PS 303 - DRAINAGE PERFORMANCE SPECIFICATION

1.0 GENERAL

The Project requires a combination of roadway reconstruction and new construction. Reconstruction areas shall require assessment to determine adequacy of existing drainage systems (e.g. capacity, outfall stability, system condition, and other parameters) to meet ICC drainage needs and future roadway needs as identified in the Roadway Performance Specifications. New construction areas shall require complete design and construction of new drainage systems. The Mainline of the proposed roadway is open section with median and roadside ditches. Segments of Mainline, ramps, local road connections, noise walls and bridges may require closed drainage systems, e.g. curb, gutter and storm drains.

2.0 STANDARDS AND REFERENCES

2.1 STANDARDS

Design and construct the drainage system in accordance with the relevant requirements of the Standards listed by priority in Table 1, unless otherwise stipulated in this specification. Standards specifically cited in the body of this specification establish requirements that shall have precedence over all others. Should the requirements in any Standard conflict with those in another, the Standard listed with the higher priority shall govern. The Design-Builder shall obtain clarification for any unresolved or perceived ambiguity prior to proceeding with design of construction.

Use the most current version of each listed standard as of the publication date of this RFP.

Table 1

Standards for Drainage

Priority	Author or Agency	Title	Document Provided
1	MDSHA	Maryland Department of Transportation, publications entitled "Highway Drainage Manual" dated December 1981 or as amended herein and any revisions thereof.	No

Table 1

Standards for Drainage

Priority	Author or Agency	Title	Document Provided
2	MDE	Regulation COMAR 26.09.01, "Erosion and Sediment Control"	No
3	MDE	"Erosion and Sedimentation Guidelines for State and Federal Projects"	Yes
4	MDE	1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control" (http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/erosionsedimentcontrol/stanrds.asp)	Yes
5	MDE	MDE Regulation COMAR 26.08.04, "National Pollutant Discharge Elimination System General Permit for Construction Activity".	No
6	MDE	Regulations COMAR 26.17.02, "Stormwater Management"	No
7	MDE	"Stormwater Management Guidelines for State and Federal Projects"	Yes
8	MDE	2000 Maryland Stormwater Design Manual, Volumes I and II.	Yes
9	Montgomery County Maryland	Code Section 19-65(a)(2)(B) "Special Protection Areas"	Yes
10	MDE	Regulations COMAR 26.17.04 "Construction on Nontidal Water and Floodplains."	No
11	MDE	"Guidelines for Construction on Nontidal Waters and Floodplains."	Yes
12	MDE	Regulation COMAR 26.08.02.10, "Water Quality Certification"	No
13	MDSHA	ICC Stormwater Management Approach (March 2006)	Yes
14	MDSHA	ICC Stormwater Management Concept (March 2006)	Yes
15	MDSHA	Standard Specifications for Construction and Materials for items identified as Standard in Attachment A of Part 3-Resign Requirements.	No
16	MDSHA	Book of Standard for Highways, Incidental Structures and Traffic Control Applications for items identified as Standard in Attachment	No

Table 1

Standards for Drainage

Priority	Author or Agency	Title	Document Provided
		B of Part 3-Resign Requirements	

2.2 REFERENCES

Use the references listed in Table 2 as supplementary guidelines for the design and construction of the drainage system. These publications have no established order of precedence.

Table 2
References for Drainage

Author or Agency	Title	Document Provided
MDSHA	Standard Specifications for Construction and Materials for items identified as Reference in Attachment B of Part 3-Resign Requirements	No
MDSHA	Book of Standard for Highways, Incidental Structures and Traffic Control Applications for items identified as Reference in Attachment B of Part 3-Resign Requirements	No
MDSHA	Guidelines for Preparing Stormwater Management Concept Reports, April 2003 draft.	Yes
MDSHA/MDE	MDE/SHA Stormwater Quality Management Banking Agreement dated June 2, 1992, and amended March 1, 1994 and August 2003.	Yes
MDSHA	ICC Water Quality Bank Summary and Definitions, December 2005	Yes
MDSHA	Grass Channel Credit Paper	Yes
Coastal Resources, Inc.	Memorandum, subject: Resident Fish Speeds dated February 1, 2006.	Yes
Montgomery County Maryland	Interim Environmental Guidelines for Culvert Design dated April 1998.	Yes

3.0 REQUIREMENTS

3.1 SURFACE STORM DRAINAGE DESIGN, SUBMITTALS AND APPROVALS

The Design-Builder shall design all surface drainage conveyances including but not limited to open channels, inlets, closed storm drainage systems, cross culverts and entrance driveway pipes. The drainage design, in report form as indicated herein, shall be submitted to the Administration for review and concurrence prior to construction.

Waterway Construction (COMAR 26.17.04) review and approval is required for a number of cross culverts on the Project. Submittals for MDE approval shall be delivered to the Administration for review and coordination with MDE. The Administration has established a review and approval process with MDE for the ICC. 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.

