOVEN	200	310	0.20	0.25	55
		WOVEN, MONOFILAMENT	250	495	0.20	0.25	90
	TYPE III	NONWOVEN	200	220	0.10	0.22	40
		WOVEN, MONOFILAMENT	250	370	0.10	0.22	70
SE		NONWOVEN	160	310	0.20	0.30	80
		WOVEN	250	495	0.20	0.30	90
ST		WOVEN	300*	600	0.05	0.15**	110
F		WOVEN	200	450	0.05	0.60	75
E		NONWOVEN	200	450	1.1	0.21	80
		WOVEN, MONOFILAMENT	370	900	0.28	0.21	100

09-03-13

Note 1: All property values in the above table are based on minimum average roll values in the weakest principal direction except for apparent opening size.
Note 2: The ultraviolet stability shall be 50 percent after 500 hrs of exposure for all classes, except Class F, which shall be 70 percent (D 4355).

***** 15% elongation for silt fence and monofilament woven geotextile in Machine Direction
****** This is a MINIMUM apparent opening size, not a maximum.
*******Machine Direction

Contact the Office of Materials Technology's Soils and Aggregate Technology Division for approval of geotextiles used for reinforcement applications.

921.09.02 Seam and Overlap. D 4884. Geotextiles joined by sewing shall conform to the following:

(a) Either "J" or "Butterfly" type seams joined with a lock stitch.

(b) Tensile strength requirements when tested across the seam.

(c) Thread used for seaming shall be of equal or greater durability than the geotextile itself.

921.09.03 Securing Pins or Staples. Minimum 10 in. length and designed to securely hold the geotextile in place during construction.

786 **ADD:** The following after 921.11.

921.12 CONCRETE STAIN.

The material shall conform to the following requirements:

TEST PROPERTY	TEST METHOD	SPECIFICATION LIMITS
Accelerated Weathering	G7	Passing results
Mildew Resistance/fungus growth	Fed. Test Method STD.141, Method 6271	Resistance
Weatherometer, 1000 hours minimum	ASTM G26	No crazing, cracking, chipping, or flaking. Light chalk and color change. No other deterioration.
Total Non Volatile Vehicle, %	D2369	Mfr. Stated Value +/- 2%
Viscosity, Krebs Units, 77 deg. F	D562	Mfr. Stated value +/- 10 KU
Drying time (to touch)	D1640	1 hour minimum
Recoat dry time	D1640	Able to recoat within 24 hours
Infrared Spectrogram	D2621	n/a
Color	Fed. Std. 595	As specified in contract documents
Weight/gallon, lb.gal	D1475	Mfr. State value +/- 0.3 lb/gal
Shelf life		6 months minimum

Material more than six months old shall be retested. Material must be VOC compliant for Maryland.

CATEGORY 900
MATERIALS

SECTION 921 — MISCELLANEOUS

784 **DELETE:** SECTION 921.09.01 — GEOTEXTILES in its entirety.

INSERT: The following.

921.09.01 Geotextile Requirements. Geotextiles used on Administration projects shall participate in the National Transportation Product Evaluation Program (NTPEP) and conform to the Contract Documents and MSMT 732. Geotextiles shall be manufactured from fibers consisting of long chain synthetic polymers, composed of a minimum 95 percent by weight of polyolefins or polyesters, and formed into a stable network so the filaments or yarns retain their dimensional stability relative to each other, including selvages. Geotextiles used on Administration projects shall conform to the following:

MARYLAND APPLICATION CLASS		TYPE OF GEOTEXTILE	GRAB STRENGTH lb	PUNCTURE STRENGTH lb	PERMITTIVITY sec^{-1}	APPARENT OPENING SIZE, MAX mm	TRAPEZOID TEAR STRENGTH (MD***) lb
			D 4632	D 6241	D4491	D 4751	D 4533
SD	TYPE I	NONWOVEN	160	310	0.50	0.43	55
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	TYPE II	NONWOVEN	160	310	0.20	0.25	55
		WOVEN, MONOFILAMENT	250	495	0.20	0.25	90
PE	TYPE I	NONWOVEN	200	430	0.70	0.43	80
		WOVEN, MONOFILAMENT	250	620	0.70	0.43	90
	TYPE II	NONWOVEN	200	310	0.20	0.25	55
		WOVEN, MONOFILAMENT	250	495	0.20	0.25	90
	TYPE III	NONWOVEN	200	220	0.10	0.22	40
		WOVEN, MONOFILAMENT	250	370	0.10	0.22	70
SE		NONWOVEN	160	310	0.20	0.30	80
		WOVEN	250	495	0.20	0.30	90
ST		WOVEN	300*	600	0.05	0.15**	110
F		WOVEN	200	450	0.05	0.60	75
E		NONWOVEN	200	450	1.1	0.21	80
		WOVEN, MONOFILAMENT	370	900	0.28	0.21	100***

Note 1: All property values in the above table are based on minimum average roll values in the weakest principal direction except for apparent opening size.
Note 2: The ultraviolet stability shall be 50 percent after 500 hrs of exposure for all classes, except Class F, which shall be 70 percent (D 4355).
***** 15% elongation for silt fence and monofilament woven geotextile in Machine Direction
****** This is a MINIMUM apparent opening size, not a maximum.
*******Machine Direction

Contact the Office of Materials Technology's Soils and Aggregate Technology Division for approval of geotextiles used for reinforcement applications.

CATEGORY 900
MATERIALS

SECTION 923 — SLURRY SEAL

787 **DELETE:** SECTION 923 — SLURRY SEAL in its entirety.

INSERT: The following.

SECTION 923 — SLURRY SEAL AND MICRO-SURFACING

923.01 AGGREGATES. Aggregates shall be crushed stone, compatible with the emulsion, and meet the gradation requirements in D 3910 or D 6372. Aggregates shall also meet the physical requirements for Slurry Seal (SS) and Micro-surfacing (MS) in Table 901 D.

923.02 MINERAL FILLER. 901.01.

923.03 WATER. 921.01.

923.04 EMULSIFIED ASPHALT. Emulsified asphalt shall be neat or polymer modified. The polymer shall be milled or blended into the asphalt or emulsifier solution prior to the emulsification process. The polymer modified emulsion shall contain 3.0 percent polymer solids minimum by weight of asphalt. The emulsified asphalt shall meet M 208, Grade CSS-1h or CQS-1h. Each load of emulsified asphalt shall be accompanied by a Certificate of Analysis/Compliance that indicates the emulsion meets specification requirements.

923.05 MIX DESIGN APPROVAL. Submit mix design data for approval at least three weeks in advance of the paving operation. Include the following:

(a) Source, percentage, and grade of emulsified asphalt.

(b) Source, gradation and proportion of each component aggregate.

(c) Source and percentage of additional additives.

(d) Target gradation and residual asphalt content of mix.

(e) Mix design worksheets.

Test the mix design in accordance with D 3910 or D 6372. The mix design report shall show that the test results meet the following:

Slurry Seal.

TEST PROPERTY	TEST METHOD	SPECIFICATION LIMITS
Consistency Test (Mix Time), 77F, s, maximum	D 3910	180
Set Time, 77F, m, minimum	D 3910	15
Wet Track Abrasion, g/ft^{2,} max One-hour soak	*ISSA TB-100	75
Residual Asphalt: Type II	T 164 or T 308	7.5 – 13.5%
Type III	T 164 or T 308	6.5 – 12.0%

Micro-Surfacing.

TEST PROPERTY	TEST METHOD	SPECIFICATION LIMITS
Set Time 77F s, minimum	D 6372	30
Wet Track Abrasion, g/ft^2, maximum One-hour soak	*ISSA TB-100	50
Residual Asphalt (by dry weight of aggregates): Type II or Type III	T 164 or T 308	5.5 – 10.5%

*International Slurry Seal Association

CATEGORY 900
MATERIALS

789 **DELETE:** SECTION 924 — RESERVED.

INSERT: The following.

SECTION 924 — COLD PATCH MATERIAL

924.01 DESCRIPTION. Cold Patch Material is a high performance asphalt patching material used to repair potholes, deteriorated concrete, and asphalt pavement in all seasons. The material shall be capable of making permanent repairs with minimal effort and with minimal affect on traffic.

Cold Patch Material is produced by an approved manufacturer using specially formulated binders. The material may be produced in bulk and stockpiled or packaged in buckets or bags weighing 40 to 50 lbs or packaged as approved. Select from the Qualified Products List (QPL).

924.02 MATERIALS.

Aggregates	M 29 T 11 T 2
Binder	D244 D402 T 59 T 78

924.02.01 Binder. Binder shall provide aggregate coverage per TP 40. No additives, modifiers, or extra ingredients are to be introduced into the liquid oil blend after shipment. Binder shall meet a maximum of 0.1 percent volume by weight of the original sample when tested to 500 F (260 degrees C) per T 59 or, the binder shall contain no more than 6.0 milliliters of oil distillate when tested per D244, D402 or T 78, depending on the type of binder used. The residual binder content shall be a minimum of 5 percent of the mix.

924.03 MIX PERFORMANCE REQUIREMENTS. Cold Patch Material patches shall remain in place when paved over and shall not adversely affect the final surface. The material shall not require primer or tack and shall be compatible with asphalt and/or concrete at a minimum thickness of 1/2 inch. The material must be capable of filling potholes in wet or dry conditions in ambient temperatures as low as to 5 F and up to 100 F.

The material shall permanently adhere to deteriorated concrete or bituminous pavement until the surrounding pavement fails. Removal shall not be required when the surface is overlaid with asphalt. Replace actual volumes used at no additional cost if the patch material fails to perform as certified.

924.03.01 Storage. Cold Patch Material furnished in bags or containers shall be stored in accordance with the manufacturer's recommendations. The material may also be furnished from stockpiled material that has been stored outside, uncovered, without drying or clumping. The stockpile shall not leach or strip. A product guarantee is required stating that the material remains workable in an uncovered stockpile of 100 tons or more for a period of not less than twelve months.

924.03.02 Usage. Cold Patch Material shall be uniformly mixed and require no mixing prior to use. The material shall be capable of being poured or shoveled into a hole. The material shall require minimal pothole preparation consisting of removing water and debris from the pothole. The material shall be capable of displacing any water remaining in the hole. The material shall be placed and compacted in accordance with the manufacturer's recommendations. The material shall not ravel nor adhere to tires when opened to traffic.

924.03.03 Quality Control Plan. Provide a Quality Control Plan (QCP) that includes the following:

(a) Description of Material.

(b) Contact Personnel.

(c) Safety Data Sheets (SDS).

(d) Technical Data Sheets, including VOC content.

(e) Job Mix Formula.

(f) QC Material Sampling Process.

(g) Storage Requirements.

The QCP shall also state that if a test result indicates that a shipment is not in compliance with specifications, the following shall apply.

(a) Immediately notify the Administration of the shipment in question,

(b) Identify the material,

(c) Cease shipment until material complies with specifications;

(d) Notify the Administration prior to resuming shipment, and

(e) Implement any mutually agreed upon procedures for the disposition of the material.

In the event a mutual agreement is not obtained, the Administration shall have final authority in the decision on specification compliance.

924.04 CERTIFICATION. Provide certification that the material meets requirements per TC 1.03 and the following:

(a) A guarantee the material conforms to the Materials, Binder, Mix Performance and Storage requirements and COMAR environmental regulations.

(b) Employ an unaffiliated AASHTO-accredited laboratory to perform all testing for certification.

Non-conforming materials will be rejected whether in-place or not, as determined. Remove all inventory on hand that fails to meet requirements and replace at no additional cost. Cold Patch Material that consistently fails to meet requirements will be removed from the QPL.

CATEGORY 900
MATERIALS

SECTION 950 — TRAFFIC MATERIALS

792 **DELETE**: 950.03 REFLECTORIZATION OF SIGNS AND CHANNELIZING DEVICES in its entirety.

INSERT: The following.

950.03 REFLECTORIZATION OF SIGNS AND CHANNELIZING DEVICES.

Provide retroreflective sheeting that meets the requirements of the latest version of ASTM D 4956 and is selected from the Administration's QPL. The type of sheeting to be used for different classifications of signs shall be as specified in the QPL and as described below.

Provide fluorescent colors, when yellow, orange or pink sheeting is specified. Color coordinates and values shall be as described in the MDMUTCD and 23 CFR Part 655, Subpart F, Appendix.

Provide non-reflective sheeting, when black sheeting is specified.

All sheeting for legend and backgrounds shall be from the same manufacturer and be a matched component system intended to be used together.

Use ASTM Type IV or VIII construction sheeting with a Class 1 backing for drums for maintenance of traffic. The sheeting must be reboundable as defined in the supplementary requirements of ASTM D 4956, latest version.

Use ASTM Type IV, V or VIII for delineators, and lane separator systems. Use ASTM Type IV, VI or VIII sheeting for cones for maintenance of traffic. The sheeting must be reboundable as defined in the supplementary requirements of ASTM D 4956, latest version.

Use ASTM Type VI sheeting with a Class 5 backing for Roll up signs for Maintenance of Traffic.

Use ASTM Type VIII, IX or XI sheeting for rigid temporary traffic signs.

Use ASTM Type IX or XI sheeting for Guide Signs, Exit Gore Signs, General Information Signs, School Signs, Warning Signs and Red Regulatory Signs.

Use ASTM Type IV, VIII, IX or XI sheeting for all other Regulatory Signs and for Route Markers.

Use ASTM Type I or higher sheeting for No Trespassing Signs, signs directed at Pedestrian Traffic, signs directed at Bicycle Traffic, R7 series Parking signs, R8 series Parking signs and supplemental panels for R7 and R8 series signs.

CATEGORY 900
MATERIALS

SECTION 950 — TRAFFIC MATERIALS

794 **DELETE:** 950.04 OVERHEAD SIGN STRUCTURES.

INSERT: The following.

950.04 OVERHEAD/CANTILEVER SIGN STRUCTURES. Design, material minimum thickness requirements and construction shall meet AASHTO Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and the following:

(a) A 709, Grade 50 for structural steel.

(b) A 595, Grade A or API 5LX52 for steel tubes or pipes.

(c) All steel shall be galvanized per A 123.

(d) Hardware, per 909.06, 909.07 and 909.08.

796 **DELETE:** 950.08 SIGNS.

INSERT: The following.

950.08 SIGNS. TC 1.03. The manufacturer or supplier shall furnish certification as specified.

DELETE: 950.08.03 Hardware.

INSERT: The following.

950.08.03 Hardware. Sign hardware shall be clear anodized and meet one of the following.

(a) B 209, alloy 2024 T4 or,

(b) B 211, alloy 2024 T4, 6262 T9, 6061 T6, 7075 T6 or 2017 T4.

DELETE: 950.09 STEEL SPAN WIRE.

INSERT: The following.

950.09 STEEL WIRE STRAND.

(a) .01 Span. A 475, Grade: Siemens-Martin, Class C, 3/8 in. diameter and seven wire strand.

(b) .02 Tether. A 475, Grade: Siemens -Martin, Class C, 1/4 in. diameter and seven wire strand.

CATEGORY 900
TRAFFIC MATERIALS

SECTION 950.06 — ELECTRICAL CABLE AND WIRE

950.06.03 Cable Duct.

794 **DELETE:** The last sentence of 950.06.03.

INSERT: The following.

Provide type XHHW cable, rated for 600 volts.

CATEGORY 900
MATERIALS

SECTION 950 — TRAFFIC MATERIALS

950.12 LUMINAIRES AND LAMPS

796 **ADD**: The following after the last sentence of the first paragraph.

A Light Emitting Diode (LED) Roadway Luminaire shall be a complete lighting device consisting of a cast aluminum housing, LED arrays, LED drivers, terminal blocks, integral transformer, associated hardware, all necessary wiring, and an optical assembly. Each LED Roadway Luminaire shall have a NEMA 3-prong twist lock photo control receptacle and shall be furnished with a shorting cap.

950.12.01 Luminaire Construction.

797 **ADD**: The following after the last sentence of the last paragraph in **(c)**.

(d) Design LED bracket arm mounted Luminaires for an operational life of at least eleven years with 70 percent lumen maintenance value of 50 000 hours (L70) at an average operating time of 12 hours per night. The illuminance shall not decrease by more than 30 percent over the minimum operational life of eleven years. All components of the LED Roadway Luminaires must be rated for the full service life without maintenance.

Provide LED Roadway Luminaires that use no more than 280 watts and are designed to operate at all voltages from 120 volt to 480 volt. For 480 volt operation, an integral transformer shall be provided to reduce the voltage. The power factor of the LED Roadway Luminaire shall be 0.90 or higher. The Correlated Color Temperature (CCT) shall be less than 4500 K and the Color Rendering Index (CRI) shall be greater than 65.

All components of the LED Roadway Luminaire shall be UL approved. The LED Roadway Luminaire housing and lens/refractor shall be sealed to prevent intrusion of moisture for the full service life and comply with Ingress Protection Rating IP-65 or greater. The lens/refractor shall be constructed of a material that will not show visible yellowing due to UV exposure, or exposure to hydrocarbon emission, for the full service life.

Provide LED Roadway Luminaire drivers that are Solid State (electronic) type with an input voltage range from 120-277VAC (±10 percent), maximum rated output current of 530mA (±5 percent), input frequency of 60Hz, minimum power factor of 90 percent at full load, Total Harmonic distortion less than 20 percent, case

temperature rated for -40˚C to 50˚C, and contain 3 kV input high voltage surge protection.

LED Roadway Luminaire on board circuitry shall include a Surge Protection Device (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The SPD shall protect the luminaries from damage and failure for transient peak voltages up to 10kV and transient peak currents up to 10kA.

Complete all photometric testing of the LED Luminaires as specified in IESNA technical memorandums LM-63, LM-79 and LM-80. Perform all testing and calculations using photopic values. No correction for scotopic values will be permitted.

Design the LED Roadway Luminaire to mount on a standard tenon mount. No field adjustment, except for leveling, shall be required for installation. All hardware shall be stainless steel.

For placement on the Qualified Product's List, the product evaluation application must be submitted on the Administration's Maryland Product Evaluation List (MPEL). After submittal, a minimum of 2 luminaires must be provided for evaluation. The Luminaires will be evaluated for 90 days, and returned to the supplier, if desired. The evaluation will be for general durability and suitability of the luminaires. All shipping costs will be the responsibility of the supplier.

950.12.02

798 **ADD**: The following after the last sentence of the first paragraph.

Refer to section 950.12.01 (d) for required lamp wattages and rated lamp life for LED Roadway Luminaires.

CATEGORY 900
MATERIALS

SECTION 950 — TRAFFIC MATERIALS

950.12 LUMINAIRES AND LAMPS

796 **ADD**: The following after the last sentence of the first paragraph.

A Light Emitting Diode (LED) Roadway Luminaire shall be a complete lighting device consisting of a cast aluminum housing, LED arrays, LED drivers, terminal blocks, integral transformer, associated hardware, all necessary wiring, and an optical assembly. Each LED Roadway Luminaire shall have a NEMA 3-prong twist lock photo control receptacle and shall be furnished with a shorting cap or photocell as required.

A Light Emitting Diode (LED) Underpass Luminaire shall be a complete lighting device consisting of a cast aluminum housing, LED arrays, LED drivers, terminal blocks, integral transformer, associated hardware, all necessary wiring, and an optical assembly.

950.12.01 Luminaire Construction.

798 **ADD**: The following after the last sentence of the last paragraph in (c).

(d) Design LED bracket arm mounted Luminaires for an operational life of at least eleven years with 70 percent lumen maintenance value of 50 000 hours (L70) at an average operating time of 12 hours per night. The illuminance shall not decrease by more than 30 percent over the minimum operational life of eleven years. All components of the LED Roadway Luminaire must be rated for the full service life without maintenance.