3.2 SURFACE DRAINAGE DESIGN - GENERAL REQUIREMENTS

All drainage design shall be performed in accordance with the following criteria and regulations:

A) Surface drain ditches receiving roadway runoff shall be designed to meet Grass Channel Credit requirements, Section 5.5 of MDE's 2000 Maryland Stormwater Design Manual, to the extent practicable, as required to meet Project stormwater management water quality control needs.

B) The design and construction of the drainage system shall include the repair and/or replacement of unstable or deteriorating outfalls, inlets, manholes, cross culverts or pipes, or other drainage structures, as well as replacement of any existing brick drainage structures regardless of condition within the Project limits. Known inlets, as-built construction materials and depth to bottom from top of grate is provided in Table 3 below. It shall also include the repair of existing outfalls and the replacement of adversely sloped and level (zero gradient) pipes to remove adverse slopes and provide positive drainage. No waivers from MDE's Channel Protection Volume (Cpv) requirements shall be granted unless a stable outfall is documented.

Table 3: Known Drainage Structures

FEIS Station	Offset	LT or RT	Structure	Material	Structure

			(MH, Inlet, etc.)		Depth (ft)

C) The drainage design shall provide positive drainage flow in all open and closed systems. The Design-Builder shall provide completed designs for all temporary and permanent pipe systems and obtain Administration approval prior to their construction.

D) The Design-Builder shall not construct Work so as to trap water along any section. If during design or construction an area of the Project is identified as not having positive drainage in pre-construction conditions, the Design-Builder shall provide adequate measures to ensure positive drainage after construction.

E) The Design-Builder shall provide adequate connections to maintain all existing drainage systems. Provisions shall be made to 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).

3.3 SURFACE DRAINAGE DESIGN - SPECIFIC CRITERIA

This section contains criteria that are in addition to that contained under Drainage Design General Requirements. Where conflicts arise between these Specific Criteria and those contained in the General Requirements, these Specific Criteria will have precedence.

3.3.1 Cross Culverts

A) Discharges for appropriate return period storms for cross culverts shall be calculated using USDA, SCS TR-55 and TR-20 hydrology models unless the drainage area exceeds 200 acres, then GIS Hydro is added as an acceptable model. For storm drain design, procedures found in the SHA Highway Drainage Manual shall be used. Floodplain modeling shall be performed with HEC-RAS.

B) The 100 year headwater pool at new culverts shall remain within the right-of-way or easements. In the case of existing, replacement, or extended culverts, the 100-year storm

headwater elevation for the proposed conditions shall be at or below the existing 100-year headwater elevation.

C) Wildlife passage accommodation at drainage cross culverts: A number of wildlife crossing locations have been identified in the Project. Anticipated culvert crossing locations and wildlife accommodation requirements are listed in Table 4. Wildlife crossing culverts shall meet any hydrologic and hydraulic requirements if at a stream crossing, as well as the applicable wildlife crossing criteria found in the Environmental Performance Specifications.

Table 4 is a list of anticipated drainage crossings to be constructed within the Project. Concept data for these crossings that contain site restrictions and other commitments are included in the RFP. This list is based on an alignment developed during conceptual studies and may vary according to the final documents developed by the Design-Builder. If the Design-Builder changes the following crossings list, the proposed changes shall be submitted in writing to the Administration. The Administration may then develop appropriate site specific requirements beyond those provided by the Design-Builder, to be used in the design of the crossing.

Table 4: Anticipated Roadway Cross Culvert Locations and Wildlife Crossing Needs

Centerline Station	Watershed	Approx. Drainage Area (Ac)	Deer*	Small Mammals*	Fish Passage Required	Comments
ICC Mainline						
112+78	Rock Creek	130		*Yes*	*Yes*	
615+50 I-370 Ramp F	Rock Creek	172		*Yes*	*Yes*	
123+84	Rock Creek	44			*Yes*	
129+77	Rock Creek	21			*Yes*	
150+00	Rock Creek	576	*Yes*		*Yes*	Major Crossing 1-1
162+62	Rock Creek	20			*Yes*	
173+30	Rock Creek	424	*Yes*		*Yes*	Major Crossing 1-2
207+01	Rock Creek	88			*Yes*	
240+00	Rock Creek	4992			*Yes*	Major Crossing 1-7 (Bridge)
275+47	Rock Creek	98	*Yes*		*Yes*	
300+70	Rock Creek	19		*Yes*	*No*	
312+50	Rock Creek	96	*Yes*		*Yes*	
313+89	Rock Creek	20			*No*	
320+00	Rock Creek	5568			*Yes*	Major Crossing 1-8 (Bridge)
327+00	Rock Creek	448			*Yes*	Major Crossing 1-9

						(Bridge)
358+38	Rock Creek	227		*Yes*	*Yes*	
366+33	Rock Creek	7			*No*	

Table 4 Continued

Centerline Station	Watershed	Approx. Drainage Area (Ac)	Deer*	Small Mammals*	Fish Passage Required	Comments
377+35	Rock Creek	41			*No*	
110+24 Overhill Road	Rock Creek	23			*No*	
46+54 MD 97 Ramp C	Northwest Branch	36			*No*	
411+92	Northwest Branch	14			*No*	

** Small Mammal Passage accommodation may be within hydraulic structures if a shelf above the 2 yr normal flow depth is included, or may be a separate 72" pipe or equivalent structure. Deer passage shall be accommodated in separate structures from hydraulic crossings carrying baseflow, and may provide flood relief for storms in greater than the 2-year return period event. Stationing for these culverts is approximate.*

D) Where fish passage is required, culverts less than 72 inches in diameter shall be constructed with inverts depressed a minimum of 1 foot below the stream invert and culverts 72 inches or greater and box culverts (excluding those not for the purpose of hydraulic crossings) shall be constructed with inverts depressed a minimum of 2 feet below the stream invert to allow for natural sedimentation of the culvert bottom. The effects of invert depression on culvert hydraulic performance shall be accommodated and incorporated into design.

E) Cross culvert design shall address fish passage in locations designated in Table 4. Fish passage design shall accommodate elements of fish biology including swim speed for

species found in reference titled Resident Fish Speeds. Culvert design shall be in accordance with Interim Environmental Guidelines for Culvert Design.

3.3.2 Roadway Drainage Design

A) The flow spread in a closed section for a 2 year storm event shall not exceed 8 ft. and in no case cover more than one half of any travel lane. Exceptions to these criteria will be considered on a case by case basis.

B) The maximum flow across entrances shall be 1 cfs for the 2-year storm event. Maximum flow from the end of curb and gutter shall be 0.5 cfs for the 2-year storm event.

C) The side ditch criteria with respect to holding the 10-year water surface elevation at least 9 inches below the shoulder edge, as stated in the Highway Drainage Manual, Part I, Chapter 3 Open Drainage, Section A Ditches, Gutters and Channels, item number 6, paragraph 2 and item number 7, is waived for the ICC. The side ditch capacity shall remain based on the 10-year storm; however the 10-year flow shall not cause flooding of the roadway or shoulder. The 10-year flow in side and median ditches shall not wet guardrail posts.

D) No inlet grates, manhole covers or other drainage structure tops shall be constructed within the travel lanes of the mainline ICC.

E) Roadway inlets and drainage structures shall conform to the Administration's "Book of Standards for Highways, Incidental Structures and Traffic Control Applications" or approved equal(s). Type COG or COS are preferred. Other inlets and non-standard structures proposed shall receive concurrence from the Administration prior to construction. When grate inlets are used within the roadway section and where the roadway is subject to pedestrian or bicycle traffic, inlets shall be fitted with ADA compliant grates such as WR or curved vane grate.

F) No break in curb, such as curb cuts, will be allowed for drainage purposes without concurrence from the Administration prior to construction.

G) The Design-Builder shall prepare and provide storm drain profiles of all new storm drains and connections to existing storm drains, as outlined in SHA's Highway Drainage Manual, for the Administration's consultation and written comment prior to construction.

H) Ditches shall be designed with minimum 0.5% slope to ensure positive drainage flow. Standing water will not be acceptable, except for stormwater management.

I) Ditch surface lining shall be Soil Stabilization Matting (SSM) rather than riprap, wherever possible. Type A matting is temporary matting and shall be used in ditches with 10-year storm discharge velocity of less than 5 fps or for slope stabilization. Type B matting is permanent matting and shall be used in ditches with 10-year storm discharge velocities ranging from 5 fps to 8.5 fps.

J) Riprap shall only be used as a ditch lining where SSM cannot be used or to provide velocity attenuation (e.g., outfall protection). Concrete lined ditches and concrete slope or channel protection will not be allowed because of long term maintenance concerns.

K) Design of side ditches in fill/embankment greater than 5 feet in height should consider impervious liners or subsurface drainage controls at some depth below the topsoil so as to have sufficient material for vegetative growth but not to infiltrate surface water into fill material that could potentially cause fill slope failure.

L) Effective sideslopes within or adjacent to wetland areas and wetland buffers shall be 2:1 or steeper to minimize wetland impacts. Refer to Geotechnical Performance Specifications for slope design and construction requirements.

M) All existing pipes and drainage structures to be used in the Final Design shall be inspected and assessed for structural integrity and hydraulic capacity by the Design-Builder. Existing brick drainage structures shall be replaced with Administration approved cast-in-place or precast concrete structures (See Table 3). Inspection reports shall be compiled and submitted for concurrence and shall include photographs and a written report describing the structural integrity of the drainage structure. Those existing pipes and drainage structures failing to meet structural integrity requirements or those not having positive drainage shall be replaced.

N) Conversion of existing drainage structures into junction boxes within the roadway shall not be incorporated into the design without the Administration's consultation and written comment prior to construction. Inspection report data shall be provided for the Administration's review and written comment.

O) As a condition of Final Completion, all storm drains shall be cleaned to the satisfaction of the Administration at no additional cost to the Administration.