Provide LED Roadway Luminaires that use no more than 280 watts and are designed to operate at all voltages from 120 volt to 480 volt. For 480 volt operation, an integral transformer shall be provided to reduce the voltage. The power factor of the LED Roadway Luminaire shall be 0.90 or higher. The Correlated Color Temperature (CCT) shall be less than 4500 K and the Color Rendering Index (CRI) shall be greater than 65.

All components of the LED Roadway Luminaire shall be UL approved. The luminaires shall be UL listed for wet locations. The LED Roadway Luminaire housing and lens/refractor shall be sealed to prevent intrusion of moisture for the full service life and comply with Ingress Protection Rating IP-65 or greater. The lens/refractor shall be constructed of a material that will not show visible yellowing due to UV exposure, or exposure to hydrocarbon emission, for the full service life.

Provide LED Roadway Luminaire drivers that are Solid State (electronic) type with an input voltage range from 120-277VAC ($\pm$10 percent), input frequency of 60Hz, minimum power factor of 90 percent at full load, Total Harmonic distortion less than 20 percent, case temperature rated for -40˚C to 50˚C, and contain 3 kV input

high voltage surge protection.

LED Roadway Luminaire on board circuitry shall include a Surge Protection Device (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The SPD shall protect the luminaries from damage and failure for transient peak voltages up to 10kV and transient peak currents up to 10kA.

Complete all photometric testing of the LED Luminaires as specified in IESNA technical memorandums LM-63, LM-79 and LM-80. Perform all testing and calculations using photopic values. No correction for scotopic values will be permitted.

Design the LED Roadway Luminaire to mount on a standard tenon mount. No field adjustment, except for leveling, shall be required for installation. All hardware shall be stainless steel.

For placement on the Qualified Product's List, the product evaluation application must be submitted on the Administration's Maryland Product Evaluation List (MPEL). After submittal, a minimum of 2 luminaires must be provided for evaluation. The Luminaires will be evaluated for 90 days, and returned to the supplier, if desired. The evaluation will be for general durability and suitability of the luminaires. All shipping costs will be the responsibility of the supplier.

(e) Design LED Underpass Luminaires for an operational life of at least eleven years with 70 percent lumen maintenance value of 50 000 hours (L70) at an average operating time of 12 hours per night. The illuminance shall not decrease by more than 30 percent over the minimum operational life of eleven years. All components of the LED Underpass Luminaire must be rated for the full service life without maintenance.

Provide LED Underpass Luminaires that use no more than 95 watts and are designed to operate at all voltages from 120 volt to 480 volt. For 480 volt operation, an integral transformer shall be provided to reduce the voltage. The power factor of the LED Underpass Luminaire shall be 0.90 or higher. The Correlated Color Temperature (CCT) shall be less than 4500 K and the Color Rendering Index (CRI) shall be greater than 65.

All components of the LED Underpass Luminaire shall be UL approved. The luminaires shall be UL listed for wet locations. The LED Underpass Luminaire housing and lens/refractor shall be sealed to prevent intrusion of moisture for the full service life and comply with Ingress Protection Rating IP-65 or greater. The lens/refractor shall be constructed of a material that will not show visible yellowing due to UV exposure, or exposure to hydrocarbon emission, for the full service life. The LED Underpass Luminaire shall be 3G vibration rated.

Provide LED Underpass Luminaire drivers that are Solid State (electronic) type with an input voltage range from 120-277VAC ($\pm$10 percent), input frequency of

60Hz, minimum power factor of 90 percent at full load, Total Harmonic distortion less than 20 percent, case temperature rated for -30˚C to 50˚C.

LED Underpass Luminaire on board circuitry shall include a Surge Protection Device (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The SPD shall protect the luminaries from damage and failure for transient peak voltages up to 10kV and transient peak currents up to 10kA.

Complete all photometric testing of the LED Underpass Luminaires as specified in IESNA technical memorandums LM-63, LM-79 and LM-80. Perform all testing and calculations using photopic values. No correction for scotopic values will be permitted.

Design the LED Underpass Luminaire to mount as specified in contract documents. Mounting hardware shall be in accordance with manufacturer recommendations. All hardware shall be stainless steel. Include mounting hardware as required per Contract Documents or as directed by the Engineer.

For placement on the Qualified Product's List, the product evaluation application must be submitted on the Administration's Maryland Product Evaluation List (MPEL). After submittal, a minimum of 2 luminaires must be provided for evaluation. The Luminaires will be evaluated for 90 days, and returned to the supplier, if desired. The evaluation will be for general durability and suitability of the luminaires. All shipping costs will be the responsibility of the supplier.

950.12.02

ADD: The following after the last sentence of the first paragraph.

Refer to section 950.12.01 (d) and (e) for required lamp wattages and rated lamp life for LED Roadway Luminaires and LED Underpass Luminaires.

CATEGORY 900
MATERIALS

SECTION 951 — PAVEMENT MARKING MATERIALS

951.01 NONTOXIC LEAD FREE WATERBORNE PAVEMENT MARKINGS

All nontoxic lead free waterborne pavement marking materials shall be ready-mixed, pigmented binder, emulsified in water, and capable of anchoring reflective beads that are applied separately.

The pavement marking material shall not contain any hazardous material listed in the Environmental Protection Agency Code of Federal Regulations (CFR) 40, Section 261.24, Table 1.

951.01.01 Waterborne Physical Requirements. The nontoxic lead free waterborne pavement marking material shall conform to the manufacturer's formulations as initially approved for use by the Administration and shall be controlled from batch to batch. All paint shall be evaluated in conformance to the requirements listed below.

Production batch samples will be subject to random tests, such as but not limited to, X-ray spectroscopy, infrared spectroscopy, ultraviolet spectral analysis, and atomic absorption spectroscopy.

The combined total of lead, cadmium, mercury, and hexavalent chromium shall not exceed 100 ppm, when tested by X-ray fluorescence spectroscopy, or other method capable of detection at this level.

For each production batch, the Contractor shall provide the Administration with the manufacturer's certified analysis conforming to TC-1.03 of the Standard Specifications.

(a) Viscosity. The viscosity shall be 85 ± 10 KU when tested in conformance with D 562.

(b) Pigment For Yellow Pavement Marking Material. The colorants used to attain the color of the yellow product shall be one or more of the following, along with titanium dioxide: Pigment Yellow 65, Pigment Yellow 75, and opaque Pigment Yellow 74.

(c) Color and Appearance. Color and appearance shall be evaluated using the following: CIE 1976 L*a*b*, illuminant D 65, and standard observer angle 1931 CIE 2 degrees. The geometry shall be 45/0 or 0/45, or d/8, excluding specular gloss. Measurements shall be taken from samples applied to an opacity chart, e.g., Leneta Form 2A, at a wet film thickness of 15 mils ± 1 mil. The applied sample shall have been allowed to dry for at least 12 hours before measurements are taken. The evaluation shall be as follows:

(1) Production: The color of the dry paint film of the production sample shall match the L*a*b* values provided, under the specified conditions. For white material the values are: L* = 94.80, a* = -2.35, b* = 3.20. For yellow material the values are: L* = 80.70, a* = 19.40, b* = 88.65. The colors shall match when compared instrumentally.

(2) Control. The maximum permissible variation from the specified L*a*b* values shall be 2.0 ΔE_{cmc}. The measurements shall be taken from a sample applied over the black portion of an opacity chart.

The Administration will approve or disapprove any batch based on a laboratory visual evaluation for blemishes and irregularities in the test specimen (i.e. cracks, flaking, surface depressions, pooling, etc.) that would interfere with the measurement of color and appearance on the opacity chart. The Administration will make the final decision.

(3) Reflectance. The reflectance, without beads, and using CIE XYZ Yxy, shall be a minimum Y of 80 percent for white production batches; and a minimum of 50 percent for yellow production batches with a maximum of 60 percent. The measurement shall be taken from a sample applied over the black portion of an opacity chart.

(4) Color Difference over Black and White.. For any production batch the measured color difference between readings taken over the black portion of the opacity chart from those taken over the white portion shall be a maximum value of 1.0 ΔE_{cmc} for white products and 1.3 ΔE_{cmc} for yellow products.

(5) Yellowness Index. The yellowness index of the white material, when determined according to E 313, Using Equation 1 and the coefficients for CIE D 65 illumination, 1931 from Table 1 in that standard, shall not exceed 8.0.

(d) Flexibility. The pigmented binder shall not display cracking or flaking when subjected to the flexibility test of Federal Test Method TT-P 1952D, with the exception that the panels shall be 35 to 31 gauge (0.0078 to 0.0112 in.) tin plate approximately 3 x 6 in. The tin plates shall be lightly buffed with steel wool and thoroughly cleaned with solvent and dried before being used for the test.

(e) Weight per Gallon. The weight per gallon for a production batch, when determined according to D 1475, shall be within ± 0.3 lb/gal of the value obtained by The National Transportation Product Evaluation Program (NTPEP), and reported on a NTPEP deck designated "north". When the Administration waives the NTPEP requirements, another target value will be stipulated.

951.01.03 Glass Bead Physical Requirements. Each lot of glass beads shall be sampled in conformance with the Administration's Frequency Guide and shall be submitted to the Administration's Office of Materials and Technology for testing and approval prior to use.

Glass beads shall be colorless, clean, transparent, and free of milkiness and excessive air bubbles.

Reflective glass beads shall conform to M 247, except that the gradation shall conform to the following:

PERCENT PASSING			
SIEVE SIZE	**Standard Beads**	**Large Beads**	**Maryland Blend**
12 (1.70 mm)	—	100	100
14 (1.40 mm)	—	95 – 100	98 – 100
16 (1.18 mm)	—	80 – 95	88 – 97
18 (1.00 mm)	—	10 – 40	48 – 70
20 (0.85 mm)	100	0 – 5	28 – 50
30 (0.60 mm)	75 – 95	—	—
50 (0.30 mm)	15 – 35	—	5 – 25
80 (0.18 mm)	—	—	0 – 5
100 (0.15 mm)	0 – 5	—	—

Moisture resistance and flotation test are not required.

(a) Refractive Index. The refractive index shall be 1.50 minimum, when tested in conformance with MSMT 211.

(b) Roundness. Glass beads shall be smooth, spherical in shape, free of sharp angular scars, scratches, or pits, and shall contain a minimum of 60 percent silica. Beads shall have a minimum average roundness of 75 percent when tested in conformance with D 1155.

951.01.04 Qualification. Pavement marking material manufacturers desiring to have their material formulations approved under this Special Provision shall have their formulations evaluated on a NTPEP North Test Deck unless waived by the Administration. Only NTPEP evaluated formulations will be considered candidates for selection, unless the requirement is waived.

951.01.05 Field testing. Materials conforming to this specification shall be field evaluated for performance on a NTPEP North Test Deck. Materials performing satisfactorily throughout the test period will be placed on the Administration's Qualified Products List. All marking materials supplied under the Contract Documents shall be identical in composition to the materials submitted for initial NTPEP testing. The Office of Materials and Technology will determine conformity with these requirements.

951.01.06 Material Acceptance. Only Administration approved and stamped materials conforming to these Specifications shall be used.

Prior to the shipment of any pavement marking material batch, the manufacturer shall provide access for the Administration's representative to collect samples of the material from each production batch. The samples shall be sent to the Administration laboratory for QA testing. Each sample shall be accompanied by a certified analysis conforming to TC 1.03, showing compliance with the physical and chemical requirements of this Specification, and a statement certifying that any marking material supplied under the Contract Documents is identical in composition to the material submitted for initial NTPEP testing. The Administration will

determine conformity with these requirements. Administration authorization shall be required before a batch or a portion of a batch is shipped.

Paints shall be compatible with cleaning solvents used in equipment cleaning.

Nontoxic waterborne pavement markings shall not skin, curdle, settle or be unusable or difficult to apply within 12 months of the date of manufacture. The supplier, at the Administration's request, shall replace containers of marking material exhibiting an unacceptable level of settling, skinning, or curdling, as determined by the Administration. Marking material from a production batch shall not be used beyond 12 months after the date of manufacture.

951.01.07 Certification. The manufacturer shall explicitly certify in writing that any marking material supplied under the Contract Documents conforms to the formulation identified by the same product code or name placed on the NTPEP test deck from which it was approved. The same code or name as used in the published report from that test deck must identify the product. Failure to certify will be considered grounds for product batch rejection.

The manufacturer shall, in accordance with TC-1.03, explicitly certify, in writing, of any paint batch supplied under the Contract Documents that it complies with all applicable specifications. Failure to so certify will be considered grounds for product batch rejection. Certification for yellow nontoxic lead free waterborne pavement markings shall include, for the purpose of showing compliance with this specification, the name or the type of colorant used to achieve the yellow color. The Administration will keep the paint composition and chemical analysis information confidential.

The Certification shall also, contain the following:

(a) Manufacturer's name.
(b) Place (address) of manufacture.
(c) Color of material.
(d) Date of manufacture (month-day-year).
(e) Lot or batch identification.
(f) Size of lot/batch.
(g) The recommended paint temperature at the spray gun.
(h) Material Safety Data Sheets for all materials submitted for testing and application.

The Contractor shall furnish a copy of this certification to the Administration's representative before applying the paint batch it represents.

951.01.08 Production Facility.

(a) The producer shall have a facility, presently in operation, capable of producing the traffic paint in the quantity and quality required by the Administration. This facility will be subject to the Administration's approval.

(b) The producer shall have a laboratory, subject to the Administration's approval, that is capable of performing the required tests.

CATEGORY 900
MATERIALS

SECTION 951 — PAVEMENT MARKING MATERIALS

951.02 LEAD FREE REFLECTIVE THERMOPLASTIC PAVEMENT MARKINGS. All materials composing the reflective thermoplastic material shall be lead free. Reflective thermoplastic material shall be homogeneously composed of pigment, filler, resins and glass beads and shall conform to the following.

951.02.01 Reflective Thermoplastic Components.

(a) Composition.

COMPONENT	TEST METHOD	COLOR	
		WHITE	YELLOW
Binder, % min	Certified	18.0	18.0
Premixed Reflective Beads, % min	MSMT 614	30.0	30.0
Titanium Dioxide, % min	X-Ray Fluorescence	10.0	N/A
Calcium Carbonate Inert fillers, % max	D 34	42.0	*
Yellow Pigment, %	—	N/A	*

* Amount of yellow pigment, calcium carbonate and filler shall be at the option of the manufacturer, provided all other requirements are in conformance.

Restrictions. The combined total of lead, cadmium, mercury and hexavalent chromium shall not exceed 100 ppm when tested by X-Ray Fluorescence, ICP, or comparable method capable of this level of detection. Diarylide type pigments shall only be used when the manufacturer or pavement marking material application temperature does not exceed 392 F.

(b) Binders. The binder shall be alkyd consisting of maleic modified glycerolester of resin and other plasticisers.

(c) Titanium Dioxide. The titanium dioxide shall be rutile type.

951.02.02 Reflective Thermoplastic.

(a) Physical Properties.

TEST PROPERTY	TEST METHOD	SPECIFICATION LIMITS
Bond Strength, psi min.	MSMT 614	180
Softening Point, F		215 ± 15
Low Temperature Stress Resistance	T 250	No Cracks

(b) Specific Gravity. The specific gravity of the white and yellow pavement marking material shall be 1.7 to 2.2 when tested in conformance with D 153, Method A at 77 F.

(c) Color. After heating for 4 ± 0.5 hours at 425 ± 3 F, the thermoplastic shall be as specified in E 1347 and the following:

(1) Production. The color of the cured thermoplastic material film of the production sample shall match the Federal Standard 595 Color chips specified when compared by instrumental measurement.

(2) Control. Control color matching determinations will be made using a Pacific Scientific Color Machine, and an observation angle of 2°, and the CIE Chromaticity Coordinate Color Matching System under light source Illuminate C, with the following tolerances permitted between the standard chip and the cured thermoplastic film sample:

	WHITE Color No. 17886		YELLOW Color No. 13538	
	X	Y	X	Y
Standard Chip	0.310	0.330	0.480	0.450
Delta Tolerance	± 0.020	± 0.020	± 0.030	± 0.030

(3) Reflectance.

COLOR	TEST METHOD	DAYLIGHT REFLECTANCE at Degree	PERCENT MIN
White	Fed Std 595 No. 17886	45 - 0	80
Yellow	Fed Std 595 No. 13538	45 - 0	50

(d) Yellowing Index. The yellowing index of the white material shall not exceed 8 prior to QUV and 15 after QUV when tested in accordance with E 313.

951.02.03 Glass Beads Physical Requirements. The glass beads shall conform to M 247 and the following:

GRADATION SIEVE SIZE	PERCENT PASSING
	STANDARD BEADS
0.85 mm (No. 20)	100
0.60 mm (No. 30)	75 - 95
0.30 mm (No. 50)	15 - 35
0.15 mm (No. 100)	0 - 5

Glass beads shall be colorless, clean, transparent, and free of milkiness, excessive air bubbles, and essentially free of sharp angular scarring or scratching. The beads shall be spherical in shape and shall contain a minimum of 60 percent silica. Roundness shall be 75 percent minimum when tested as specified in D 1155, Procedure A.

Glass beads shall have a 1.50 minimum refractive index when tested in conformance with MSMT 211.

Glass beads shall not absorb moisture in storage and shall remain free of clusters or lumps.

951.02.04 Field Testing. Materials conforming to this specification shall be field evaluated at the National Transportation Product Evaluation Program (NTPEP) Northeast test deck for performance. Materials performing satisfactorily throughout the test period will be placed on the Administration's Prequalified Materials List. All marking materials supplied during the Contract shall be identical in composition to the materials submitted for initial testing. Conformity with these requirements will be determined by the Office of Materials and Technology (OMT).

951.02.05 Sampling for Preapproval. Sources supplying thermoplastic material and glass beads shall be submitted by the Contractor to the Engineer for approval in conformance with the Contract Documents.

Each lot of thermoplastic material will be sampled at the source and tested by the Administration over two construction seasons. If 95 percent of the lots tested conform to Specifications, source samples will no longer be required and the manufacturer may ship directly to the project. All shipments shall be accompanied by a manufacturer's certification in conformance with TC-1.03 and shall include the following:

(a) Manufacturer's name.

(b) Place of manufacture.

(c) Material color.

(d) Date of manufacture (month-year).

(e) Lot identification.

(f) Size/quantity of lot represented.

Random samples will be taken on the project in conformance with the MSMT Sample Frequency Guide and tested for conformance with these specifications. Nonconformance may result in the suspension from the certification program until conformance is reestablished. To reestablish conformance, the manufacturer shall achieve a 95 percent approval level from samples taken at the manufacturer's facility and tested by the Administration prior to shipment to Administration projects.

Each lot of glass beads shall be sampled in conformance with the MSMT Sample Frequency Guide and shall be submitted to the OMT for testing and approval prior to use.

Sampling will be by batch or lot which is defined as a maximum of 44 000 lbs of material.

951.02.06 Certification. The Contractor shall furnish notarized certification as specified in TC-1.03. The manufacturer shall certify that any reflective thermoplastic materials supplied during the Contract conforms to the identical formulation as the samples submitted for evaluation on the NTPEP Northeast test deck, and identify the formulas by referring to the code used on the deck. Reflective thermoplastic materials which fail to conform will be rejected.

The manufacturer shall also provide the following:

(a) Material Safety Data Sheets for all materials submitted for testing and use.

(b) A facility, presently in operation, capable of producing the reflective thermoplastic materials in the quantity and quality required by the Administration.

(c) A laboratory subject to the Administration's approval which is capable of performing the required tests.

CATEGORY 900
MATERIALS

SECTION 951 — PAVEMENT MARKING MATERIALS

951.04 REMOVABLE PAVEMENT MARKING TAPE. Removable pavement marking tape shall remain in place on the pavement surface without being displaced by traffic, or affected by weather conditions. The material shall be capable of being removed without the use of heat, solvents, grinding, or sand blasting and shall not leave an objectionable residue.

The material shall be of good appearance and free from cracks. Edges shall be true, straight and unbroken. Line marking material shall be in rolls having no more than three splices per 150 ft of length. All marking materials shall be packaged in conformance with accepted commercial standards and shall have a minimum shelf life of one year.

Performance Requirements. When applied in conformance with the manufacturer's recommendations, the material shall provide a neat, durable marking that will not flow or distort due to temperature if the pavement surface or underlying markings remain stable. The material shall be weather resistant and, through normal traffic wear, shall show no lifting or shrinkage that will significantly impair the intended usage of the tape throughout its useful life, and shall show no significant tearing while in place, or other signs of poor adhesion. The material shall be capable of easy removal without tearing into small pieces.

951.04.01 White and Yellow. Removable preformed pavement marking materials shall conform to the requirements of the MdMUTCD and the following:

(a) Composition. The marking material shall consist of a mixture of polymeric materials, pigment, and glass beads distributed uniformly throughout the surface.

(b) Color. The color of the marking materials shall match Federal Test Standard No. 595 for the following color numbers:

White - 37925
Yellow - 38907

(c) Glass Beads. Glass beads shall conform to the General Requirements of M 247 and have a minimum refractive index of 1.90 when tested as specified in MSMT 211.

(d) Frictional Resistance. The British Pendulum Number shall be a minimum of 50 when tested as specified in E 303.

(e) Certification. Samples submitted to the Office of Materials Technology (OMT) for testing shall be accompanied by the manufacturer's certified analysis in conformance with TC-1.03.

Any material supplied for a Contract shall be identical in composition to the material originally submitted for testing. Conformity will be determined by OMT.

(f) Field Testing. Line marking materials conforming to the Contract Documents will be field tested by The National Transportation Product Evaluation Program (NTPEP) and over 180 day period as specified in MSMT 723 for conformance with the following:

(1) Ease of Application - satisfactory.

(2) Removability - a minimum rating of 2.

(3) Residue Remaining at Time of Removal (day and night) - minimum rating of 2.

(4) Durability, Appearance, and Night Visibility - minimum weighted rating of 4.

(5) Loss or Movement - minimum rating of 2.

Upon satisfactory completion of the field testing, the marking materials will be placed on OMT's Qualified Products List. The material shall conform to all criteria for a minimum period of 120 days to be considered satisfactory.

951.04.02 Black. Removable preformed pavement marking materials shall conform to the requirements of the MdMUTCD and the following:

(a) Composition. The non-reflective blackout tape shall not contain metallic foil and shall consist of a mixture of high quality polymeric materials, pigments, and inorganic fillers distributed throughout its cross-sectional area, with a matte black non-reflective surface. The film shall be pre-coated with a pressure sensitive adhesive. A nonmetallic medium shall be incorporated to facilitate removal.

For patterned materials, a minimum of 20 percent of the total surface area shall be raised and coated with nonskid particles. The channels between the raised areas shall be substantially free of particles.

(b) Color. The color of the blackout material shall match Federal Test Standard No. 595 for the following color numbers:

Black - 37038 (or as approved by the Engineer)

(c) Frictional Resistance. The British Pendulum Number shall be a minimum of 50 when tested as specified in E 303.

(d) Certification. Samples submitted to OMT for testing shall be accompanied by the manufacturer's certified analysis in conformance with TC-1.03.

Any material supplied for a Contract shall be identical in composition to the material originally submitted for testing. Conformity will be determined by OMT.

(e) Field Testing. Line marking materials conforming to the Contract Documents will be field tested by The National Transportation Product Evaluation Program (NTPEP) and over a 180 day period as specified in MSMT 723 for conformance with the following:

(1) Ease of Application - satisfactory.

(2) Removability - a minimum rating of 2. The manufacturer shall show that the blackout tape can be manually removed after its intended use, intact or in large pieces, at temperatures above 40 F without the use of heat, solvents, grinding, or sand or water blasting. The blackout tape shall remove cleanly from existing markings that are adequately adhered to the pavement surface.

(3) Residue Remaining at Time of Removal (day and night) - minimum rating of 2.

(4) Durability, Adhesion, Appearance, and Night Visibility - minimum weighted rating of 4. The manufacturer shall demonstrate that the properly applied blackout tape adheres to the roadway and existing stable roadway markings under climatic and traffic conditions normally encountered in the construction work zone.

(5) Loss or Movement - minimum rating of 2.

Upon satisfactory completion of the field testing, the marking materials will be placed on OMT's Qualified Products List. The material shall conform to all criteria for a minimum period of 180 days to be considered satisfactory.

951.04.03 Packaging. Preformed pavement markings shipping package shall conform to the manufacturer's shipping requirements to prevent damage during delivery and unloading of all shipments. The shipping package shall be marked with the following information placed on each container:

(a) Description of item.

(b) Date of manufacture.

(c) Successful Bidder's Name.

(d) Purchase Order Number.

(e) Lot Number.

(f) Color.

(g) Installation instructions.

CATEGORY 900
MATERIALS

SECTION 951 — PAVEMENT MARKING MATERIALS

951.05 SNOWPLOWABLE RAISED PAVEMENT MARKERS (SPRPM) and RECESSED PAVEMENT MARKERS (RPM).

Pavement Marker Reflector Lenses. Pavement marker reflector lenses shall conform to the requirements of D 4383 and shall be comprised of materials with adequate chemical, water and UV resistance for the intended use. The reflector lens shall contain one or two prismatic reflective faces to reflect incident light from opposite directions. The reflector lens shall be in the shape of a shallow frustum of a pyramid. The bottom of the reflector lens shall be equipped with an elastomeric pad to permit its attachment to the surface of the casting using the manufacturer's recommended adhesive. The lens faces shall provide extremely hard and durable abrasion resistant surfaces.

Pavement marker reflector lenses shall be 4.00 x 2.00 x 0.46 in. The slope of the reflecting surface shall be 30 degrees and the area of each reflecting surface shall be 1.7 $in.^2$. The outer surface of the shell shall be smooth except in identification areas.

The pavement marker reflector lens shall be imprinted with the model number and the manufacturer's name.

SPRPM Casting. Both ends of the casting shall be shaped to deflect a snow plow blade. The bottom of the casting shall incorporate two parallel keels and an arcuately shaped web designed to fit into a grooved surface. Casting dimensions shall be a minimum of 9.25 x 5.86 x 1.69 in. and shall not exceed 10.5 x 7.25 x 1.69 in. The installed height shall not exceed 0.25 in. above the road surface.

The casting shall be nodular iron conforming to A 536, Grade 80-55-06, hardened to 51 to 55 R_C. The surface of the keel and web shall be free of scale, dirt, oil, grease or any other contaminant, which may reduce its bond to the epoxy adhesive.

The casting shall be imprinted with the model number and the manufacturer's name.

Recessed Pavement Marker Adhesive. The adhesive used to fasten the pavement marker lens to the pavement surface shall conform to D 4383-05 Table X1.4.2.3 M 237 Type II. Rapid Set Type adhesives shall not be used.

Casting Adhesive. The epoxy adhesive used to fasten the castings to the pavement surface shall conform to D 4383-05 Table X1.1.

Reflector Lens Adhesive in Casting. The adhesive used to fasten the reflector lens to the casting shall conform to the manufacturers' recommendations.

951.05.01 Field Testing. Materials conforming to SPRPM Specification shall be field evaluated at the National Transportation Product Evaluation Program (NTPEP) Northeast test deck for performance. Materials conforming to recessed pavement marker specification shall be field evaluated at any (NTPEP) test deck for performance. Materials performing satisfactorily throughout the test period will be placed on the Administrations Prequalified Materials List. All marking materials supplied during the Contract shall be identical in composition to the materials submitted for initial testing. Random sampling will be performed on projects sites. Conformity with these requirements will be determined by the Office of Materials Technology (OMT).

951.05.02 Facility Sampling. Random testing of samples will be performed by the Administration as Quality Assurance and certification verification. Materials will be periodically sampled at the manufacturer's facility by the Administration. Each sample shall be accompanied by a certification showing compliance with the physical requirements of this Specification. Materials supplied during the Contract shall be identical in composition to the materials submitted for initial testing. Conformity with these requirements will be determined by OMT.

Sources supplying materials shall be submitted by the Contractor to the Engineer for approval in conformance with the Contract Documents.

The material manufacturer shall reimburse the Administration for the cost of sampling and shipment of the samples when sampled by the Administration.

Material Shipment. The components shall be shipped in containers sealed by the manufacturer. The label on each container shall include the following information:

(a) Manufacturer's Name.

(b) Place of Manufacture.

(c) Color of Material and Component Type.

(d) Date of Manufacture (month-year).

(e) Batch and Lot Identification Number.

(f) Size/quantity of lot represented.

951.05.03 Certification. The Contractor shall furnish notarized certification as specified in TC-1.03.

The manufacturer shall certify that any SPRPM materials supplied during the Contract conforms to the identical composition of the samples submitted for evaluation on the NTPEP Northeast Test Deck, and identify the SPRPM materials by referring to the code used on the deck. PRPM materials which fail to conform will be rejected.

The manufacturer shall certify that any recessed pavement marker materials supplied during the Contract conforms to the identical composition of the samples submitted for evaluation on any NTPEP Test Deck, and identify the recessed pavement marker materials by referring to the code used on the deck. Recessed pavement marker materials which fail to conform will be rejected.

The manufacturer shall also provide the following:

(a) Material Safety Data Sheets for all materials submitted for testing and use.

(b) A facility, in operation, capable of producing the materials in the quantity and quality required by the Administration.

(c) A laboratory capable of performing the required tests. This laboratory will be subject to the Administration's approval.

CATEGORY 900
MATERIALS

SECTION 951 — PAVEMENT MARKING MATERIALS

951.06 HEAT APPLIED PERMANENT PREFORMED THERMOPLASTIC PAVEMENT MARKING MATERIAL. The material shall be highly durable retroreflective polymeric materials designed for use as transverse lines, numbers, legends, symbols and arrow markings subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment.

The applied material shall adhere to hot mix asphalt (HMA), open-grade friction courses (OGFC), stone matrix asphalt (SMA), portland cement concrete (PCC), and any existing pavement markings when applied using normal heat from a propane fueled heat gun in conformance with manufacturer's recommendations.

The applied material shall be capable of conforming to pavement contours, breaks and faults, shall not be affected by weather conditions, and shall remain in place on pavement surfaces without being displaced by traffic.

The material shall have a minimum shelf life of one year.

The material shall conform to the requirements of the MdMUTCD and the following:

(a) Composition. The material shall consist of polymeric materials, pigments, binders and glass beads distributed throughout the entire cross-sectional area. The thermoplastic material shall conform to M 249 with the exception of the relevant differences for the material being supplied in the preformed state.

Restrictions. The combined total of lead, cadmium, mercury and hexavalent chromium shall not exceed 100 ppm when tested by X-ray diffraction, ICP, or comparable method capable of this level of detection. Nonleachable lead based pigments will not be permitted. Diarylide type pigments shall only be used when the manufacture or pavement marking material application temperature does not exceed 392 F.

(b) Color. Preformed markings shall consist of film with pigments selected and blended to match Federal Standard 595 color chip Nos. 17886 and 13538 for white and yellow respectively.

(c) Frictional Resistance. The surface of the applied material shall provide a minimum average skid resistance value of 50 BPN when tested in conformance with E 303.

(d) Patchability. The material shall be capable of use for patching worn areas of the same type in conformance with manufacturer's recommendations.

(e) Thickness. The minimum thickness, without adhesive, shall be 120 mils.

(f) Adhesion. The material shall retain a minimum of 65 percent adhesive bond after 100 cycles of freeze-thaw when tested in conformance with C 666, Method B.

(g) Beads.

(1) Index of Refraction. All beads shall meet the general requirements of M 247, Type I, and shall have a minimum index of refraction of 1.50 when tested using the liquid oil immersion method specified in MSMT 211.

(2) Acid Resistance. A maximum of 15 percent of the beads shall show a formation of a distinct opaque white layer on the entire surface after exposure to a 1 percent solution (by weight) of sulfuric acid in conformance with MSMT 211.

Field Testing. Materials conforming to this Specification shall be field tested at AASHTO regional test facilities, such as National Transportation Product Evaluation Program (NTPEP), for performance.

Materials performing satisfactorily throughout the test period, including exhibiting a minimum retained reflectance of 100 mcd/m^2/lux at the completion of the testing, will be placed on the Prequalified Materials List maintained by the Office of Materials and Technology.

Certification. Any marking material supplied during the Contract shall be identical in composition to the material submitted for initial testing. Samples submitted for testing shall be accompanied by the manufacturer's certified analysis in conformance with TC-1.03.

CATEGORY 900
MATERIALS

SECTION 951 — PAVEMENT MARKING MATERIALS

951.07 PERMANENT PREFORMED PATTERNED REFLECTIVE PAVEMENT (PPPRP) MARKING MATERIAL. The material shall be capable of adhering to hot mix asphalt and portland cement concrete surfaces, and to any existing pavement markings in accordance with manufacturer's recommendations by a pre-coated pressure sensitive adhesive. A primer shall be used to precondition the surface if recommended by the manufacturer. The markings shall be capable of being inlaid in new hot mix asphalt surfaces during the paving operation.

The material shall be highly durable and retroreflective and shall be fabricated of a polymeric material designed for longitudinal and legend/symbol markings subjected to high traffic volumes and severe wear conditions, such as shear action from crossover or encroachment on typical longitudinal configurations, and where high levels of reflectivity are required to ensure the safety of the motoring public.

The material shall be of good appearance and free from cracks. Edges shall be true, straight and unbroken. Line marking material shall be in rolls having no more than three splices per 150 ft of length. All marking materials shall be packaged in conformance with accepted commercial standards and shall have a minimum shelf life of one year.

The material shall remain in place on the pavement surface without being displaced by traffic, and shall not be affected by weather conditions.

951.07.01 Permanent Preformed Patterned Reflective Pavement Marking Material Components.

Composition. The material shall consist of a mixture of polymeric materials, pigments and reflective spheres distributed throughout the base cross-sectional area and reflective spheres bonded to the topcoat surface to provide immediate and continuing retroreflection.

Restrictions. The combined total of lead, cadmium, mercury and hexavalent chromium shall not exceed 100 ppm. Diarylide based pigments and non-leachable lead pigmentation are not acceptable. The presence of these compounds shall be tested for compliance to the specification by X-ray diffraction, ICP, or another comparable method, capable of this level of detection.

951.07.02 Permanent Preformed Patterned Reflective Pavement Marking Material Physical Requirements.

(a) Reflectance. The manufacturer shall certify that the white and yellow materials shall have the minimum initial retroreflectance values of 350 mcd/L/m^2 for white and 250 mcd/L/m^2 for yellow markings in any 528 ft section. Reflectance shall be measured using a reflectometer with CEN 30-meter geometry (88.76 degree entrance angle and 1.05 degree observation angle).

(b) Color. The color of preformed markings shall essentially match the 37886, 33538 or 37038 color chips for white, yellow or black respectively as shown in Federal Standard 595A.

(c) Frictional Resistance. The surface of the retroreflective pliant polymer shall provide a minimum initial average skid resistance value of 45 BPN when tested according to ASTM E 303.

951.07.03 Field Testing. Materials conforming to this specification shall be field evaluated at the National Transportation Product Evaluation Program (NTPEP) Northeast test deck for performance. Materials performing satisfactorily throughout the test period will be placed on the Administration's Prequalified Materials List. All marking materials supplied during the Contract shall be identical in composition to the materials submitted for initial testing. Conformity with these requirements will be determined by the Office of Materials and Technology.

951.07.04 Prequalification. Samples shall be taken by Administration for testing. The manufacturer shall submit any data from AASHTO NTPEP Northeast Test Deck which support material performance. Materials conforming to this Specification will be placed on the Administration's Prequalified List of Patterned Tapes.

951.07.05 Certification. The Contractor shall furnish notarized certification as specified in TC-1.03. The manufacturer shall certify that any reflective thermoplastic materials supplied during the Contract conforms to the identical formulation as the samples submitted for evaluation on the NTPEP Northeast test deck, and identify the formulas by referring to the code used on the deck. Reflective thermoplastic materials which fail to conform will be rejected.

The manufacturer shall also provide the following:

(a) Material Safety Data Sheets for all materials submitted for testing and use.

(b) A facility, presently in operation, capable of producing the reflective thermoplastic materials in the quantity and quality required by the Administration.

(c) A laboratory subject to the Administration's approval which is capable of performing the required tests.

CATEGORY 900
MATERIALS

SECTION 951 — PAVEMENT MARKING MATERIALS

951.08 LEAD FREE TWO COMPONENT EPOXY PAVEMENT MARKING MATERIALS. The white and yellow lead free epoxy pavement marking material shall consist of a 100 percent solid two-part system with glass beads embedded homogeneously throughout the depth of the film and the surface. All of these materials shall be lead free as defined herein.

951.08.01 Epoxy Physical Components.

(a) Composition.

COMPONENT A	PERCENT BY WEIGHT	
	WHITE	YELLOW
Epoxy Resin	75 - 82	75 – 79
Titanium Dioxide	18 - 25	14 – 17
Organic Yellow	—	7 – 8

The entirety of the pigment of Component A white shall consist of D 476, Type II Rutile Titanium Dioxide. No extender pigments are permitted. Yellow pigments and tinting colors shall be added in proportions which will produce a color equal to the yellow color depicted in the color box described herein. Any Titanium Dioxide used shall conform to D 476, Type II Rutile.

The epoxy system shall contain no volatile solvents. The cured film shall be no less than 99.5 percent of the wet film thickness of the panel at the time it was prepared for test.

Restrictions. The manufacturer shall certify that the combined total of lead, cadmium, mercury, and hexavalent chromium shall not exceed 100 ppm when tested by X-ray diffraction, ICP, Atomic Absorption Spectroscopy, or a comparable method capable of this level of detection.

(b) Epoxide Number. The weight per epoxy equivalent (WPE) as determined by D 1652 for both white and yellow of Component A, on a pigment free basis, shall conform to a target value ± 50 provided by the manufacturer and approved by the Engineer.

(c) Amine Number. The amine value of the curing agent (component B) shall consist entirely of stable amines and shall be determined as specified in D 2074. The total amine value shall conform to a target value ± 50 provided by the manufacturer and approved by the Engineer.

951.08.02 Mixed Composition.

(a) Mixing Ratio. The mixing ratio for the epoxy pavement marking material shall be proportioned according to the manufacturer's recommendations. The ratio shall not vary more than 2.5 percent during any operation conducted in conjunction with these materials.

(b) Color (White and Yellow).

(1) Production. The color of the cured epoxy material film of the production sample shall essentially match the specified color chips conforming to Federal Standard 595 when visually compared or by instrumental measurement.

(2) Control. Control color matching determinations will be made using a Pacific Scientific Color Machine at an observation angle of 2 degrees, and the C.I.E. Chromatically Coordinate Color Matching System under light source Illuminate C, with the following tolerances permitted between the standard chip and the cured epoxy film sample:

	WHITE Color No. 17886		**YELLOW Color No. 13538**	
	X	Y	X	Y
Standard Chip	0.310	0.330	0.480	0.450
Delta Tolerance	± 0.020	± 0.020	± 0.030	± 0.030

(c) Yellowing Index. After curing for 72 hours, the yellowing index of the white material when tested in conformance with E 313, using the C.I.E. Scale Illuminate C and 45/2 degrees geometry, shall not exceed 8.0 preceding QUV, and shall not exceed 15.0 after 72 hours in QUV.

(d) Toxicity. After heating to the application temperature, the material shall not exude fumes which are toxic or injurious to persons or property.

(e) Directional Reflectance. The directional reflectance when tested in conformance with E 1347 after QUV using the C.I.E. Scale Illuminate C and 45/2 degrees geometry, shall be minimums of 80 for white and 50 for yellow.

(f) Abrasion Resistance. Abrasion Resistance of the mixed material without glass beads shall be 80 mg maximum loss when tested as specified in C 501 with a 1000 g load, 1000 cycles, CS-l7 wheel and a 15 ± 0.5 mil wet film thickness on a S-l6 plain steel plate.