P) Pipes shall conform to the following service life requirements:

- Roadbed width greater than 27 ft. or cover depth greater than 10 ft. - 75 years;
- Roadbed width 27 ft. or less - 50 years;
- All pipes within Administration right-of-way - minimum 50 years;

- Installations under interim alignment - 25 years; and
- Underground SWM facilities – 75 years.

Q) The assumed service life for concrete pipe shall be 75 years. The assumed service life for all other pipe meeting the minimum gage and performance criteria set forth in the SHA Highway Drainage Manual shall be 50 years.

R) Horizontal Elliptical Reinforced Concrete Pipe (HERCP) may be specified when necessary to meet the minimum cover requirements as set forth in the Highway Drainage Manual.

S) The pipe material shall conform to Table 5:

TABLE 5

PIPE SELECTION CRITERIA

Abbreviation	Description	Specification	Limitations	Range of Application
CSP	Corrugated Steel Pipe - Aluminized Type 2	M 36, M274	15" to 60" - 2 2/3" x ½" Corrugations 54" to 60" – 3" x 1" Corrugations * #	Metal pipes: Soil and water pH shall be between 5.0 and 9.0 and minimum resistivity shall be above 1500 ohm-cm. Minimum gauge is 14. Deviation from these requirements requires written concurrence from the Administration prior to construction.
CSPA	Corrugated Steel Pipe Arch - Aluminized Type 2	M 36, M274	17" x 13" to 71" x 47" – 2 2/3" x ½" Corrugations 60" x 46" to 71" x 47" – 3" x 1" Corrugations	
SPP	Structural Steel Plate Pipe	M 167	60" to 96" diameter * #	
SPPA	Structural Steel Plate Pipe Arch	M 167	60” to 96" diameter equivalent. * #	
SRP	Steel Spiral Rib Pipe - Aluminized Type 2	M 36, M274	18" to 60" - ¾" x ¾" x 7 ½" Corrugations	
SRPA	Steel Spiral Rib Pipe-Arch - Aluminized Type 2	M 36, M274	21" x 15" to 71" x 47" - ¾" x ¾" x 7 ½" Corrugations	

Abbreviation	Description	Specification	Limitations	Range of Application
PCSP	Corrugated Steel Pipe, Polymer Precoated	M 245	18” to 60” Not for use as culvert.	
CPP-S	Corrugated Polyethylene Pipe - Type 'S' (Smooth Interior)	M 294	18" to 36" diam. - 2’ minimum cover, granular backfill Not for use in roadway – 6” min diam. for use as SWM underdrain.	
PPWP	Polyvinyl Chloride Profile Wall Pipe	M 304	18" to 36" - 2’ minimum cover, granular backfill Not for use in roadway.	
PVCP-P	Polyvinyl Chloride Pipe – Perforated	M 278	4" to 12", underdrains	
PVCP	Polyvinyl Chloride Pipe	M 278	4" to 12", underdrain outlets	

Table 5 Continued

Abbreviation	Description	Specification	Limitations	Range of Application
HERCP	Horizontal Elliptical Reinforced Concrete Pipe	M 207	23" x 14" to 53" x 34" , Class HE-IV minimum	
RCP	Reinforced Concrete Pipe	M 170	15" to 84" - Class IV minimum *	
RCPP	Reinforced Concrete Low- Head Pressure Pipe	C 361	Code 378 Spillways	
Box Culvert	Box Culvert	M 259, M 219	Concurrence from the Administration required prior to final design.	

Notes:
* Pipes greater than 84" diameter (or equivalent) require concurrence from the Administration prior to final design.

Metal Pipes greater than 96" (or equivalent) diameter require concurrence from the Administration prior to final design.

T) Unsuitable pipe foundation material shall be replaced with No. 57 aggregate or crushed run aggregate CR-6.

U) Pipes shall be laid with hubs upgrade. A single lay hole through the shell of the pipe is permitted for installation with a lifting device. The lay hole shall be cast in the pipe during fabrication or cored without damaging any reinforcement, and plugged after installation with mortar, rubber plug or other means.

V) All pipe joints shall be sealed in a manner appropriate to the type of pipe material. Reinforced Concrete Pipe shall be sealed with rubber type gaskets (circular pipe) or resilient type material (elliptical pipe). Metal pipe joints shall be sealed with rubber gaskets and coupling bands. Plastic Pipe joints shall be integral bell and spigot with rubber or neoprene gaskets.

W) Pipe connections may be either prefabricated or constructed in the field. Corrugated pipe sections shall be butted together and sections joined with a band in accordance with manufacturer's recommendations to make a soiltight seal. Field connections for concrete or corrugated metal pipes shall employ concrete collars or welded connections for metal pipes may be substituted for concrete collars.

3.4 GROUNDWATER

The Design-Builder shall develop a chemical spills plan to prevent spilled chemicals from entering the groundwater or surface water by direct runoff into a stormdrain or stream or by infiltration into the subsurface during construction. The Design-Builder shall make every effort to remediate spills before they can infiltrate into the groundwater system. Furthermore, as part of any spill remediation plan, contaminated soils shall be removed, disposed of properly with appropriate documentation, and replaced with clean fill.