(g) Hardness. The Type D Durometer Hardness of the material shall be a minimum of 75 when tested in conformance with D 2240. Test films shall be cast on a suitable substrate at 20 ± 1 mil wet film thickness. The film shall be cured 24 to 72 hours at 75 ± 2 F prior to testing.

(h) Tensile Strength. The average tensile strength shall be a minimum of 6000 psi when tested in conformance with D 638, Type IV molded specimens. Specimens shall be cured 24 to 72 hours at 75 ± 2 F with a relative humidity of 50 ± 3 percent prior to testing.

(i) Compressive Strength. The compressive strength of the catalyzed epoxy marking material shall be a minimum of 12 000 psi when tested in conformance with D 695. The test specimen shall be cured 72 hours at 75 ± 2 F with a relative humidity of 50 ± 3 percent prior to testing.

(j) Adhesion to Concrete. The catalyzed epoxy paint pavement marking materials, when tested in conformance with ACI Method 503, shall have a 4000 psi minimum adhesion to the specified concrete surface with 100 percent concrete failure in the performance of this test. The prepared specimens shall be conditioned for 24 to 72 hours at 75 ± 2 F prior to the performance of the tests.

(k) Infrared Spectroscopy. Both component A and component B shall be analyzed to verify for control purposes that materials submitted for use are of an identical formulation as originally approved. Deviations as determined by comparison with the original sample shall be cause for rejection.

(l) Curing. The epoxy material shall be fully cured at a surface temperature of 35 F or above. The pavement marking material shall exhibit a no-tracking time of less than 10 minutes, when mixed in the proper ratio and applied at 20 ± 1.0 mil film thickness at 75 ± 2 F and with the proper saturation of beads when tested in conformance with D 711. The manufacturer shall furnish a table depicting typical no-track time versus various temperatures in the recommended application temperature range.

951.08.03 Glass Beads Physical Requirements. Glass beads shall be colorless, clean, transparent and free of milkiness or excessive air bubbles and essentially clean from surface scarring or scratching. The beads shall be spherical in shape, and shall contain a minimum of 60 percent silica. Roundness shall be 75 percent minimum when tested in conformance with D 1155, Procedure A.

The beads shall have a minimum refractive index of 1.50 (Standard) and 1.90 (Large) when tested in conformance with MSMT 211.

Glass beads shall not absorb moisture in storage and shall remain free of clusters or lumps.

Glass beads shall conform to all the requirements of M 247, except that the moisture resistance and flotation tests shall not be required, and the following:

GRADATION SIEVE SIZE	PERCENT PASSING	
	Standard Beads	**Large Beads**
12 (1.70 mm)		100
14 (1.40 mm)		95 - 100
16 (1.18 mm)		80 - 95
18 (1.00 mm)		10 - 40
20 (0.85 mm)	100	0 - 5
30 (0.60 mm)	75 - 95	
50 (0.30 mm)	15 - 35	
100 (0.15 mm)	0 - 5	

951.08.04 Field Testing. Materials conforming to this Specification shall be field evaluated at the National Transportation Product Evaluation Program (NTPEP) Northeast test deck for performance. Materials performing satisfactorily throughout the test period will be placed on the Administrations Prequalified Materials List. All marking materials supplied during the Contract shall be identical in composition to the materials submitted for initial testing. Conformity with these requirements will be determined by the Office of Materials and Technology (OMT).

951.08.05 Sampling. Random testing of samples will be performed by the Administration as Quality Assurance and certification verification. Samples of each batch will be procured at the manufacturer's facility by the Administration. Each sample shall be accompanied by a certified analysis showing compliance with the physical requirements of this Specification, the recommended epoxy resin material temperature at the spray gun, and certification that any epoxy resin material supplied during the Contract period shall be identical in composition to the material submitted for initial testing. Conformity to these requirements will be determined by OMT.

Sources supplying epoxy resin materials and glass beads shall be submitted by the Contractor to the Engineer for approval in conformance with the Contract Documents.

The epoxy resin material manufacturer shall reimburse the Administration for the cost of sampling and shipment of the samples if sampled by the Administration.

(a) Epoxy Resin Components. The epoxy resin components shall be shipped in containers sealed by the manufacturer. The label on each container shall include the following information:

(1) Manufacturer's Name,

(2) Place of Manufacture,

(3) Color of Material and Component Type,

(4) Date of Manufacture (month-year),

(5) Batch or Lot Identification Number, and

(6) Size/quantity of lot represented.

(b) Glass Beads. The glass beads shall be shipped in 50 lb, moisture resistant bags with complete identification information imprinted on the outside.

The Contractor shall furnish samples of the glass beads and epoxy resin materials to the Administration's Central Laboratory. Physical testing will be performed every four months.

951.08.06 Certification. The Contractor shall furnish notarized certification as specified in TC-1.03. The manufacturer shall certify that any epoxy resin materials supplied during the Contract conforms to the identical formulation as the samples submitted for evaluation on the NTPEP Northeast test deck, and identify the formulas by referring to the code used on the deck. Epoxy resin materials which fail to conform will be rejected.

The manufacturer shall also provide the following:

(a) Material Safety Data Sheets for all materials submitted for testing and use.

(b) A facility, in operation, capable of producing the epoxy resin materials in the quantity and quality required by the Administration.

(c) A laboratory capable of performing the required tests. This laboratory will be subject to the Administration’s approval.

Proposers are advised that the following:

ADDENDUM RECEIPT
VERIFICATION FORM
and the
PROPOSAL FORM PACKET
shall be completed,
and submitted in a sealed envelope
clearly marked
“SEALED PROPOSAL”
and the
CONTRACT NUMBER
on the outside of the envelope

ADDENDUM RECEIPT VERIFICATION FORM

COMAR 21.05.02.08 requires that all addenda issued be acknowledged, therefore before proposals may be considered responsive, the Maryland State Highway Administration must receive verification that all proposals considered the contents of all Contract Documents and all Addenda issued, as applicable, for this project.

I do solemnly declare and affirm under the penalties of perjury that this proposal was prepared by this firm, including all subcontractors and suppliers, with consideration of all the information contained in the as advertised Contract Documents and all Addenda issued, as applicable.

☐ NO ADDENDA WERE ISSUED

☐ ADDENDUM NO. 1 to _____
(Must be filled in by the proposer – if only one Addendum enter 1 in the blank space provided)

Date: _____

By: _____
(print name of Authorized Representative)

_____
(signature of Authorized Representative)

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
PROPOSAL FORM

Proposal by_____
Name

_____
Address (Street and/or P.O. Box)

_____
City State Zip

( ) ( )
A.C. Phone No. A.C. Fax No.

to furnish and deliver all materials and to do and perform all work, in conformance with the Standard Specifications, revisions thereto, General Provisions and the Special Provisions in this contract for MD 32 – MD 108 to North of Linden Church Road Design-Build located in, Howard County, Maryland, for which Price Proposals will be received until 12:00 o'clock noon on **December 6, 2016.** Price Proposals shall be submitted to:

State Highway Administration
Office of Procurement and Contract Management
Fourth Floor, C-405
707 N. Calvert Street
Baltimore, MD 21202

In response to the advertisement by the Administration, inviting Price Proposals for the work in conformance with the Contract Documents, now on file in the office of the Administration. I/We hereby certify that I/we am/are the only person, or persons, interested in this proposal as principals, and that an examination has been made of the work site, the Specifications, and Request for Proposals, including the Special Provisions contained herein. I/We propose to furnish all necessary machinery, equipment, tools, labor and other means of construction, and to furnish all materials required to complete the project at the following unit price or lump sum price.

ITEM NO. CCS NO.	APPROXIMATE QUANTITIES	DESCRIPTION OF ITEMS	SECTION	UNIT PRICE DOLLARS	 CENTS	AMOUNTS DOLLARS	 CENTS
1001 100000	LUMP SUM	DESIGN-BUILD	XXX	LUMP SUM			
1002 100000	30	. EACH OF . CALENDAR DAY INCENTIVE FOR EARLY COMPLETION	XXX	18,300	00	549,000	00
1003 110500	76,000	EACH OF PRICE ADJUSTMENT FOR DIESEL FUEL	XXX	1	00	76,000	00

END OF CATEGORY NO. 1

STATE CONTRACT - HO1415170
FEDERAL CONTRACT - NOT APPLICABLE

ITEM NO. CCS NO.	APPROXIMATE QUANTITIES	DESCRIPTION OF ITEMS	SECTION	UNIT PRICE DOLLARS	 CENTS	AMOUNTS DOLLARS	 CENTS
3001 300000	2	EACH OF . SEVER WEATHER EVENT	XXX	73,200	00	146,400	00
3002 388130	10	EACH OF QUARTERLY EROSION AND SEDIMENT CONTROL INCENTIVE	308 SP	6,710	00	67,100	00
3003 388135	LUMP SUM	FINAL EROSION AND SEDIMENT CONTROL INCENTIVE	308 SP	67,100	00	67,100	00

END OF CATEGORY NO. 3

ITEM NO. CCS NO.	APPROXIMATE QUANTITIES	DESCRIPTION OF ITEMS	SECTION	UNIT PRICE DOLLARS	 CENTS	AMOUNTS DOLLARS	 CENTS
5001 504600	94,000	EACH OF PRICE ADJUSTMENT FOR ASPHALT BINDER	504	1	00	94,000	00
5002 504605	170,000	EACH OF PAYMENT ADJUSTMENT FOR PAVEMENT DENSITY	504	1	00	170,000	00
5003 504615	170,000	EACH OF PAYMENT ADJUSTMENT FOR ASPHALT MIXTURE	504	1	00	170,000	00
5004 535100	57,000	EACH OF PAVEMENT SURFACE PROFILE PAY ADJUSTMENT	535 SP	1	00	57,000	00

END OF CATEGORY NO. 5

STATE CONTRACT - HO1415170
FEDERAL CONTRACT - NOT APPLICABLE

ITEM NO. CCS NO.	APPROXIMATE QUANTITIES	DESCRIPTION OF ITEMS	SECTION	UNIT PRICE DOLLARS	 CENTS	AMOUNTS DOLLARS	 CENTS
7001 700000	10	EACH OF . FINAL WETLAND REDUCTION INCENTIVE	XXX	8,000	00	80,000	00
7002 700000	10	EACH OF . FOREST IMPACT REDUCTION/ FOREST MITIGATION INCENTIVE	XXX	2,500	00	25,000	00

END OF CATEGORY NO. 7

STATE CONTRACT - HO1415170
FEDERAL CONTRACT - NOT APPLICABLE

ITEM NO. CCS NO.	APPROXIMATE QUANTITIES	DESCRIPTION OF ITEMS SECTION	UNIT PRICE DOLLARS CENTS	AMOUNTS DOLLARS CENTS
		AGGREGATE AMOUNT AT UNIT PRICES ALTERNATE A IS USING BID 1001-1003, 3001-3003, 5001-5004, 7001, 7002		
		THIS PROPOSAL SHALL BE FILLED IN BY THE BIDDER WITH PRICES IN NUMERALS AND EXTENSIONS SHALL BE MADE BY HIM.		

STATE CONTRACT - HO1415170
FEDERAL CONTRACT - NOT APPLICABLE

CONTRACT PROVISION BUY AMERICA

This section only applies to projects partially or totally financed with Federal funds. The Contractor shall comply with Section 165 of the Surface Transportation Assistance Act of 1982 as amended by Section 1041(a) and 1048(a) of the Intermodal Surface Transportation Efficiency Act of 1991 with regard to the furnishing and coating of iron and steel products.

The Contract, if awarded, will be awarded to the responsive and responsible bidder who submits the lowest total bid for the Contract based on furnishing Domestic Products unless such bid exceeds the lowest total bid based on furnishing Foreign Products by more than twenty five percent (25%). Foreign Products will not be permitted to be used as a substitution for Domestic ones after the bid has been awarded.

Furnish steel or iron construction materials, including coating, for permanently incorporated work according to 23 CFR 635.410 and as follows:

(a) All manufacturing processes of steel or iron materials in a product, including coating; and any subsequent process that alters the steel or iron material's physical form or shape, changes its chemical composition, or the final finish; are to occur within the United States (One of the 50 States, the District of Columbia, Puerto Rico, or in territories and possessions of the U.S.). Manufacturing begins with the initial melting and mixing, and continues through the coating stage. The processes include rolling, extruding, machining, bending, grinding, drilling, welding, and coating. The action of applying a coating to steel or iron is deemed a manufacturing process. Coating includes epoxy coating, galvanizing, aluminizing, painting, and any other coating that protects or enhances the value of steel or iron. Any process from the original reduction from ore to the finished product constitutes a manufacturing process for iron.

(b) The following are considered to be steel manufacturing processes:

(1) Production of steel by any of the following processes:

(a) Open hearth furnace.
(b) Basic oxygen.
(c) Electric furnace.
(d) Direct reduction.

(2) Rolling, heat treating, and any other similar processing.

(3) Fabrication of the products:

(a) Spinning wire into cable or strand.
(b) Corrugating and rolling into culverts.
(c) Shop fabrication.

(c) The manufacturing process for a steel/iron product is considered complete when the product is ready for use as an item (e.g., fencing, posts, girders, pipe, manhole cover, etc.) or could be incorporated as a component of a more complex product through a further manufacturing process (e.g., prestressed concrete girders, reinforced concrete pipe, traffic control devices, bearing pads, etc.). A product containing both steel and/or iron components, may be assembled outside the United States and meet Buy America requirements if the constituent steel and iron components (in excess of the minimal amounts permitted) were manufactured domestically and are not modified at the assembly location prior to final assembly.

(d) If domestically produced steel billets or iron ingots are exported outside of the U.S., as defined above, for any manufacturing process then the resulting product does not conform to the Buy America requirements. Additionally, products manufactured domestically from foreign source steel billets or iron ingots do not conform to the Buy America requirements because the initial melting and mixing of alloys to create the material occurred in a foreign country.

(e) Due to a nationwide waiver, Buy America does not apply to raw materials (iron ore and alloys), scrap (recycled steel or iron), and pig iron or processed, pelletized, and reduced iron ore.

(f) For the Buy America provisions to apply, the steel or iron product must be permanently incorporated into the project. If an item is rendered as a "donated material" in accordance with 23 U.S.C. 323 – Donations and Credits, it will have to comply with Buy America requirements. While States and local governments may receive a credit for donated material, this material must generally comply with Buy America requirements. Buy America does not apply to temporary steel items, e.g., temporary sheet piling, temporary bridges, steel scaffolding and falsework. Further, Buy America does not apply to materials which remain in place at the contractor convenience.

(g) Certifications which document that steel and iron have been manufactured and that coatings for iron or steel have been applied in the United States shall be provided to the Contractor by the manufacturer. The Contractor shall provide the required certifications to the Engineer prior to such items being incorporated into the permanent work. Certifications shall extend to materials utilized in manufactured and fabricated products purchased by the Contractor.

(h) Products manufactured of foreign steel or iron materials may be used, provided the cost of such products as they are delivered to the project does not exceed 0.1% of the total contract amount, or $2,500, whichever is greater. If a supplier or fabricator wishes to use a partial fabrication process where domestic and foreign source components are assembled at a domestic location, the "as delivered cost" of the foreign components should include any transportation, assembly and testing costs required to install them in the final product.

ALTERNATE BID
USING FOREIGN PRODUCTS

When a bidder elects to utilize Foreign Products on one or more items, the following summation indicating the Total Bid using Foreign Products must be completed in addition to the individual item bid tabulations.

The following instructions are given to the bidder in completing the Total Bid summation using Foreign Products:

1 - The "Bid Total" for the initial bid using Domestic Products shall be shown on line (1).

2 - The subtotal for Item Amounts using Domestic Products shall be shown on line (2), for those items which the Contractor elects to use Foreign Products.

3 - The subtotal for Item Amounts using Foreign Products shall be shown on line (3).

4 - The total Bid, utilizing Foreign Products shall be shown on line (4). The value is obtained by subtracting subtotal (2) from the Total Bid (1) and then adding subtotal (3).

Bid Total for Bid 1 using Domestic items	Line (1)_____
Total of Domestic Items	Line (2) -_____
Total of Foreign Items	Line (3) +_____
Bid Total using Foreign Items	Line (4)_____

ALTERNATE BID - USING FOREIGN PRODUCTS
BIDDER'S INSTRUCTIONS

When the bidder elects to submit a bid for one or more items using Foreign Products, the following form must be used. For each item that Foreign Products are contemplated, the appropriate "Item Numbers", "Approximate Quantities", "Description of Items", "Unit Price or Lump Sum Price", "Item Amount Domestic" and "Item Amount Foreign" shall be tabulated below as specified in the initial bid. The bidder shall indicate the unit price in dollars and cents and show the total cost of the item for each item that utilizes Foreign Products. When all items utilizing Foreign Products have been listed, the bidder shall indicate on Page 6 of 45 the subtotals of the Item Amounts for Domestic Products in Line (2) and for Foreign Products in Line (3).

Item Nos.	Approximate Quantities	Description of Items	Unit Price or Lump Sum Dollars.Cts.	Items Amount Domestic Dollars.Cts.	Items Amount Foreign Dollars.Cts.

BID/PROPOSAL AFFIDAVIT

A. Each solicitation shall provide notice that the affidavit in §B of this regulation shall be completed and submitted to the procurement agency with the vendor's bid or offer.

B. Mandatory Solicitation Addendum. The solicitation addendum shall be in substantially the same form as follows:

A. AUTHORITY

I HEREBY AFFIRM THAT:

I, _____ (print name), possess the legal authority to make this Affidavit.

B. CERTIFICATION REGARDING COMMERCIAL NONDISCRIMINATION

The undersigned bidder hereby certifies and agrees that the following information is correct: In preparing its bid on this project, the bidder has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not engaged in "discrimination" as defined in §19-103 of the State Finance and Procurement Article of the Annotated Code of Maryland. "Discrimination" means any disadvantage, difference, distinction, or preference in the solicitation, selection, hiring, or commercial treatment of a vendor, subcontractor, or commercial customer on the basis of race, color, religion, ancestry, or national origin, sex, age, marital status, sexual orientation, or on the basis of disability or any otherwise unlawful use of characteristics regarding the vendor's, supplier's, or commercial customer's employees or owners. "Discrimination" also includes retaliating against any person or other entity for reporting any incident of "discrimination". Without limiting any other provision of the solicitation on this project, it is understood that, if the certification is false, such false certification constitutes grounds for the State to reject the bid submitted by the bidder on this project, and terminate any contract awarded based on the bid. As part of its bid or proposal, the bidder herewith submits a list of all instances within the past 4 years where there has been a final adjudicated determination in a legal or administrative proceeding in the State of Maryland that the bidder discriminated against subcontractors, vendors, suppliers, or commercial customers, and a description of the status or resolution of that determination, including any remedial action taken. Bidder agrees to comply in all respects with the State's Commercial Nondiscrimination Policy as described under Title 19 of the State Finance and Procurement Article of the Annotated Code of Maryland.

B-1. CERTIFICATION REGARDING MINORITY BUSINESS ENTERPRISES.

The undersigned bidder hereby certifies and agrees that it has fully complied with the State Minority Business Enterprise Law, State Finance and Procurement Article, §14-308(a)(2), Annotated Code of Maryland, which provides that, except as otherwise provided by law, a contractor may not identify a certified minority business enterprise in a bid or proposal and:

(1) Fail to request, receive, or otherwise obtain authorization from the certified minority business enterprise to identify the certified minority proposal;

(2) Fail to notify the certified minority business enterprise before execution of the contract of its inclusion in the bid or proposal;

(3) Fail to use the certified minority business enterprise in the performance of the contract; or

(4) Pay the certified minority business enterprise solely for the use of its name in the bid or proposal.

(5) Without limiting any other provision of the solicitation on this project, it is understood that if the certification is false, such false certification constitutes grounds for the State to reject the bid submitted by the bidder on this project, and terminate any contract awarded based on the bid.

B-2. CERTIFICATION REGARDING VETERAN-OWNED SMALL BUSINESS ENTERPRISES. THE UNDERSIGNED

Bidder hereby certifies and agrees that it has fully complied with the State veteran-owned small business enterprise law, State Finance and Procurement Article, §14-605, Annotated Code of Maryland, which provides that a person may not:

(1) Knowingly and with intent to defraud, fraudulently obtain, attempt to obtain, or aid another person in fraudulently obtaining or attempting to obtain public money, procurement contracts, or funds expended under a procurement contract to which the person is not entitled under this title;

(2) Knowingly and with intent to defraud, fraudulently represent participation of a veteran–owned small business enterprise in order to obtain or retain a bid preference or a procurement contract;

(3) Willfully and knowingly make or subscribe to any statement, declaration, or other document that is fraudulent or false as to any material matter, whether or not that falsity or fraud is committed with the knowledge or consent of the person authorized or required to present the declaration, statement, or document;

(4) Willfully and knowingly aid, assist in, procure, counsel, or advise the preparation or presentation of a declaration, statement, or other document that is fraudulent or false as to any material matter, regardless of whether that falsity or fraud is committed with the knowledge or consent of the person authorized or required to present the declaration, statement, or document;

(5) Willfully and knowingly fail to file any declaration or notice with the unit that is required by COMAR 21.11.12; or

(6) Establish, knowingly aid in the establishment of, or exercise control over a business found to have violated a provision of §B-2(1)—(5) of this regulation.

C. AFFIRMATION REGARDING BRIBERY CONVICTIONS

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business (as is defined in Section 16-101(b) of the State Finance and Procurement Article of the Annotated Code of Maryland), or any of its officers, directors, partners, controlling stockholders, or any of its employees directly involved in the business's contracting activities including obtaining or performing contracts with public bodies has been convicted of, or has had probation before judgment imposed pursuant to Criminal Procedure Article, §6-220, Annotated Code of Maryland, or has pleaded nolo contendere to a charge of, bribery, attempted bribery, or conspiracy to bribe in violation of Maryland law, or of the law of any other state or federal law, except as follows (indicate the reasons why the affirmation cannot be given and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of person(s) involved, and their current positions and responsibilities with the business):

_____

_____

_____.

D. AFFIRMATION REGARDING OTHER CONVICTIONS

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of its officers, directors, partners, controlling stockholders, or any of its employees directly involved in the business's contracting activities including obtaining or performing contracts with public bodies, has:

(1) Been convicted under state or federal statute of:

(a) A criminal offense incident to obtaining, attempting to obtain, or performing a public or private contract; or

(b) Fraud, embezzlement, theft, forgery, falsification or destruction of records or receiving stolen property;

(2) Been convicted of any criminal violation of a state or federal antitrust statute;

(3) Been convicted under the provisions of Title 18 of the United States Code for violation of the Racketeer Influenced and Corrupt Organization Act, 18 U.S.C. §1961 et seq., or the Mail Fraud Act, 18 U.S.C. §1341 et seq., for acts in connection with the submission of bids or proposals for a public or private contract;

(4) Been convicted of a violation of the State Minority Business Enterprise Law, §14-308 of the State Finance and Procurement Article of the Annotated Code of Maryland;

(5) Been convicted of a violation of §11-205.1 of the State Finance and Procurement Article of the Annotated Code of Maryland;

(6) Been convicted of conspiracy to commit any act or omission that would constitute grounds for conviction or liability under any law or statute described in subsections (1)—(5) above;

(7) Been found civilly liable under a state or federal antitrust statute for acts or omissions in connection with the submission of bids or proposals for a public or private contract;

(8) Been found in a final adjudicated decision to have violated the Commercial Nondiscrimination Policy under Title 19 of the State Finance and Procurement Article of the Annotated Code of Maryland with regard to a public or private contract; or

(9) Admitted in writing or under oath, during the course of an official investigation or other proceedings, acts or omissions that would constitute grounds for conviction or liability under any law or statute described in §§B and C and subsections D(1)—(8) above, except as follows (indicate reasons why the affirmations cannot be given, and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of the person(s) involved and their current positions and responsibilities with the business, and the status of any debarment):

_____

_____.

E. AFFIRMATION REGARDING DEBARMENT

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of its officers, directors, partners, controlling stockholders, or any of its employees directly involved in the business's contracting activities, including obtaining or performing contracts with public bodies, has ever been suspended or debarred (including being issued a limited denial of participation) by any public entity, except as follows (list each debarment or suspension providing the dates of the suspension or debarment, the name of the public entity and the status of the proceedings, the name(s) of the person(s) involved and their current positions and responsibilities with the business, the grounds of the debarment or suspension, and the details of each person's involvement in any activity that formed the grounds of the debarment or suspension).

_____

_____

_____.

F. AFFIRMATION REGARDING DEBARMENT OF RELATED ENTITIES

I FURTHER AFFIRM THAT:

(1) The business was not established and it does not operate in a manner designed to evade the application of or defeat the purpose of debarment pursuant to Sections 16-101, et seq., of the State Finance and Procurement Article of the Annotated Code of Maryland; and

(2) The business is not a successor, assignee, subsidiary, or affiliate of a suspended or debarred business, except as follows (you must indicate the reasons why the affirmations cannot be given without qualification):

_____

_____

_____.

G. SUB-CONTRACT AFFIRMATION

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business, has knowingly entered into a contract with a public body under which a person debarred or suspended under Title 16 of the State Finance and Procurement Article of the Annotated Code of Maryland will provide, directly or indirectly, supplies, services, architectural services, construction related services, leases of real property, or construction.

H. AFFIRMATION REGARDING COLLUSION

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business has:

(1) Agreed, conspired, connived, or colluded to produce a deceptive show of competition in the compilation of the accompanying bid or offer that is being submitted;

(2) In any manner, directly or indirectly, entered into any agreement of any kind to fix the bid price or price proposal of the bidder or offeror or of any competitor, or otherwise taken any action in restraint of free competitive bidding in connection with the contract for which the accompanying bid or offer is submitted.

I. CERTIFICATION OF TAX PAYMENT

I FURTHER AFFIRM THAT:

Except as validly contested, the business has paid, or has arranged for payment of, all taxes due the State of Maryland and has filed all required returns and reports with the Comptroller of the Treasury, the State Department of Assessments and Taxation, and the Department of Labor, Licensing, and Regulation, as applicable, and will have paid all withholding taxes due the State of Maryland prior to final settlement.

J. CONTINGENT FEES

I FURTHER AFFIRM THAT:

The business has not employed or retained any person, partnership, corporation, or other entity, other than a bona fide employee, bona fide agent, bona fide salesperson, or commercial selling agency working for the business, to solicit or secure the Contract, and that the business has not paid or agreed to pay any person, partnership, corporation, or other entity, other than a bona fide employee, bona fide agent, bona fide salesperson, or commercial selling agency, any fee or any other consideration contingent on the making of the Contract.

K. CERTIFICATION REGARDING INVESTMENTS IN IRAN

(1) The undersigned certifies that, in accordance with State Finance and Procurement Article, §17-705, Annotated Code of Maryland:

(a) It is not identified on the list created by the Board of Public Works as a person engaging in investment activities in Iran as described in State Finance and Procurement Article, §17-702, Annotated Code of Maryland; and

(b) It is not engaging in investment activities in Iran as described in State Finance and Procurement Article, §17-702, Annotated Code of Maryland.

(2) The undersigned is unable to make the above certification regarding its investment activities in Iran due to the following activities: _____

L. CONFLICT MINERALS ORIGINATED IN THE DEMOCRATIC REPUBLIC OF CONGO (FOR SUPPLIES AND SERVICES CONTRACTS)

I FURTHER AFFIRM THAT:

The business has complied with the provisions of State Finance and Procurement Article, §14-413, Annotated Code of Maryland governing proper disclosure of certain information regarding conflict minerals originating in the Democratic Republic of Congo or its neighboring countries as required by federal law.

M. ACKNOWLEDGEMENT

I ACKNOWLEDGE THAT this Affidavit is to be furnished to the Procurement Officer and may be distributed to units of: (1) the State of Maryland; (2) counties or other subdivisions of the State of Maryland; (3) other states; and (4) the federal government. I further acknowledge that this Affidavit is subject to applicable laws of the United States and the State of Maryland, both criminal and civil, and that nothing in this Affidavit or any contract resulting from the submission of this bid or proposal shall be construed to supersede, amend, modify or waive, on behalf of the State of Maryland, or any unit of the State of Maryland having jurisdiction, the

exercise of any statutory right or remedy conferred by the Constitution and the laws of Maryland with respect to any misrepresentation made or any violation of the obligations, terms and covenants undertaken by the above business with respect to (1) this Affidavit, (2) the contract, and (3) other Affidavits comprising part of the contract.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF.

Date: _____

By: _____ (print name of Authorized Representative and Affiant)

_____ (signature of Authorized Representative and Affiant)

COMPREHENSIVE SIGNATURE PAGE 1 OF 2

THE BIDDER IS HEREBY NOTIFIED THAT THIS DOCUMENT SHALL BE SIGNED IN INK IN ORDER FOR THE BID TO BE ACCEPTED. BY SIGNING, THE BIDDER CERTIFIES THAT HE/SHE WILL COMPLY IN EVERY ASPECT WITH THESE SPECIFICATIONS.

FURTHER, I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT (PARAGRAPHS A-M) ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF.

This bid form shall be filled out legibly in ink or typed. The bid, if submitted by an individual, shall be signed by an individual; if submitted by a partnership, shall be signed by such member or members of the partnership as have authority to bind the partnership; if submitted by a corporation the same shall be signed by the President and attested by the Secretary or an Assistant Secretary. If not signed by the President as aforesaid, there must be attached a copy of that portion of the By-Laws, or a copy of a Board resolution, duly certified by the Secretary, showing the authority of the person so signing on behalf of the corporation. In lieu thereof, the corporation may file such evidence with the Administration, duly certified by the Secretary, together with a list of the names of those officers having authority to execute documents on behalf of the corporation, duly certified by the Secretary, which listing shall remain in full force and effect until such time as the Administration is advised in writing to the contrary. In any case where a bid is signed by an Attorney in Fact the same must be accompanied by a copy of the appointing document, duly certified.

IF AN INDIVIDUAL:

NAME:_____

_____
Street and/or P.O. Box

_____ _____
City State Zip Code Fed ID or SSN

_____(SEAL) _____
Signature Date

_____
Print Signature

WITNESS:_____
Signature

_____
Print Signature

07-11-16

COMPREHENSIVE SIGNATURE PAGE 2 OF 2

IF A PARTNERSHIP:

NAME OF PARTNERSHIP:_____

_____
Street and/or P.O. Box

_____ _____ _____ _____
City State Zip Code Fed ID or SSN

BY:_____(SEAL)_____
Member Signature Title Date

_____
Print Signature

TITLE:_____ WITNESS:_____
Signature

_____
Print Signature

IF A CORPORATION:

NAME OF CORPORATION:_____

_____
Street and/or P.O. Box

_____ _____ _____ _____
City State Zip Code Fed ID or SSN

STATE OF INCORPORATION:_____

BY:_____(SEAL)_____
Signature Date

_____
Print Signature

TITLE:_____ WITNESS:_____
Secretary's Signature

_____
Print Signature

MDOT MBE FORM A
STATE-FUNDED CONTRACTS
CERTIFIED MBE UTILIZATION AND FAIR SOLICITATION AFFIDAVIT
PAGE 1 OF 2

This affidavit must be included with the bid/proposal. If the bidder/offeror fails to accurately complete and submit this affidavit as required, the bid shall be deemed not responsive or the proposal not susceptible of being selected for award.

In connection with the bid/proposal submitted in response to Solicitation No. HO1415170, I affirm the following:

1. MBE Participation (PLEASE CHECK ONLY ONE).

☐ I have met the overall certified Minority Business Enterprise (MBE) participation goal of Sixteen percent (16%) and the following subgoals, if applicable:
Seven percent (7%) for African American-owned MBE firms
Zero percent (0%) for Hispanic American-owned MBE firms
Zero percent (0%) for Asian American-owned MBE firms
Zero percent (0%) for Women-owned MBE firms

I agree that these percentages of the total dollar amount of the Contract, for the MBE goal and subgoals (if any), will be performed by certified MBE firms as set forth in the MBE Participation Schedule - Part 2 of the MDOT MBE Form B (State-Funded Contracts).

OR

☐ I conclude that I am unable to achieve the MBE participation goal and/or subgoals. I hereby request a waiver, in whole or in part, of the overall goal and/or subgoals. Within 10 business days of receiving notice that our firm is the apparent awardee or as requested by the Procurement Officer, I will submit a written waiver request and all required documentation in accordance with COMAR 21.11.03.11. For a partial waiver request, I agree that certified MBE firms will be used to accomplish the percentages of the total dollar amount of the Contract, for the MBE goal and subgoals (if any), as set forth in the MBE Participation Schedule - Part 2 of the MDOT MBE Form B (State-Funded Contracts).

2. Additional MBE Documentation.

I understand that if I am notified that I am the apparent awardee or as requested by the Procurement Officer, I must submit the following documentation within 10 business days of receiving such notice:

MDOT MBE FORM A
STATE-FUNDED CONTRACTS
CERTIFIED MBE UTILIZATION AND FAIR SOLICITATION AFFIDAVIT
PAGE 2 OF 2

(a) Outreach Efforts Compliance Statement (MDOT MBE Form C - State-Funded Contracts);
(b) Subcontractor Project Participation Statement (MDOT MBE Form D - State-Funded Contracts);
(c) If waiver requested, MBE Waiver Request Documentation and Forms (MDOT MBE/DBE Form E – Good Faith Efforts Guidance and Documentation) per COMAR 21.11.03.11; and
(d) Any other documentation required by the Procurement Officer to ascertain bidder's responsibility/ offeror's susceptibility of being selected for award in connection with the certified MBE participation goal and subgoals, if any.

I acknowledge that if I fail to return each completed document (in 2 (a) through (d)) within the required time, the Procurement Officer may determine that I am not responsible and therefore not eligible for contract award or that the proposal is not susceptible of being selected for award.

3. Information Provided to MBE firms.

In the solicitation of subcontract quotations or offers, MBE firms were provided not less than the same information and amount of time to respond as were non-MBE firms.

4. Products and Services Provided by MBE firms.

I hereby affirm that the MBEs are only providing those products and services for which they are MDOT certified.

I solemnly affirm under the penalties of perjury that the information in this affidavit is true to the best of my knowledge, information and belief.

_____	_____
Company Name	Signature of Representative
_____	_____
Address	Printed Name and Title
_____	_____
City, State and Zip Code	Date

MDOT MBE FORM B
STATE-FUNDED CONTRACTS
PART 1 – INSTRUCTIONS FOR MBE PARTICIPATION SCHEDULE
PAGE 1 OF 4

PARTS 2 AND 3 MUST BE INCLUDED WITH THE BID/PROPOSAL. IF THE BIDDER/OFFEROR FAILS TO ACCURATELY COMPLETE AND SUBMIT PART 2 WITH THE BID/PROPOSAL AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE OR THE PROPOSAL SHALL BE DEEMED NOT SUSCEPTIBLE OF BEING SELECTED FOR AWARD.

PLEASE READ BEFORE COMPLETING THIS FORM

1. Please refer to the Maryland Department of Transportation (MDOT) MBE Directory at www.mdot.state.md.us to determine if a firm is certified for the appropriate North American Industry Classification System ("NAICS") Code **and** the product/services description (specific product that a firm is certified to provide or specific areas of work that a firm is certified to perform). For more general information about NAICS, please visit www.naics.com. Only those specific products and/or services for which a prime or subcontractor is a certified MBE in the MDOT Directory can be used for purposes of achieving the MBE participation goals.

2. In order to be counted for purposes of achieving the MBE participation goals, the MBE firm (whether a prime or subcontractor) must be certified for that specific NAICS Code ("MBE" for State-funded projects designation after NAICS Code). **WARNING:** If the firm's NAICS Code is in **graduated status**, such services/products **will not be counted** for purposes of achieving the MBE participation goals. Graduated status is clearly identified in the MDOT Directory (such graduated codes are designated with the word graduated after the appropriate NAICS Code).

3. Examining the NAICS Code is the **first step** in determining whether an MBE firm is certified and eligible to receive MBE participation credit for the specific products/services to be supplied or performed under the contract. The **second step** is to determine whether a firm's Products/Services Description in the MBE Directory includes the products to be supplied and/or services to be performed that are being used to achieve the MBE participation goals. If you have any questions as to whether a firm is certified to perform the specific services or provide specific products, please contact MDOT's Office of Minority Business Enterprise at 1-800-544-6056 or via email at mbe@mdot.state.md.us.

4. Complete the Part 2 – MBE Participation Schedule for all certified MBE firms (including primes and subcontractors) being used to achieve the MBE participation goal and subgoals, if any.mailto:

MDOT MBE FORM B
STATE-FUNDED CONTRACTS
PART 1 – INSTRUCTIONS FOR MBE PARTICIPATION SCHEDULE
PAGE 2 OF 4

5. **MBE Prime Self-Performance.** When a certified MBE firm participates as a prime (independently or as part of a joint venture) on a contract, a procurement agency may count the distinct, clearly defined portion of the work of the contract that the certified MBE firm performs with its own forces toward fulfilling up to fifty-percent (50%) of the MBE participation goal (overall) and up to one hundred percent (100%) of not more than one of the MBE participation subgoals, if any, established for the contract. In order to receive credit for self-performance, an MBE prime must be (a) a certified MBE (see 1-3 above) and (b) listed in the Part 2 – MBE Participation Schedule with its certification number, the certification classification under which it will self-perform, and the percentage of the contract that can be counted as MBE self-performance. For the remaining portion of the overall goal and any subgoals, the MBE prime must also list, in the Part 2 – MBE Participation Schedule, other certified MBE firms used to meet those goals or, after making good faith efforts to obtain the participation of additional MBE firms, request a waiver. Note: A dually-certified MBE firm can use its own forces toward fulfilling ONLY ONE of the MBE subgoals for which it can be counted.

6. The Contractor's subcontractors are considered second-tier subcontractors. Third-tier contracting used to meet an MBE goal is to be considered the exception and not the rule. The following two conditions must be met before MDOT, its Modal Administrations and the Maryland Transportation Authority may approve a third-tier contracting agreement: (a) the bidder/offeror must request in writing approval of each third-tier contract arrangement, and (b) the request must contain specifics as to why a third-tier contracting arrangement should be approved. These documents must be submitted with the bid/proposal in Part 2 of this MBE Participation Schedule.

7. For each MBE firm that is being used as a supplier/wholesaler/regular dealer/broker/manufacturer, please follow these instructions for calculating the **amount of the subcontract for purposes of achieving the MBE participation goals**:

   A. Is the firm certified as a broker of the products/supplies? If the answer is YES, please continue to Item C. If the answer is NO, please continue to Item B.

   B. Is the firm certified as a supplier, wholesaler, regular dealer, or manufacturer of such products/supplies? If the answer is YES, continue to Item D. If the answer is NO, continue to Item C only if the MBE firm is certified to perform trucking/hauling services under NAICS Codes 484110, 484121, 484122, 484210, 484220 and 484230. If the answer is NO and the firm is not certified under these NAICS Codes, then no MBE participation credit will be given for the supply of these products.

   C. For purposes of achieving the MBE participation goal, you may count only the amount of any reasonable fee that the MBE firm will receive for the provision of such products/supplies - not the total subcontract amount or the value (or a percentage thereof) of such products and/or supplies. For Column 3 of the MBE Participation Schedule, please divide the amount

MDOT MBE FORM B
STATE-FUNDED CONTRACTS
PART 1 – INSTRUCTIONS FOR MBE PARTICIPATION SCHEDULE
PAGE 3 OF 4

of any reasonable fee that the MBE firm will receive for the provision of such products/services by the total Contract value and insert the percentage in Line 3.1.