Any chemical spills along the ICC would likely concentrate in roadside ditches. Ditches shall be designed with storm drain inlets that convey runoff to storm drains and finally to a larger SWM facility (i.e., sand filter, pond). The Design-Builder shall block storm drains when advantageous

to prevent contaminated water from entering drainage systems and afford the maximum potential for clean-up.

3.5 FLOODPLAIN COORDINATION

The Design-Builder shall be responsible for coordinating analysis of applicable drainage crossings with FEMA and the Administration. Floodplain crossing requirements can be found in Structures Performance Specifications.

3.6 STORMWATER MANAGEMENT DESIGN AND APPROVALS

The Design-Builder shall coordinate all reviews and submissions with the Administration. The Administration has established a review and approval process with MDE for the ICC. 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 Stormwater Management plans and calculations. MDE will formally review the methodology in the Design-Builder's preliminary stormwater management report and issue a Letter of Intent to issue a formal approval based on this information. Once the Letter of Intent is issued by MDE, the Design-Builder shall be responsible for finalizing the SWM design. Pieces of the Work may be designed, submitted for review, and approved to address anticipated earth disturbance areas or phases required to complete the Project.

Once the MDE review process is complete, the Design-Builder shall submit 3 sets of the approved plans and reports to the Administration. The Design-Builder shall ensure that copies of the most current approved plans are available to all personnel involved in the construction and inspection of the Project.

Maryland Department of the Environment (MDE) SWM Review and Approval:

A) The Design-Builder shall be responsible for demonstrating to the Administration that all of the stormwater management needs of the Project can be met within the right-of-way shown on the RFP Plates. The final design of each section or phase shall be acceptable to both the Administration and MDE prior to construction.

B) A Pre-Permitting meeting will be held by the Administration once Notice of Award for the Project has been issued. This meeting will be scheduled by the Administration upon request by the Design-Builder and will include the Design-Builder's Responsible Engineer for Drainage, Construction Manager, Design Manager, Responsible Engineer for ESC design, Erosion and Sediment Control Manager (ESCM), and representatives from the Administration's Environmental Management Team (EMT), Independent Environmental Monitor (IEM) and MDE. The purpose of the meeting will be to preview

and discuss stormwater management and erosion and sediment control concepts to be developed by the Design-Builder, submission schedules proposed by the Design-Builder, permitting timeframes, submission requirements and the Administration's quality expectations.

C) Deviations from the Concept/Preliminary SWM Report by the Design-Builder are the sole responsibility of the Design-Builder. The Administration will not pay for any additional design, MDE review coordination, construction or other costs incurred due to deviations from the Concept SWM Report.

D) Structural stormwater management facility locations have been suggested by the Administration as shown on the applicable RFP Plans by "SWM" and in Table 6. The Design-Builder may identify other locations within the Project right of way such as within interchange loops, gore areas, extra land or other areas as appropriate and explore the feasibility of using those areas with the Administration's consultation and written comment. If the Design-Builder chooses locations for stormwater management facilities outside of Administration right-of-way, approval from the Administration must be obtained during the Definitive Design for SWM development.

E) The Preliminary SWM Report shall address SWM for each location where discharge leaves the Limit of Disturbance. The Letter of Intent from MDE will be issued based upon MDE's acceptance of the Preliminary Stormwater Management Report, and the use of SWM facilities described therein. Various types of SWM facilities may be used, but they shall meet all requirements of the 2000 Maryland Stormwater Design Manual and subsequent changes with concurrence from the Administration and formal approval from MDE prior to construction.

3.7 STORMWATER MANAGEMENT – GENERAL REQUIREMENTS

Stormwater management (SWM) Best Management Practices (BMPs) shall conform to MDE's *2000 Maryland Stormwater Design Manual* and *Stormwater Management Guidelines for State and Federal Projects*, and the following ICC commitments with regard to SWM:

A) In calculating Water Quality Volume using the *2000 Maryland Stormwater Design Manual*, the Design-Builder shall replace "P = rainfall depth in inches and is equal to 1.0" in the Eastern rainfall Zone and 0.9" in the Western Rainfall Zone (Fig. 2.1)" with "P = rainfall depth in inches and is equal to 1.5" for the ICC" in Table 2.1, and throughout the manual.

B) Within the Montgomery County Special Protection Areas (SPAs) and Use III watersheds, approximately between MD 115 and MD 97, in addition to MDE Grass Channel Credit criteria as found in Section 5.5 of the *2000 Maryland Stormwater Design Manual*, linear filtering devices shall be employed in outside and median ditches in accordance with "ICC Linear Stormwater Management Concept" dated November 2005.

C) The Design-Builder shall capture and provide water quality and quantity control for runoff from bridge decks within the SPA through methods acceptable to the Administration, MDE, and Montgomery County Department of Permitting Services.

D) The Design-Builder shall demonstrate compliance with MDE's 12-hour Channel Protection Volume (Cpv) requirements in accordance with Table 2.1, 2000 Maryland Stormwater Design Manual. Cpv storage shall be provided either in dry surface ponds or dry underground chambers depending on available right of way and with concurrence from the Administration prior to construction.

E) Waivers of or variances from strict adherence with MDE requirements shall be evaluated on a case by case basis.

3.7.1 BMP Selection

The Design-Builder shall present SWM facility types during Definitive Design for the Administration's consultation and written comment prior to advancing SWM design. The Administration will use the following criteria in evaluating proposed facilities:

A) The best fit given the site context shall be considered.

B) Grass Channels (see Grass Channel Credit paper included in this advertisement package for design guidance) and other non-structural practices shall be considered first when feasible.

C) BMPs requiring lower maintenance shall be considered first. Potential maintenance needs shall be considered when SWM facilities.

E) Maintenance access and frequency.

3.7.2 ICC Water Quality Bank

Impervious surface created for the Project shall be accounted from a stormwater management perspective in the ICC Water Quality Bank. The Project falls primarily within the Rock Creek Watershed, and as a result, must demonstrate a "0" or positive balance of impervious surface treated at the completion of the Project. The aggregate amount of new impervious surface added

to the Project shall be treated for water quality according to the above-mentioned regulations and/or guidelines, and the treatment provided shall be tallied according to:

A) MDE/SHA Stormwater Quality Management Banking Agreement dated June 2, 1992, and amended March 1, 1994, with revisions as described below:

- 100% credit for on-site (SHA) untreated impervious with any MDE approved BMP.
- Off-site (non-SHA) untreated impervious areas may be eligible for 80% credit with MDE concurrence.
- Non-structural BMPs qualify for only Project credit, not bank credit. Excess grass channel credit cannot be applied to the bank.
- Pavement removal will be considered as redevelopment and will receive 80% credit. If it is demonstrated that the pavement removal is solely for water quality treatment purposes, then 100% credit will be applied.

B) The ICC Water Quality Bank Summary and Definitions.

3.7.3 SWM Specific Engineering Criteria

A) Proposed stormwater management facilities shall have coordinated detailing throughout the Project and they shall be worked into the concepts for the corridor landscaping. This means that facility types, outfall structure designs, detailing, colors, planting palette, landforms, surface area shapes and fencing (if required) shall be consistent. Refer to Planting and Landscape Architectural Performance Specifications for further information regarding landscaping design and SWM.

B) All stormwater management ponds and constructed wetlands for stormwater treatment shall be located a minimum distance of 15 feet from the edge of pavement. This distance shall be measured from the 2-year water surface elevation limit at its closest point to the roadway. Though preferred, this criterion does not apply to existing SWM facilities within the Project.

C) Design of linear SWM in fill/embankment greater than 5 feet in height should consider impervious liners or subsurface drainage controls at some depth below the topsoil so as to have sufficient material for vegetative growth but not to infiltrate surface water into fill material that could potentially cause fill slope failure..

D) Riser structures and pipe outfall systems shall be concrete. Concrete structures that are visible shall meet the requirements set forth in the Planting and Landscape Architectural Performance Specifications.

E) Concrete pipe used for stormwater management pond outfalls shall meet the requirements of ASTM C-361. Riser structures shall be set in embankments or placed 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) Underground SWM structures anticipated to be used as shown in Table 6 or elsewhere on the Project:

- Shall not include manholes or other access structures within roadway paving section
- Shall address groundwater recharge (Rev), water quality volume (WQv), and Channel Protection Volume (Cpv) as appropriate..
- Shall include safe, stable, long term maintenance access from off of the roadway shoulder including sufficient room for vehicular pull-off, with concurrence from the Administration prior to final design.
- That are designed to address water quality shall consider filter media design life/maintenance frequency and degree of maintenance difficulty, and selection of the device with concurrence from the Administration and comments satisfactorily addressed prior to Final Design. All water quality devices, proprietary or otherwise, must either be included in the *2000 Maryland Stormwater Design Manual* or shall be approved by MDE in writing prior to use.
- Shall meet design life requirements of culverts (reference Section 3.3.2 of these Specifications).
- That require vacuum truck maintenance access shall incorporate access manholes on 100 foot maximum center spacing.
- Underground stormwater management facility needs are anticipated in the locations identified in Table 6.

TABLE 6: ANTICIPATED UNDERGROUND SWM FACILITY LOCATIONS	
APPROX. STATION	APPROX. STORAGE VOLUME (AC-FT)
147+50	1.04
151+50	0.30
160+50	0.29
173+00	0.65
176+00	0.80
236+50	2.82*
243+00	0.34
322+00	0.60
331+00	2.62

Facilities are for Channel Protection Volume (Cpv) only unless noted.
** This facility provides both quality and quantity treatment underground.*

G) The finish and appearance of trash racks where required on stormwater management pond risers visible from the roadway or adjacent communities shall be consistent with roadway aesthetic requirements found in the Planting and Landscape Architectural Performance Specifications. Trash racks not visible from the roadway or adjacent communities shall be hot-dipped galvanized metal, M 111-80. Trash racks shall be designed as flat-fronted cages that stand away from and completely enclose the riser opening(s). Ends of the steel rods shall be attached to a frame that attaches to the structure. Trash rack designs shall use similar detailing for all openings on the structure. Trash rack detailing shall be similar throughout the Project.