D. Is the firm certified as a manufacturer (refer to the firm's NAICS Code and specific description of products/services) of the products/supplies to be provided? If the answer is NO, please continue to Item E. If the answer is YES, for purposes of achieving the MBE participation goal, you may count the total amount of the subcontract. For Column 3 of the MBE Participation Schedule, please divide the total amount of the subcontract by the total Contract value and insert the percentage in Line 3.1.

E. Is the firm certified as a supplier, wholesaler and/or regular dealer? If the answer is YES and the MBE firm is furnishing and installing the materials and is certified to perform these services, please divide the total subcontract amount (including full value of supplies) by the total Contract value and insert the percentage in Line 3.1. If the answer is YES and the MBE firm is only being used as a supplier, wholesaler and/or regular dealer or is not certified to install the supplies/materials, for purposes of achieving the MBE participation goal, you may only count sixty percent (60%) of the value of the subcontract for these supplies/products (60% Rule). To apply the 60% Rule, first divide the amount of the subcontract for these supplies/products only (not installation) by the total Contract value. Then, multiply the result by sixty percent (60%) and insert the percentage in Line 3.2.

8. For each MBE firm that **is not** being used as a supplier/wholesaler/regular dealer/broker/manufacturer, to calculate the **amount of the subcontract for purposes of achieving the MBE participation goals**, divide the total amount of the subcontract by the total Contract value and insert the percentage in Line 3.1.

   Example: $ 2,500 (Total Subcontract Amount) ÷ $10,000 (Total Contract Value) x 100 = 25%

9. **WARNING:** The percentage of MBE participation, computed using the percentage amounts determined per Column 3 for all of the MBE firms listed in Part 2, MUST at least equal the MBE participation goal **and** subgoals (if applicable) as set forth in MDOT MBE Form A – State-Funded Contracts for this solicitation. If a bidder/offeror is unable to achieve the MBE participation goal and/or any subgoals (if applicable), then the bidder/offeror must request a waiver in Form A or the bid will be deemed not responsive, or the proposal not susceptible of being selected for award. You may wish to use the attached Goal/Subgoal Worksheet to assist you in calculating the percentages and confirming that you have met the applicable MBE participation goal and subgoals (if any).

MDOT MBE FORM B
STATE-FUNDED CONTRACTS
PART 1 – INSTRUCTIONS FOR MBE PARTICIPATION SCHEDULE
PAGE 4 OF 4
GOAL/SUBGOAL PARTICIPATION WORKSHEET

1. Complete the Part 2 – MBE Participation Schedule for each MBE being used to meet the MBE goal and any subgoals.
2. After completion of the Part 2 – MBE Participation Schedule, you may use the Goal/Subgoal Worksheet to calculate the total MBE participation commitment for the overall goal and any subgoals.
3. **MBE Overall Goal Participation Boxes:** Calculate the total percentage of MBE participation for each MBE classification by adding the percentages determined per Column 3 of the Part 2 – MBE Participation Schedule. Add the percentages determined in Lines 3.1 and 3.2 for the MBE subcontractor (subs) total. Add the overall participation percentages determined in Line 3.3 for the MBE prime total.
4. **MBE Subgoal Participation Boxes:** Calculate the total percentage of MBE participation for each MBE classification by adding the percentages determined per Column 3 of the Part 2 – MBE Participation Schedule. Add the percentages determined in Lines 3.1 and 3.2 for the MBE subcontractor (subs) total. Add the subgoal participation percentages determined in Line 3.3 for the MBE prime total.
5. The percentage amount for the MBE overall participation in the Total MBE Firm Participation Box F1 should be equal to the sum of the percentage amounts in Boxes A through E of the MBE Overall Goal Participation Column of the Worksheet.
6. The percentage amount for the MBE subgoal participation in the Total MBE Firm Participation Box L should be equal to the sum of the percentage amounts in Boxes A through E of the MBE Subgoal Participation Column of the Worksheet.

GOAL/SUBGOAL WORKSHEET		
MBE Classification	**MBE Overall Goal Participation**	**MBE Subgoal Participation**
(A) Total African American Firm Participation (Add percentages determined for African American-Owned Firms per Column 3 of MBE Participation Schedule)	_____%subs _____%prime	_____%subs _____%prime
(B) Total Hispanic American Firm Participation (Add percentages determined for Hispanic American-Owned Firms per Column 3 of MBE Participation Schedule)	_____%subs _____%prime	_____%subs _____%prime
(C) Total Asian American Firm Participation (Add percentages listed for Asian American-Owned Firms per Column 3 of MBE Participation Schedule)	_____%subs _____%prime	_____%subs _____%prime
(D) Total Women-Owned Firm Participation (Add percentages determined for Women-Owned Firms per Column 3 of MBE Participation Schedule)	_____%subs _____%prime	_____%subs _____%prime
(E) Total for all other MBE Firms (Add percentages for firms listed as Other MBE Classification per Column 3 of the MBE Participation Schedule)	_____%subs _____%prime	_____%subs _____%prime
Total MBE Firm Participation (Add total percentages determined for all MBE Firms in each column of the Worksheet)	**(F1)**_____%	**(F2)**_____%

MDOT MBE FORM B
STATE-FUNDED CONTRACTS
PART 2 – MBE PARTICIPATION SCHEDULE
PAGE __ OF ___

PARTS 2 AND 3 MUST BE INCLUDED WITH THE BID/PROPOSAL. IF THE BIDDER/OFFEROR FAILS TO ACCURATELY COMPLETE AND SUBMIT PART 2 WITH THE BID/PROPOSAL AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE OR THE PROPOSAL SHALL BE DEEMED NOT SUSCEPTIBLE OF BEING SELECTED FOR AWARD.

Prime Contractor	Project Description	Solicitation Number

LIST INFORMATION FOR EACH CERTIFIED MBE PRIME OR MBE SUBCONTRACTOR YOU AGREE TO USE TO ACHIEVE THE MBE PARTICIPATION GOAL AND SUBGOALS, IF ANY. NOTE INSTRUCTIONS IN EACH COLUMN.

COLUMN 1	**COLUMN 2**	**COLUMN 3** Unless the bidder/offeror requested a waiver in MDOT MBE Form A – State Funded Contracts for this solicitation, the cumulative MBE participation for all MBE firms listed herein must equal at least the MBE participation goal and subgoals (if applicable) set forth in Form A.
NAME OF MBE PRIME OR MBE SUBCONTRACTOR AND TIER	**CERTIFICATION NO. AND MBE CLASSIFICATION**	FOR PURPOSES OF ACHIEVING THE MBE PARTICIPATION GOAL AND SUBGOALS, refer to Sections 5 through 8 in Part 1 - Instructions. State the percentage amount of the products/services in Line 3.1, except for those products or services where the MBE firm is being used as a wholesaler, supplier, or regular dealer. For items of work where the MBE firm is being used as a supplier, wholesaler and/or regular dealer, complete Line 3.2 using the 60% Rule. For items of work where the MBE firm is the prime, complete Line 3.3.
MBE Name: _____ ☐ Check here if MBE firm is a subcontractor and complete in accordance with Sections 6, 7, & 8 of Part 1 - Instructions. If this box is checked, complete 3.1 or 3.2 in Column C, whichever is appropriate. ☐ Check here if MBE firm is the prime contractor, including a participant in a joint venture, and self-performance is being counted pursuant to Section 5 of Part 1 - Instructions. If this box is checked, complete 3.3 in Column C. ☐ Check here if MBE firm is a third-tier contractor (if applicable). Please submit written documents in accordance with Section 6 of Part 1 - Instructions	**Certification Number:** _____ _____ **(If dually certified, check only one box.)** ☐ African American-Owned ☐ Hispanic American-Owned ☐ Asian American-Owned ☐ Women-Owned ☐ Other MBE Classification _____	3.1. **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR** (STATE THIS PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE-EXCLUDING PRODUCTS/SERVICES FROM SUPPLIERS, WHOLESALERS OR REGULAR DEALERS). _____% (Percentage for purposes of calculating achievement of MBE Participation goal and subgoals, if any) 3.2 **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR FOR ITEMS OF WORK WHERE THE MBE FIRM IS BEING USED AS A SUPPLIER, WHOLESALER AND/OR REGULAR DEALER)** (STATE THE PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE AND THEN APPLY THE 60% RULE PER SECTION 7(E) IN PART 1 - INSTRUCTIONS). _____% Total percentage of Supplies/Products x _____60% (60% Rule) _____% (Percentage for purposes of calculating achievement of MBE Participation goal and subgoals, if any) 3.3. **TOTAL PERCENTAGE TO BE PAID TO MBE PRIME FOR WORK THAT CAN BE COUNTED AS MBE SELF-PERFORMANCE** (STATE THIS PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE). (a) _____% Total percentage for self-performed items of work in which MBE is certified) (b) _____% (Insert 50% of MBE overall goal) (c) _____% (Insert subgoal for classification checked in Column 2, if applicable) Percentages for purposes of calculating achievement of MBE Participation goals: ➡ For MBE Overall goal – Use lesser of (a) or (b) ➡ For MBE Subgoal – Use lesser of (a) or (c) ➡ If MBE Prime is supplier, wholesaler and/or regular dealer, apply the 60% rule.

☐Check here if Continuation Sheets are attached.

MDOT MBE FORM B
STATE-FUNDED CONTRACTS
PART 2 – MBE PARTICIPATION SCHEDULE
CONTINUATION SHEET
PAGE __ OF ___

Prime Contractor	Project Description	Solicitation Number

LIST INFORMATION FOR EACH CERTIFIED MBE PRIME OR MBE SUBCONTRACTOR YOU AGREE TO USE TO ACHIEVE THE MBE PARTICIPATION GOAL AND SUBGOALS, IF ANY. NOTE INSTRUCTIONS IN EACH COLUMN.

COLUMN 1	**COLUMN 2**	**COLUMN 3** Unless the bidder/offeror requested a waiver in MDOT MBE Form A – State Funded Contracts for this solicitation, the cumulative MBE participation for all MBE firms listed herein must equal at least the MBE participation goal and subgoals (if applicable) set forth in Form A.
NAME OF MBE PRIME OR MBE SUBCONTRACTOR AND TIER	**CERTIFICATION NO. AND MBE CLASSIFICATION**	FOR PURPOSES OF ACHIEVING THE MBE PARTICIPATION GOAL AND SUBGOALS, refer to Sections 5 through 8 in Part 1 - Instructions. State the percentage amount of the products/services in Line 3.1, except for those products or services where the MBE firm is being used as a wholesaler, supplier, or regular dealer. For items of work where the MBE firm is being used as a supplier, wholesaler and/or regular dealer, complete Line 3.2 using the 60% Rule. For items of work where the MBE firm is the prime, complete Line 3.3.
MBE Name: _____ ☐ Check here if MBE firm is a subcontractor and complete in accordance with Sections 6, 7, & 8 of Part 1 - Instructions. If this box is checked, complete 3.1 or 3.2 in Column C, whichever is appropriate. ☐ Check here if MBE firm is the prime contractor, including a participant in a joint venture, and self-performance is being counted pursuant to Section 5 of Part 1 - Instructions. If this box is checked, complete 3.3 in Column C. ☐ Check here if MBE firm is a third-tier contractor (if applicable). Please submit written documents in accordance with Section 6 of Part 1 - Instructions	**Certification Number:** _____ **(If dually certified, check only one box.)** ☐ African American-Owned ☐ Hispanic American-Owned ☐ Asian American-Owned ☐ Women-Owned ☐ Other MBE Classification _____	3.1. **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR** (STATE THIS PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE-EXCLUDING PRODUCTS/SERVICES FROM SUPPLIERS, WHOLESALERS OR REGULAR DEALERS). _____% (Percentage for purposes of calculating achievement of MBE Participation goal and subgoals, if any) 3.2 **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR FOR ITEMS OF WORK WHERE THE MBE FIRM IS BEING USED AS A SUPPLIER, WHOLESALER AND/OR REGULAR DEALER)** (STATE THE PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE AND THEN APPLY THE 60% RULE PER SECTION 7(E) IN PART 1 - INSTRUCTIONS). _____% Total percentage of Supplies/Products x _____60% (60% Rule) _____% (Percentage for purposes of calculating achievement of MBE Participation goal and subgoals, if any) 3.3. **TOTAL PERCENTAGE TO BE PAID TO MBE PRIME FOR WORK THAT CAN BE COUNTED AS MBE SELF-PERFORMANCE** (STATE THIS PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE).. (a) _____% Total percentage for self-performed items of work in which MBE is certified) (b) _____% (Insert 50% of MBE overall goal) (c) _____% (Insert subgoal for classification checked in Column 2, if applicable) Percentages for purposes of calculating achievement of MBE Participation goals: ➡ For MBE Overall goal – Use lesser of (a) or (b) ➡ For MBE Subgoal – Use lesser of (a) or (c) ➡If MBE Prime is supplier, wholesaler and/or regular dealer, apply the 60% rule.

☐Check here if Continuation Sheets are attached.

MDOT MBE FORM B
STATE-FUNDED CONTRACTS
PART 3 – CERTIFICATION FOR MBE PARTICIPATION SCHEDULE

PARTS 2 AND 3 MUST BE INCLUDED WITH THE BID/PROPOSAL AS DIRECTED IN THE INVITATION TO BID/ REQUEST FOR PROPOSALS.

I hereby affirm that I have reviewed the Products and Services Description (specific product that a firm is certified to provide or areas of work that a firm is certified to perform) set forth in the MDOT MBE Directory for each of the MBE firms listed in Part 2 of this MBE Form B for purposes of achieving the MBE participation goals and subgoals that were identified in the MBE Form A that I submitted with this solicitation, and that the MBE firms listed are only performing those products/services/areas of work for which they are certified. I also hereby affirm that I have read and understand the form instructions set forth in Part 1 of this MBE Form B.

The undersigned Prime Contractor hereby certifies and agrees that they have fully complied with the State Minority Business Enterprise law, State Finance and Procurement Article §14-308(a)(2), Annotated Code of Maryland which provides that, except as otherwise provided by law, a contractor may not identify a certified minority business enterprise in a bid or proposal and:

(1) fail to request, receive, or otherwise obtain authorization from the certified minority business enterprise to identify the certified minority business enterprise in its bid or proposal;

(2) fail to notify the certified minority business enterprise before execution of the contract of its inclusion of the bid or proposal;

(3) fail to use the certified minority business enterprise in the performance of the contract; or

(4) pay the certified minority business enterprise solely for the use of its name in the bid or proposal.

I solemnly affirm under the penalties of perjury that the contents of Parts 2 and 3 of MDOT MBE Form B are true to the best of my knowledge, information and belief.

Company Name	Signature of Representative
Address	Printed Name and Title
City, State and Zip Code	Date

MDOT MBE/DBE FORM E
GOOD FAITH EFFORTS GUIDANCE AND DOCUMENTATION

PART 1 – GUIDANCE FOR DEMONSTRATING GOOD FAITH EFFORTS TO MEET MBE/DBE PARTICIPATION GOALS

In order to show that it has made good faith efforts to meet the Minority Business Enterprise (MBE)/Disadvantaged Business Enterprise (DBE) participation goal (including any MBE subgoals) on a contract, the bidder/offeror must either (1) meet the MBE/DBE Goal(s) and document its commitments for participation of MBE/DBE Firms, or (2) when it does not meet the MBE/DBE Goal(s), document its Good Faith Efforts to meet the goal(s).

I. Definitions

MBE/DBE Goal(s) – "MBE/DBE Goal(s)" refers to the MBE participation goal and MBE participation subgoal(s) on a State-funded procurement and the DBE participation goal on a federally-funded procurement.

Good Faith Efforts – The "Good Faith Efforts" requirement means that when requesting a waiver, the bidder/offeror must demonstrate that it took all necessary and reasonable steps to achieve the MBE/DBE Goal(s), which, by their scope, intensity, and appropriateness to the objective, could reasonably be expected to obtain sufficient MBE/DBE participation, even if those steps were not fully successful. Whether a bidder/offeror that requests a waiver made adequate good faith efforts will be determined by considering the quality, quantity, and intensity of the different kinds of efforts that the bidder/offeror has made. The efforts employed by the bidder/offeror should be those that one could reasonably expect a bidder/offeror to take if the bidder/offeror were actively and aggressively trying to obtain DBE participation sufficient to meet the DBE contract goal. Mere *pro forma* efforts are not good faith efforts to meet the DBE contract requirements. The determination concerning the sufficiency of the bidder's/offeror's good faith efforts is a judgment call; meeting quantitative formulas is not required.

Identified Firms – "Identified Firms" means a list of the DBEs identified by the procuring agency during the goal setting process and listed in the federally-funded procurement as available to perform the Identified Items of Work. It also may include additional DBEs identified by the bidder/offeror as available to perform the Identified Items of Work, such as DBEs certified or granted an expansion of services after the procurement was issued. If the procurement does not include a list of Identified Firms or is a State-funded procurement, this term refers to all of the MBE Firms (if State-funded) or DBE Firms (if federally-funded) the bidder/offeror identified as available to perform the Identified Items of Work and should include all appropriately certified firms that are reasonably identifiable.

Identified Items of Work – "Identified Items of Work" means the bid items identified by the procuring agency during the goal setting process and listed in the procurement as possible items of work for performance by MBE/DBE Firms. It also may include additional portions of items of work the bidder/offeror identified for performance by MBE/DBE Firms to increase the likelihood that the MBE/DBE Goal(s) will be achieved. If the procurement does not include a list of Identified Items of Work, this term refers to all of the items of work the bidder/offeror identified as possible items of work for performance by MBE/DBE Firms and should include all reasonably identifiable work opportunities.

MBE/DBE Firms – For State-funded contracts, "MBE/DBE Firms" refers to certified **MBE** Firms. Certified MBE Firms can participate in the State's MBE Program. For federally-funded contracts, "MBE/DBE Firms" refers to certified **DBE** Firms. Certified DBE Firms can participate in the federal DBE Program.

II. Types of Actions MDOT will Consider

The bidder/offeror is responsible for making relevant portions of the work available to MBE/DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE/DBE subcontractors and suppliers, so as to facilitate MBE/DBE participation. The following is a list of types of actions MDOT will consider as part of the bidder's/offeror's Good Faith Efforts when the bidder/offeror fails to meet the MBE/DBE Goal(s). This list is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases.

A. Identify Bid Items as Work for MBE/DBE Firms

1. Identified Items of Work in Procurements

(a) Certain procurements will include a list of bid items identified during the goal setting process as possible work for performance by MBE/DBE Firms. If the procurement provides a list of Identified Items of Work, the bidder/offeror shall make all reasonable efforts to solicit quotes from MBE Firms or DBE Firms, whichever is appropriate, to perform that work.

(b) Bidders/Offerors may, and are encouraged to, select additional items of work to be performed by MBE/DBE Firms to increase the likelihood that the MBEDBE Goal(s) will be achieved.

2. Identified Items of Work by Bidders/Offerors

(a) When the procurement does not include a list of Identified Items of Work, bidders/offerors should reasonably identify sufficient items of work to be performed by MBE/DBE Firms.

(b) Where appropriate, bidders/offerors should break out contract work items into economically feasible units to facilitate MBE/DBE participation, rather than perform these work items with their own forces. The ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the bidder/offeror of the responsibility to make Good Faith Efforts.

B. Identify MBE Firms or DBE Firms to Solicit

1. DBE Firms Identified in Procurements

(a) Certain procurements will include a list of the DBE Firms identified during the goal setting process as available to perform the items of work. If the procurement provides

a list of Identified DBE Firms, the bidder/offeror shall make all reasonable efforts to solicit those DBE firms.

(b) Bidders/offerors may, and are encouraged to, search the MBE/DBE Directory to identify additional DBEs who may be available to perform the items of work, such as DBEs certified or granted an expansion of services after the solicitation was issued.