H) Open tops on outfall structures are not preferred. If they are used, a trash rack shall be designed that is not placed horizontally but is placed at an angle of not less than 1" vertical for every 12" horizontal in order to reduce the potential for clogging.

I) Low flow, perforated pipes shall be wrapped with galvanized wire mesh rather than geotextile. Pipes extending into ponds shall be anchored against flotation.

J) SWM embankments shall be planted in accordance with the Planting and Landscape Architectural Performance Specifications. No woody material shall be planted on pond fill embankments, within 15 feet of the toe of pond embankments, or within 25 feet of pond outfall structures. Material for the SWM embankments is required to conform to NRCS Pond Code MD-378 as found in the 2000 Maryland Stormwater Design Manual, Appendix B1, embankment clay core and cut-off trench shall conform to A-2-7, A-7-2, A-4-7, A-7-4, or A-7. Maximum particle size shall be three inches.

K) The maximum grade allowed for side slopes at stormwater management facilities shall be in conformance with Planting and Landscape Architectural Performance Specifications.

L) Filter diaphragms shall be used for embankment seepage control in place of anti-seep collars within the SWM embankment when classified as embankment ponds under the 2000 Maryland Stormwater Design Manual, Appendix B1. The design criteria for filter diaphragms shall be as outlined in the 2000 Maryland Stormwater Design Manual, Appendix B1.

M) A BMP number shall be obtained from the Administration for each structural BMP constructed on the Project.

N) A minimum 15 foot clear zone shall be provided within the Project right-of-way at the toe of SWM pond embankments to keep woody vegetation clear.

O) Fencing of SWM facilities shall meet requirements set forth in the Planting and Landscape Architectural Performance Specification.

3.7.4 SWM As-Built Certifications

This Work shall consist of inspecting stormwater management (SWM) facilities during various stages of construction and providing documentation to the Administration that certifies SWM facilities have been constructed as specified in the Contract Documents, including certification that the constructed SWM facilities meet the functionality as designed.

As-Built (AB) Inspector. The AB Inspector shall be a licensed Professional Engineer or Land Surveyor in the State of Maryland with experience in stormwater management design and construction.

As-Built Certification Package. The as-built certification package shall consist of photographs, completed as-built checklists for each SWM facility, completed as-built certification forms for each SWM facility, material testing reports for any soil, a copy of green-line revision plans for SWM facilities that include as-built survey information, a copy of completed planting checklists, and turf inspection data for SWM facilities and drainage conveyances areas (such as ditches and swales). Information about the person(s) that perform the plant and turf inspections shall be part of the as-built certification package and shall include, but not be limited to, name of person(s), employer name, brief description of related work history, contact information, and anticipated dates for plant and turf establishment inspections. The Design-Builder shall provide to the Administration two hard-copies and one digital copy in PDF format of the as-built certification package.

The AB Inspector shall perform minimum inspections for SWM facilities as follows:

A) Ponds.

1) Upon completion of excavation to sub-foundation and when required, installation of structural supports or reinforcement for structures, including, but not limited to:

a) Core trenches for structural embankments.

b) Inlet (riser) 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 catchbasins.

3) During backfill of foundations and trenches.

4) During embankment construction.

5) Upon completion of final grading and establishment of permanent stabilization.

B) Wetlands. Refer to stages specified for pond construction. Additional inspections include:

1) During and after wetland area planting.

2) During the second growing season to verify a vegetation survival rate of no less than fifty percent (50%).

C) Infiltration Trenches.

1) During excavation to subgrade.

2) During placement and backfill of underdrain systems and observations wells.

3) During placement of 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 underdrain systems.

E) Filtering Systems. Filtering systems include bioretention, sand filters, organic filters, bio-filters, and dry swales.

1) During excavation to subgrade.

2) During placement and backfill of underdrain systems.

3) During placement of 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.

1) Upon completion of final grading and after the establishment of permanent stabilization.

The checklist for each SWM facility shall be completed in its entirety at the appropriate stages of construction as specified in the Contract Documents. The as-built certification shall be signed and dated by the AB Inspector upon completion of all SWM facility checklists.

As-Built Survey, Computations and Green-Line Drawings. Upon completion of the final grade and stabilization at each SWM facility, the Design-Builder shall survey each SWM facility, including contours, inflow and outflow ditches, limits of riprap, emergency spillway(s), outfall structure(s) (including elevations and dimensions at top, all orifices, weirs and openings), and all other pertinent features in and around the facility.

The constructed elevations shall be within 3 inches of design elevations. Elevation variance greater than 3 inches shall be corrected by the Design-Builder to meet the acceptable tolerance limits or the Design-Builder shall provide computations for the volumes, discharges, stage-storages, freeboard, detention times and other parameters deemed necessary by the Design-Builder or the Administration that demonstrate that the SWM facility meets the designed parameters. The Design-Builder shall resurvey any corrected areas.