2. MBE/DBE Firms Identified by Bidders/Offerors

(a) When the procurement does not include a list of Identified MBE/DBE Firms, bidders/offerors should reasonably identify the MBE Firms or DBE Firms, whichever is appropriate, that are available to perform the Identified Items of Work.

(b) Any MBE/DBE Firms identified as available by the bidder/offeror should be certified in the appropriate program (MBE for State-funded procurements or DBE for federally-funded procurements)

(c) Any MBE/DBE Firms identified as available by the bidder/offeror should be certified to perform the Identified Items of Work.

C. Solicit MBE/DBEs

1. Solicit <u>all</u> Identified Firms for all Identified Items of Work by providing written notice. The bidder/offeror should:

(a) provide the written solicitation at least 10 days prior to bid opening to allow sufficient time for the MBE/DBE Firms to respond;

(b) send the written solicitation by first-class mail, facsimile, or email using contact information in the MBE/DBE Directory, unless the bidder/offeror has a valid basis for using different contact information; and

(c) provide adequate information about the plans, specifications, anticipated time schedule for portions of the work to be performed by the MBE/DBE, and other requirements of the contract to assist MBE/DBE Firms in responding. (This information may be provided by including hard copies in the written solicitation or by electronic means as described in C.3 below.)

2. "All" Identified Firms includes the DBEs listed in the procurement and any MBE/DBE Firms you identify as potentially available to perform the Identified Items of Work, but it does not include MBE/DBE Firms who are no longer certified to perform the work as of the date the bidder/offeror provides written solicitations.

3. "Electronic Means" includes, for example, information provided *via* a website or file transfer protocol (FTP) site containing the plans, specifications, and other requirements of the contract. If an interested MBE/DBE cannot access the information provided by electronic means, the bidder/offeror must make the information available in a manner that is accessible by the interested MBE/DBE.

4. Follow up on initial written solicitations by contacting DBEs to determine if they are interested. The follow up contact may be made:

(a) by telephone using the contact information in the MBE/DBE Directory, unless the bidder/offeror has a valid basis for using different contact information; or

(b) in writing *via* a method that differs from the method used for the initial written solicitation.

5. In addition to the written solicitation set forth in C.1 and the follow up required in C.4, use all other reasonable and available means to solicit the interest of MBE/DBE Firms certified to perform the work of the contract. Examples of other means include:

(a) attending any pre-bid meetings at which MBE/DBE Firms could be informed of contracting and subcontracting opportunities;

(b) if recommended by the procurement, advertising with or effectively using the services of at least two minority focused entities or media, including trade associations, minority/women community organizations, minority/women contractors' groups, and local, state, and federal minority/women business assistance offices listed on the MDOT Office of Minority Business Enterprise website; and

(c) effectively using the services of other organizations, as allowed on a case-by-case basis and authorized in the procurement, to provide assistance in the recruitment and placement of MBE/DBE Firms.

D. Negotiate With Interested MBE/DBE Firms

Bidders/Offerors must negotiate in good faith with interested MBE/DBE Firms.

1. Evidence of negotiation includes, without limitation, the following:

(a) the names, addresses, and telephone numbers of MBE/DBE Firms that were considered;

(b) a description of the information provided regarding the plans and specifications for the work selected for subcontracting and the means used to provide that information; and

(c) evidence as to why additional agreements could not be reached for MBE/DBE Firms to perform the work.

2. A bidder/offeror using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration.

3. The fact that there may be some additional costs involved in finding and using MBE/DBE Firms is not in itself sufficient reason for a bidder's/offeror's failure to meet the contract DBE goal, as long as such costs are reasonable. Factors to take into consideration when determining whether a MBE/DBE Firm's quote is excessive or unreasonable include, without limitation, the following:

(a) the dollar difference between the MBE/DBE subcontractor's quote and the average of the other subcontractors' quotes received by the bidder/offeror;

(b) the percentage difference between the MBE/DBE subcontractor's quote and the average of the other subcontractors' quotes received by the bidder/offeror;

(c) the percentage that the DBE subcontractor's quote represents of the overall contract amount;

(d) the number of MBE/DBE firms that the bidder/offeror solicited for that portion of the work;

(e) whether the work described in the MBE/DBE and Non-MBE/DBE subcontractor quotes (or portions thereof) submitted for review is the same or comparable; and

(f) the number of quotes received by the bidder/offeror for that portion of the work.

4. The above factors are not intended to be mandatory, exclusive, or exhaustive, and other evidence of an excessive or unreasonable price may be relevant.

5. The bidder/offeror may not use its price for self-performing work as a basis for rejecting a MBE/DBE Firm's quote as excessive or unreasonable.

6. The "average of the other subcontractors' quotes received by the" bidder/offeror refers to the average of the quotes received from all subcontractors, except that there should be quotes from at least three subcontractors, and there must be at least one quote from a MBE/DBE and one quote from a Non-MBE/DBE.

7. A bidder/offeror shall not reject a MBE/DBE Firm as unqualified without sound reasons based on a thorough investigation of the firm's capabilities. For each certified MBE/DBE that is rejected as unqualified or that placed a subcontract quotation or offer that the bidder/offeror concludes is not acceptable, the bidder/offeror must provide a written detailed statement listing the reasons for this conclusion. The bidder/offeror also must document the steps taken to verify the capabilities of the MBE/DBE and Non-MBE/DBE Firms quoting similar work.

(a) The factors to take into consideration when assessing the capabilities of a MBE/DBE Firm, include, but are not limited to the following: financial capability, physical capacity to perform, available personnel and equipment, existing workload, experience performing the type of work, conduct and performance in previous contracts, and ability to meet reasonable contract requirements.

(b) The MBE/DBE Firm's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the efforts to meet the project goal.

E. Assisting Interested MBE/DBE Firms

When appropriate under the circumstances, the decision-maker will consider whether the bidder/offeror:

1. made reasonable efforts to assist interested MBE/DBE Firms in obtaining the bonding, lines of credit, or insurance required by MDOT or the bidder/offeror; and

2. made reasonable efforts to assist interested MBE/DBE Firms in obtaining necessary equipment, supplies, materials, or related assistance or services.

III. Other Considerations

In making a determination of Good Faith Efforts the decision-maker may consider engineering estimates, catalogue prices, general market availability and availability of certified MBE/DBE Firms in the area in which the work is to be performed, other bids or offers and subcontract bids or offers substantiating significant variances between certified MBE/DBE and Non-MBE/DBE costs of participation, and their impact on the overall cost of the contract to the State and any other relevant factors.

The decision-maker may take into account whether a bidder/offeror decided to self-perform subcontract work with its own forces, especially where the self-performed work is Identified Items of Work in the procurement. The decision-maker also may take into account the

performance of other bidders/offerors in meeting the contract. For example, when the apparent successful bidder/offeror fails to meet the contract goal, but others meet it, this reasonably raises the question of whether, with additional reasonable efforts, the apparent successful bidder/offeror could have met the goal. If the apparent successful bidder/offeror fails to meet the goal, but meets or exceeds the average MBE/DBE participation obtained by other bidders/offerors, this, when viewed in conjunction with other factors, could be evidence of the apparent successful bidder/offeror having made Good Faith Efforts.

IV. Documenting Good Faith Efforts

At a minimum, a bidder/offeror seeking a waiver of the MBE/DBE Goal(s) or a portion thereof must provide written documentation of its Good Faith Efforts, in accordance with COMAR 21.11.03.11, within 10 business days after receiving notice that it is the apparent awardee. The written documentation shall include the following:

A. Items of Work (Complete Good Faith Efforts Documentation Form E, Part 2)

A detailed statement of the efforts made to select portions of the work proposed to be performed by certified MBE/DBE Firms in order to increase the likelihood of achieving the stated MBE/DBE Goal(s).

B. Outreach/Solicitation/Negotiation

1. The record of the bidder's/offeror's compliance with the outreach efforts prescribed by COMAR 21.11.03.09C(2)(a) through (e) and 49 C.F.R. Part 26, Appendix A. **(Complete Outreach Efforts Compliance Statement)**

2. A detailed statement of the efforts made to contact and negotiate with MBE/DBE Firms including:

(a) the names, addresses, and telephone numbers of the MBE/DBE Firms who were contacted, with the dates and manner of contacts (letter, fax, email, telephone, etc.) **(Complete Good Faith Efforts Form E, Part 3, and submit letters, fax cover sheets, emails, etc. documenting solicitations)**; and

(b) a description of the information provided to MBE/DBE Firms regarding the plans, specifications, and anticipated time schedule for portions of the work to be performed and the means used to provide that information.

C. Rejected MBE/DBE Firms (Complete Good Faith Efforts Form E, Part 4)

1. For each MBE/DBE Firm that the bidder/offeror concludes is not acceptable or qualified, a detailed statement of the reasons for the bidder's/offeror's conclusion, including the steps taken to verify the capabilities of the MBE/DBE and Non-MBE/DBE Firms quoting similar work.

2. For each certified MBE/DBE Firm that the bidder/offeror concludes has provided an excessive or unreasonable price, a detailed statement of the reasons for the bidder's/offeror's conclusion, including the quotes received from all MBE/DBE and Non-MBE/DBE firms bidding on the same or comparable work. **(Include copies of all quotes received.)**

3. A list of MBE/DBE Firms contacted but found to be unavailable. This list should be accompanied by a Minority Contractor Unavailability Certificate signed by the MBE/DBE contractor or a statement from the bidder/offeror that the MBE/DBE contractor refused to sign the Minority Contractor Unavailability Certificate.

D. Other Documentation.

1. Submit any other documentation requested by the Procurement Officer to ascertain the bidder's/offeror's Good Faith Efforts.

2. Submit any other documentation the bidder/offeror believes will help the Procurement Officer ascertain its Good Faith Efforts.

MDOT MBE/DBE FORM E
GOOD FAITH EFFORTS GUIDANCE AND DOCUMENTATION

PART 2 – CERTIFICATION REGARDING GOOD FAITH EFFORTS DOCUMENTATION

PAGE __ OF ___

Prime Contractor	Project Description	Solicitation Number

PARTS 3, 4, AND 5 MUST BE INCLUDED WITH THIS CERTIFICATE ALONG WITH ALL DOCUMENTS SUPPORTING YOUR WAIVER REQUEST.

I hereby request a waiver of (1) the Minority Business Enterprise (MBE) participation goal and/or subgoal(s), (2) the Disadvantaged Business Enterprise (DBE) participation goal, or (3) a portion of the pertinent MBE/DBE participation goal and/or MBE subgoal(s) for this procurement.[1] I affirm that I have reviewed the Good Faith Efforts Guidance MBE/DBE Form E. I further affirm under penalties of perjury that the contents of Parts 3, 4, and 5 of MDOT MBE/DBE Form E are true to the best of my knowledge, information and belief.

Company Name	Signature of Representative
Address	Printed Name and Title
City, State and Zip Code	Date

[1] MBE participation goals and subgoals apply to State-funded procurements. DBE participation goals apply to federally-funded procurements. Federally-funded contracts do not have subgoals.

MDOT MBE/DBE FORM E
GOOD FAITH EFFORTS GUIDANCE AND DOCUMENTATION

PART 3 – IDENTIFIED ITEMS OF WORK BIDDER/OFFEROR MADE AVAILABLE TO MBE/DBE FIRMS

PAGE __ OF ___

Prime Contractor	Project Description	Solicitation Number

Identify those items of work that the bidder/offeror made available to MBE/DBE Firms. This includes, where appropriate, those items the bidder/offeror identified and determined to subdivide into economically feasible units to facilitate the MBE/DBE participation. For each item listed, show the anticipated percentage of the total contract amount. It is the bidder's/offeror's responsibility to demonstrate that sufficient work to meet the goal was made available to MBE/DBE Firms, and the total percentage of the items of work identified for MBE/DBE participation equals or exceeds the percentage MBE/DBE goal set for the procurement. Note: If the procurement includes a list of bid items identified during the goal setting process as possible items of work for performance by MBE/DBE Firms, the bidder/offeror should make all of those items of work available to MBE/DBE Firms or explain why that item was not made available. If the bidder/offeror selects additional items of work to make available to MBE/DBE Firms, those additional items should also be included below.

Identified Items of Work	Was this work listed in the procurement?	Does bidder/offeror normally self-perform this work?	Was this work made available to MBE/DBE Firms? If no, explain why?
	□ Yes □ No	□ Yes □ No	□ Yes □ No
	□ Yes □ No	□ Yes □ No	□ Yes □ No
	□ Yes □ No	□ Yes □ No	□ Yes □ No
	□ Yes □ No	□ Yes □ No	□ Yes □ No
	□ Yes □ No	□ Yes □ No	□ Yes □ No
	□ Yes □ No	□ Yes □ No	□ Yes □ No

☐ Please check if Additional Sheets are attached.

MDOT MBE/DBE FORM E
GOOD FAITH EFFORTS GUIDANCE AND DOCUMENTATION

PART 4 – IDENTIFIED MBE/DBE FIRMS AND RECORD OF SOLICITATIONS

PAGE __ OF ___

Prime Contractor	Project Description	Solicitation Number

Identify the MBE/DBE Firms solicited to provide quotes for the Identified Items of Work made available for MBE/DBE participation. Include the name of the MBE/DBE Firm solicited, items of work for which bids/quotes were solicited, date and manner of initial and follow-up solicitations, whether the MBE/DBE provided a quote, and whether the MBE/DBE is being used to meet the MBE/DBE participation goal. MBE/DBE Firms used to meet the participation goal must be included on the MBE/DBE Participation Schedule, Form B. Note: If the procurement includes a list of the MBE/DBE Firms identified during the goal setting process as potentially available to perform the items of work, the bidder/offeror should solicit all of those MBE/DBE Firms or explain why a specific MBE/DBE was not solicited. If the bidder/offeror identifies additional MBE/DBE Firms who may be available to perform Identified Items of Work, those additional MBE/DBE Firms should also be included below. Copies of all written solicitations and documentation of follow-up calls to MBE/DBE Firms must be attached to this form. If the bidder/offeror used a Non-MBE/DBE or is self-performing the identified items of work, Part 4 must be completed.

Name of Identified MBE/DBE Firm & MBE Classification	Describe Item of Work Solicited	Initial Solicitation Date & Method	Follow-up Solicitation Date & Method	Details for Follow-up Calls	Quote Rec'd	Quote Used	Reason Quote Rejected
Firm Name: _____ **MBE Classification (Check only if requesting waiver of MBE subgoal.)** ☐ African American-Owned ☐ Hispanic American-Owned ☐ Asian American-Owned ☐ Women-Owned ☐ Other MBE Classification _____		Date: □ Mail □ Facsimile □ Email	Date: □ Phone □ Mail □ Facsimile □ Email	Time of Call: Spoke With: □ Left Message	□ Yes □ No	□ Yes □ No	□ Used Other MBE/DBE □ Used Non-MBE/DBE □ Self-performing
Firm Name: _____ **MBE Classification (Check only if requesting waiver of MBE subgoal.)** ☐ African American-Owned ☐ Hispanic American-Owned ☐ Asian American-Owned ☐ Women-Owned ☐ Other MBE Classification _____		Date: □ Mail □ Facsimile □ Email	Date: □ Phone □ Mail □ Facsimile □ Email	Time of Call: Spoke With: □ Left Message	□ Yes □ No	□ Yes □ No	□ Used Other MBE/DBE □ Used Non-MBE/DBE □ Self-performing

☐Please check if Additional Sheets are attached.

MDOT MBE/DBE FORM E
GOOD FAITH EFFORTS GUIDANCE AND DOCUMENTATION

PART 5 – ADDITIONAL INFORMATION REGARDING REJECTED MBE/DBE QUOTES

PAGE __ OF ___

Prime Contractor	Project Description	Solicitation Number

This form must be completed if Part 3 indicates that a MBE/DBE quote was rejected because the bidder/offeror is using a Non-MBE/DBE or is self-performing the Identified Items of Work. Provide the Identified Items Work, indicate whether the work will be self-performed or performed by a Non-MBE/DBE, and if applicable, state the name of the Non-MBE/DBE. Also include the names of all MBE/DBE and Non-MBE/DBE Firms that provided a quote and the amount of each quote.

Describe Identified Items of Work Not Being Performed by MBE/DBE (Include spec/section number from bid)	Self-performing or Using Non-MBE/DBE (Provide name)	Amount of Non-MBE/DBE Quote	Name of Other Firms who Provided Quotes & Whether MBE/DBE or Non-MBE/DBE	Amount Quoted	Indicate Reason Why MBE/DBE Quote Rejected & Briefly Explain
	□ Self-performing □ Using Non-MBE/DBE _____	$_____	_____ □ MBE/DBE □ Non-MBE/DBE	$_____	□ Price □ Capabilities □ Other
	□ Self-performing □ Using Non-MBE/DBE _____	$_____	_____ □ MBE/DBE □ Non- MBE/DBE	$_____	□ Price □ Capabilities □ Other
	□ Self-performing □ Using Non-MBE/DBE _____	$_____	_____ □ MBE/DBE □ Non- MBE/DBE	$_____	□ Price □ Capabilities □ Other

☐Please check if Additional Sheets are attached.

INFORMATION REQUIRED TO BE SUBMITTED FOR STRAIGHT STATE CONTRACTS:

(a) Each bidder shall provide the following information:

NAME OF FIRM:_____

_____
Street and/or P.O. Box

_____
City State Zip Code

____ MBE ____ Non-MBE Age of the firm ____ years
Annual gross receipts per last calendar year _____<$500,000 ____$500,000-1,000,000
____$1,000,000-3,000,000 ____$3,000,000-5,000,000 ____$5,000,000-10,000,000
____>$10,000,000

(b) Each bidder shall provide the following information for each firm quoting or considered as subcontractors and/or suppliers:

NAME OF FIRM:_____

_____
Street and/or P.O. Box

_____
City State Zip Code

____ MBE ____ Non-MBE Age of the firm ____ years
Annual gross receipts per last calendar year _____<$500,000 ____$500,000-1,000,000
____$1,000,000-3,000,000 ____$3,000,000-5,000,000 ____$5,000,000-10,000,000
____> $10,000,000

NAME OF FIRM:_____

_____
Street and/or P.O. Box

_____
City State Zip Code

____ MBE ____ Non-MBE Age of the firm ____ years
Annual gross receipts per last calendar year _____<$500,000 ____$500,000-1,000,000
____$1,000,000-3,000,000 _$3,000,000-5,000,000 _____$5,000,000-10,000,000
____> $10,000,000

NAME OF FIRM:____

____
Street and/or P.O. Box

____
City State Zip Code

_____ MBE _____ Non-MBE Age of the firm _____ years
Annual gross receipts per last calendar year _____<$500,000 _____$500,000-1,000,000
_____$1,000,000-3,000,000 _____$3,000,000-5,000,000 _____$5,000,000-10,000,000
_____> $10,000,000

NAME OF FIRM:____

____
Street and/or P.O. Box

____
City State Zip Code

_____ MBE _____ Non-MBE Age of the firm _____ years
Annual gross receipts per last calendar year _____<$500,000 _____$500,000-1,000,000
_____$1,000,000-3,000,000 _____$3,000,000-5,000,000 _____$5,000,000-10,000,000
_____> $10,000,000

NAME OF FIRM:____

____
Street and/or P.O. Box

____
City State Zip Code

_____ MBE _____ Non-MBE Age of the firm _____ years
Annual gross receipts per last calendar year _____<$500,000 _____$500,000-1,000,000
_____$1,000,000-3,000,000 _____$3,000,000-5,000,000 _____$5,000,000-10,000,000
_____> $10,000,000

Submit additional copies of this page as page 40A of 55, 40B of 55, etc. as necessary, and place them as the last pages in the Invitation for Bids. Place an "X" for "NO" on the last copy. Any additional Copies: ______ NO _____ YES

VETERAN-OWNED SMALL BUSINESS ENTERPRISES (VSBE) INSTRUCTIONS

The VSBE participation goal for this solicitation is One-Half percent (0.5%).

These instructions provide guidance on the VSBE reporting requirements. If after reading these instructions you have additional questions or need further clarification, please see the section entitled REQUEST FOR INFORMATION found within the SPECIAL PROVISIONS – NOTICE TO CONTRACTOR in the RFP.

PURPOSE

The Contractor shall structure its procedures for the performance of the work required in this solicitation to attempt to achieve the VSBE participation goal stated in this solicitation. VSBE performance must be in accordance with this Solicitation, as authorized by COMAR 21.11.13. The Contractor agrees to exercise all good faith efforts to carry out the requirements set forth in these instructions and Attachments A-G.

In order to be counted for purposes of achieving VSBE participation goals, VSBEs must be verified by the Center for Veterans Enterprise of the United States Department of Veterans Affairs. The listing of verified VSBEs may be found at http://www.vetbiz.gov.

GUIDELINES FOR VSBE SELF-PERFORMANCE

When a certified VSBE firm participates as a prime contractor on a contract, a procurement agency may count the distinct, clearly defined portion of the contract work that the certified VSBE prime performs with its own forces toward fulfilling up to one hundred percent (100%) of the VSBE participation goal. In order to receive credit for self-performance, a VSBE prime must list its firm in Section A of the VSBE Participation Schedule (Attachment B Form V-1B).

If a VSBE prime cannot fulfill the overall goal through its own work force, it must identify other certified VSBE subcontractors for the remaining portion of the goal. Those VSBE certified subcontractors should be listed in Section B of the VSBE Participation Schedule (Attachment B Form V-1B).

SUMMARY OF FORMS

A. Must be submitted with bid/offer

a. Form V-1A Bidder/Offeror Acknowledgement VSBE Requirements

b. Form V-1B Veteran-Owned Small Business Enterprise Utilization Affidavit and VSBE Participation Schedule

B. Must be submitted within 10 working days of notification of apparent award or actual award (whichever is earlier)

a. Form V-2A VSBE Prime Contractor Project Participation Statement

b. Form V-2B VSBE Subcontractor Project Participation Statement

C. After Notice to Proceed – must be submitted monthly

a. Form V-3A VSBE Prime Contractor Unpaid Invoice Report (Submitted monthly)

b. Form V-3B VSBE Subcontractor Unpaid Invoice Report (Submitted monthly)

SOLICITATION AND CONTRACT INFORMATION

Bidder/Offeror shall include with its Bid/Proposal a completed VSBE Acknowledgement of Requirements (Attachment A Form V-1A) and Utilization Affidavit and Participation Schedule (Attachment B Form V-1B) whereby:

(1) Bidder/Offeror acknowledges it: a) intends to meet the VSBE participation goal; or b) requests a full or partial waiver of the VSBE participation goal. If Bidder or Offeror commits to the full VSBE goal or requests a partial waiver, it shall commit to making a good faith effort to achieve the stated goal.

(2) Bidder/Offeror responds to the expected degree of VSBE participation as stated in the solicitation, by identifying the specific commitment of VSBEs at the time of Bid/Proposal submission. Bidder/Offeror shall specify the percentage of value associated with each VSBE identified on the VSBE Participation Schedule.

If Bidder/Offeror fails to submit Attachment A Form V-1A and Attachment B Form V-1B with the Bid/Proposal as required, the Procurement Officer may determine that the Bid is non-responsive or that the Proposal is not reasonably susceptible to be selected for award.

Within 10 Working Days from notification that it is the apparent awardee, the awardee shall provide the following documentation to the Procurement Officer.

1. VSBE Prime Contractor Project Participation Statement (Attachment C Form V-2A);
2. VSBE Subcontractor Project Participation Statement (Attachment D Form V-2B);
3. If the apparent awardee believes a full or partial waiver of the overall VSBE goal is necessary, it must submit a fully-documented waiver request that complies with COMAR 21.11.13.07; and
4. Any other documentation required by the Procurement Officer to ascertain Bidder/Offeror's responsibility in connection with the VSBE subcontractor participation goal.

If the apparent awardee fails to return each completed document within the required time, the Procurement Officer may determine that the apparent awardee is not responsible and therefore not eligible for award.

CONTRACT ADMINISTRATION REQUIREMENTS

The Contractor, once awarded the contract shall:

1. Submit monthly to the Maryland State Highway Administration ("SHA") a report listing any unpaid invoices, over 45 days old, received from any VSBE subcontractor, the amount of each invoice, and the reason payment has not been made (Attachment F Form V-3A).
2. Include in its agreements with any VSBE subcontractors a requirement that those subcontractors submit monthly to SHA a report that identifies the prime contract and lists all payments received from Contractor in the preceding 30 days, as well as any outstanding invoices, and the amount of those invoices (Attachment G Form V-3B).
3. Maintain such records as are necessary to confirm compliance with its VSBE participation obligations. These records shall indicate the identity of VSBE and non-VSBE subcontractors employed on the contract, the type of work performed by each, and the actual dollar value of work performed. Any subcontract agreement documenting work performed by VSBE participants must be retained by the Contractor and furnished to the Procurement Officer on request.
4. Consent to provide such documentation as reasonably requested and to provide right-of-entry at reasonable times for purposes of the State's representatives verifying compliance with the VSBE participation obligations. Contractor shall retain all records concerning VSBE participation and make them available for State inspection for three years after final completion of the contract.
5. At the option of SHA, upon completion of the contract and before final payment and/or release of retainage, submit a final report in affidavit form and under penalty of perjury, of all payments made to, or withheld from VSBE subcontractors.

ATTACHMENT A
FORM V-1A

BIDDER/OFFEROR ACKNOWLEDGEMENT OF VSBE REQUIREMENTS

This document shall be included with the submittal of the Bid/Offeror's response to the solicitation when the VSBE goal is greater than 0%. If Bidder/Offeror fails to complete and submit this form with its response to the solicitation, the Procurement Officer may determine that the Bidder's/ Offeror's response to the solicitation is not responsive.

In conjunction with the bid/offer submitted in response to Solicitation for Contract Number _____, I affirm the following:

If I am awarded a Contract in response to this solicitation, I commit to making a good faith effort to achieve the VSBE goal established for this solicitation.

I solemnly affirm under the penalties of perjury that the contents of this paper are true to the best of my knowledge, information, and belief.

_____ _____
Bidder/Offeror Name Signature of Affiant

_____ _____
_____ Printed Name, Title
_____
Address

_____
Date

ATTACHMENT B
FORM V-1B

Veteran-Owned Small Business Enterprise (VSBE)
Utilization Affidavit and Participation Schedule
(submit with bid or offer)

This document **MUST BE** included with the bid or offer. If the Bidder or Offeror fails to complete and submit this form with the bid or offer, the procurement officer may determine that the bid is non-responsive or that the proposal is not reasonably susceptible of being selected for award.

In conjunction with the bid or proposal submitted in response to Solicitation for Contract Number _____, I affirm the following (check one (1) box):

1. ☐ I acknowledge and intend to meet the overall verified VSBE participation goal of One-Half percent (0.5%). Therefore, I will not be seeking a waiver.

OR

☐ I conclude that I am unable to achieve the VSBE participation goal. I hereby request a waiver, in whole or in part, of the overall goal. Within 10 working days of receiving notice that our firm is the apparent awardee, I will submit all required waiver documentation in accordance with COMAR 21.11.13.07.

2. I understand that if I am notified that I am the apparent awardee, I must submit the following additional documentation within 10 working days of receiving notice of the apparent award or from the date of conditional award (per COMAR 21.11.13.06), whichever is earlier.

   (a) Project Participation Statement (s) (Attachments C and/or D as required)
   (b) Any other documentation, including waiver documentation, if applicable, required by the Procurement Officer to ascertain bidder or offeror responsibility in connection with the VSBE participation goal.

   I understand that if I fail to return each completed document within the required time, the Procurement Officer may determine that I am not responsible and therefore not eligible for contract award. If the contract has already been awarded, the award is voidable**.**

3. In the solicitation of subcontract quotations or offers, VSBE subcontractors were provided not less than the same information and amount of time to respond as were non-VSBE subcontractors.

4. Set forth below are the (i) verified VSBEs I intend to use and (ii) the percentage of the total contract amount allocated to each VSBE for this project. I hereby affirm that the VSBE firms are only providing those products and services for which they are verified.

Veteran-Owned Small Business Enterprise (VSBE)
Utilization Affidavit and Participation Schedule
(continued)

Prime Contractor: (Firm Name, Address, Phone)	Project Description:
Project Number:	

List information for each verified VSBE that you agree to use to achieve the VSBE participation goal on this project.

Section A- To be completed by VSBE Prime Bidders for self-performance ONLY

Name of VSBE Prime Firm	DUNS Number
Percentage of Total Contract Value to be performed using VSBE's Prime Bidder's own forces and counted toward the VSBE overall participation goal: _____ %	

Section B- To be completed by all Bidders/Offerors using VSBE Subcontractors

Name of Veteran-Owned Firm	DUNS Number
Percentage of Total Contract _____	
Name of Veteran-Owned Firm	DUNS Number
Percentage of Total Contract _____	
Name of Veteran-Owned Firm	DUNS Number
Percentage of Total Contract _____	
Name of Veteran-Owned Firm	DUNS Number
Percentage of Total Contract _____	

Continue on a separate page, if needed.

Veteran-Owned Small Business Enterprise (VSBE)
Utilization Affidavit and Participation Schedule
(continued)

SUMMARY

Total *VSBE* Participation: _____%

I solemnly affirm under the penalties of perjury that the contents of this Affidavit are true to the best of my knowledge, information, and belief.

_____ _____
Bidder/Offeror Name Signature of Affiant

(PLEASE PRINT OR TYPE)

Name: _____
Title: _____
Date: _____

ATTACHMENT C
FORM V-2A

VSBE PRIME CONTRACTOR PROJECT PARTICIPATION STATEMENT

(Self performance)

Please complete and submit this form to certify work that your VSBE firm will perform with its own forces for the purposes of meeting the VSBE participation goal, as listed on the VSBE Participation Schedule. This form must be submitted within 10 working days of notification of apparent award. If the form is not returned within the required time, the Procurement Officer may determine that the Bidder/Offeror is not responsible and therefore not eligible for Contract award.

Provided that _____ (Prime Contractor) is awarded the State contract in conjunction with the Solicitation for Contract No. _____, such VSBE Prime Contractor intends to perform work with its own forces to be counted toward the VSBE participation goal as described below:

VSBE Prime Contractor Name, Address, and Phone	Project Description
Project Number	Total Contract Amount
Description of Work to be Performed With VSBE's Own Forces:	
Percentage of Total Contract	Value of the Work

By:

_____
Signature of VSBE Prime Representative

_____
Printed Name and Title of VSBE Prime Representative

Date_____

ATTACHMENT D
FORM V-2B

VSBE SUBCONTRACTOR PROJECT PARTICIPATION STATEMENT

Please complete and submit one form for each verified VSBE subcontractor listed on VSBE PARTICIPATION SCHEDULE within 10 working days of notification of apparent award.

_____ (prime contractor) has entered into or intends to enter into a contract with _____ (subcontractor) to provide services in connection with the solicitation described below.

Prime Contractor Address and Phone	Project Description
Project Number	Total Contract Amount
Name of Veteran-Owned Firm	
Work to be Performed	
Percentage of Total Contract	
Amount and type of bond required (if any)	

The undersigned Prime Contractor and Subcontractor hereby certify and agree that they have fully complied with the State Veteran-Owned Small Business Enterprise law, State Finance and Procurement Article, Title 14, Subtitle 6, Annotated Code of Maryland.

By: By:

_____ _____

PRIME CONTRACTOR SIGNATURE SUBCONTRACTOR SIGNATURE

_____ _____

Printed Name, Title Printed Name, Title

Date_____ Date _____

ATTACHMENT E

VETERAN SMALL BUSINESS ENTERPRISE REPORTING REQUIREMENTS

1. As the Contractor, you have entered into a contract with the State of Maryland. As such, your company/firm is responsible for successful completion of all deliverables under the contract, including your commitment to making a good faith effort to meet the VSBE participation goal established for this Solicitation. Part of that effort includes submission of monthly reports to the State regarding the previous month's VSBE payment activity. Reporting Forms V-3A (VSBE Prime Contractor Unpaid Invoice Report) and V-3B (VSBE Subcontractor Unpaid Invoice Report) are attached for your use and convenience.

2. The Contractor must complete a separate Form V-3A for each VSBE subcontractor for each month of the contract and submit one copy to each of the locations indicated at the bottom of the form. The report is due no later than the 15th of the month following the month that is being reported. For example, the report for January's activity is due no later than the 15th of February. With the approval of the Administration, the report may be submitted electronically. Note: Reports are required to be submitted each month, regardless of whether there was any VSBE payment activity for the reporting month.

3. The Contractor is responsible for ensuring that each subcontractor receives a copy (e-copy and/or hard copy) of Form V-3B. The Contractor should make sure that the subcontractor receives all the information necessary to complete the form properly, i.e., all of the information located in the upper right corner of the form. It may be wise to customize Form V-3B for the subcontractor the same as the Form V-3A to minimize any confusion for those who receive and review the reports.

4. It is the responsibility of the Contractor to make sure that all subcontractors submit reports no later than the 15th of each month, regardless of whether there was any VSBE payment activity for the reporting month. Actual payment data is verified and entered into the State's financial management tracking system from the subcontractor's Form V-3B report only. Therefore, if the subcontractor(s) do not submit their Form V-3B payment forms, the Contractor cannot and will not be given credit for subcontractor payments, regardless of the Contractor's proper submission of Form V-3A. The Administration will contact the Contractor if reports are not received each month from either the Contractor or any of the identified subcontractors.

5. The Contractor is directed to GP-8.01 and TC-5.03 of the Standard Specifications regarding subcontracting requirements that are in-force upon issuance of the Notice to Proceed. Attention is particularly directed to the requirements regarding removal / substitution on **any** subcontractor and the concurrence required by the Administration in such action.

ATTACHMENT F
FORM V-3A

VSBE PRIME CONTRACTOR UNPAID INVOICE REPORT
(for use after issuance of the Contract Notice to Proceed)

In accordance with COMAR 21.11.13.09, Prime Contractors on contracts with VSBE requirements are required to monthly submit to the Administration a report of all unpaid invoices received from VSBE subcontractors that are older than 45 days. Submit one report for each VSBE subcontractor working on the Contract.

Date: _____

Contract Title: _____ Contract Number: _____

Prime Contractor Name: _____ Subcontractor Name: _____

Invoice Number	Invoice Date	Invoice Amount	Reason for Non-Payment

Prime Contractor Signature: _____

Date: _____

Submit to:
Maryland State Highway Administration
Office of Equal Opportunity
707 North Calvert St
Baltimore, MD 21202

ATTACHMENT G
FORM V-3B

VSBE SUBCONTRACTOR UNPAID INVOICE REPORT

(for use upon issuance of the Contract Notice to Proceed)

In accordance with COMAR 21.11.13.09 VSBE subcontractors on Contracts with VSBE requirements are required to monthly submit to the Administration a report of all payments received from the prime contractor within 30 days as well as all outstanding invoices.

Date: _____

Contract Title: _____ Contract Number: _____

Subcontractor Name: _____ Prime Contractor Name: _____

Payments:

Invoice Number	Payment Date	Payment Amount	Comments

Outstanding Invoices:

Invoice Number	Invoice Date	Invoice Amount	Comments

Subcontractor Signature: _____

Date: _____

Submit to:
Maryland State Highway Administration
Office of Equal Opportunity
707 North Calvert St
Baltimore, MD 21202

EXTRA WORK, CONTRACT TIME, BONDING, LIQUIDATED DAMAGES, AND PROPOSAL GUARANTY

EXTRA WORK. It is further proposed to do all "Extra Work" which may be required to complete the work contemplated at unit prices or lump sum prices to be agreed upon in writing prior to starting such extra work, or if such prices or sums cannot be agreed upon, to perform such work on a Force Account basis as specified in TC-7.03.

CONTRACT TIME. To commence work as specified in the "Notice to Proceed" and to prosecute the work to complete the contract within/or before

Total Contract Time:_____(calendar date) – **To be completed by Proposer**

Total Ramp Detour Duration:_____(calendar days) – **To be completed by Proposer**

Any delay in awarding or the execution of this contract will not be considered as a basis for any monetary claim, however, an extension of time may be considered by the Administration, if warranted.

BONDING. When the Contractor's bid is $100,000 or more, the Contractor shall furnish a Payment Bond and a Performance Bond in the full amount of the Contract Award as security for the construction and completion of the contract in conformance with the Plans, Standard Specifications, revisions thereto, General Provisions and Special Provisions.

To guarantee all of the work performed under this contract to be done in conformance with the Standard Specifications, revisions thereto, General Provisions and Special Provisions in a good workmanlike manner and to renew or repair any work which may be rejected due to defective materials or workmanship, prior to final completion and acceptance of the work, also we have the equipment, labor, supervision and financial capacity to perform this contract either with our organization or with Subcontractors.

LIQUIDATED DAMAGES. The Contractor is hereby advised that liquidated damages in the amount of:

Four-Thousand and Forty dollars ($4,040.00) per calendar day.

will be assessed for unauthorized extensions beyond the contracted time of completion.

PROPOSAL GUARANTY. A bid security is not required on Contract Proposals under $100,000.

A bid security totaling at least five percent (5%) of the bid amount will be required on contracts of $100,000 or over.

Acceptable forms of security for bid guaranty shall be:

(1) A bond in a form satisfactory to the State underwritten by a company licensed to issue bonds in this State;

(2) A bank certified check, bank cashier's check, bank treasurer's check, or cash;

(3) Pledge of security backed by the full faith and credit of the United States government or bonds issued by the State of Maryland.

Enclosed herewith, find bid security based on at least five percent (5%) of the aggregate amount of the bid submitted, and made payable to the "State of Maryland". This bid security is a Proposal Guarantee (which is understood will be forfeited in the event the contract is not executed, if awarded to the signer of this affidavit).

Commercial Nondiscrimination

A. As a condition of entering into this Agreement, Contractor represents and warrants that it will comply with the State's Commercial Nondiscrimination Policy, as described under Title 19 of the State Finance and Procurement Article of the Annotated Code of Maryland. As part of such compliance, Contractor may not discriminate on the basis of race, color, religion, ancestry or national origin, sex, age, marital status, sexual orientation, or on the basis of disability or other unlawful forms of discrimination in the solicitation, selection, hiring, or commercial treatment of subcontractors, vendors, suppliers, or commercial customers, nor shall Contractor retaliate against any person for reporting instances of such discrimination. Contractor shall provide equal opportunity for subcontractors, vendors, and suppliers to participate in all of its public sector and private sector subcontracting and supply opportunities, provided that this clause does not prohibit or limit lawful efforts to remedy the effects of marketplace discrimination that have occurred or are occurring in the marketplace. Contractor understands that a material violation of this clause shall be considered a material breach of this Agreement and may result in termination of this Agreement, disqualification of Contractor from participating in State contracts, or other sanctions. This clause is not enforceable by or for the benefit of, and creates no obligation to, any third party.

B. As a condition of entering into this Agreement, upon the Maryland Human Relations Commission's request, and only after the filing of a complaint against Contractor under Title 19 of the State Finance and Procurement Article, as amended from time to time, Contractor agrees to provide within 60 days after the request a complete list of the names of all subcontractors, vendors, and suppliers that Contractor has used in the past 4 years on any of its contracts that were undertaken within the state of Maryland, including the total dollar amount paid by Contractor on each subcontract or supply contract. Contractor further agrees to cooperate in any investigation conducted by the State pursuant to the State's Commercial Nondiscrimination Policy as set forth under Title 19 of the State Finance and Procurement Article of the Annotated Code of Maryland, and to provide any documents relevant to any investigation that is requested by the State. Contractor understands that violation of this clause is a material breach of this Agreement and may result in contract termination, disqualification by the State from participating in State contracts, and other sanctions.