Submission to and Acceptance by the Administration. The Design-Builder shall submit the completed as-built certification package to the Administration for final acceptance.

3.8 EROSION AND SEDIMENT CONTROL (ESC) DESIGN AND APPROVALS

The Design-Builder will prepare and submit an Erosion and Sediment Control plan for the PROJECT to the Administration for review, comment and coordination with MDE. The Administration has established a review and approval process with MDE for the ICC. 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 Erosion and Sediment Control plans and calculations.

The Design-Builder shall assign an employee to serve in the capacity of Erosion and Sediment Control Manager (ESCM). The ESCM and the superintendent(s) shall have successfully completed the Administration's Erosion and Sediment Control Certification Training for Contractors and Inspectors. This certification must be current at all times. If the certification is expired or revoked for either person, the Design-Builder shall immediately replace the personnel with appropriately certified persons acceptable to the Administration.

3.8.1 Erosion and Sediment Control Program

The Design-Builder shall be responsible for developing an ESC Program for earth disturbing activities. Elements of the ESC Program shall include but not be limited to:

A) ESC Plans: Plans meeting the requirements of MDE's Erosion and Sediment Control Guidelines for State and Federal Projects shall be submitted to the Administration for review, comment and coordination with MDE. The Design-Builder shall be responsible for addressing any comments supplied by the Administration. Upon approval of ESC plans by the Administration, the Administration shall submit the final plans to MDE for formal approval.

B) A Pre-Permitting meeting must be scheduled as discussed under SWM Design and Approval section 3.6 above. Submittals for ESC approval shall be delivered to the Administration according to the review process for SWM approval described above under SWM Design and Approval.

C) A written ESC Sequence of Construction, in concert with Traffic Control Plan (TCP) phasing, shall include:

- Detailed steps necessary to establish and maintain clear water diversions through or around any work area.
- Proposers shall submit an Earth Disturbance Area (EDA) plan to demonstrate to the Administration that the proposed areas of ground disturbance will be consistent with proposed resources to grade in a timely and quality manner and, more importantly, to maintain sediment and erosion controls. An EDA is a Design-Builder defined work area within the project limits that must be disturbed to carry out a contiguous grading operation. A grading operation is defined by the Design-Builder's ability to provide adequate resources to perform the grading in a timely manner and provide and maintain the proper erosion and sediment control measures for the duration of the earth disturbing activities and until final stabilization is accomplished. The Plan shall include a storm response plan depicting steps to be taken to assess, mobilize, and resolve ESC issues after a major storm event. Upon concurrence from the Administration that the EDA Plan is acceptable, each EDA must be substantially completed (greater than 75 percent graded and with final stabilization) before the Design-Builder can request in writing that subsequent EDA(s) can be disturbed. The Design-Builder shall not proceed if a score of less than 80 was received on the most recent quality assurance rating and until a quality assurance rating of A or B is obtained.

D) Once the MDE review process is complete, the Design-Builder will be granted final approval from the Administration and shall submit a completed Notice of Intent (NOI) Form to MDE in accordance with the NPDES General Permit for Construction Activities.

E) Design-Builder's Inspection and Maintenance Protocols for ESC devices, including plans for preemptive actions to address predicted severe weather events and sediment spills.

F) Design-Builder's approach to stockpiling materials needed to perform emergency maintenance.

3.9 ESC QUALITY ASSURANCE RATINGS

ESC compliance will be monitored during construction by the Administration/EMT (see Environmental Performance Specification) to ensure compliance with the approved ESC plan. The Design-Builder shall, after obtaining ESC approval for the earth disturbance area (EDA) required for a grading operation, demarcate limits of disturbance, wetlands and wetland buffers, floodplains, and tree protection areas, and shall proceed with clearing and grubbing of the earth disturbance area under approved ESC plans and schedules. The Project shall be inspected for compliance with ESC plans by the EMT once per calendar week at a minimum, and be given one of the following ratings:

Rating A. The Project will receive an 'A' rating from the Administration if the score is equal to or greater than 90 on form number OOC61, ESC Field Investigation Report.

Rating B. The Project will receive a 'B' rating from the Administration if the score is 80.0 to 89.9 on Form OOC61, ESC Field Investigation Report.

Rating C. The Project will receive a 'C' rating from the Administration if the score is 70.0 to 79.9 on Form OOC61, ESC Field Investigation Report. A 'C' rating indicates that the Project is in compliance, however, deficiencies are noted and shall be corrected. Conditions for a shut down could arise quickly. If the Project receives a 'C' rating it will be formally re-inspected by the EMT within 72 hours.

Rating D. The Project will receive a 'D' rating from the Administration if the score is 60.0 to 69.9 on Form OOC61, ESC Field Investigation Report. A 'D' rating indicates that the Project is in non-compliance. All earthwork operations on the Project will be shut down by the Administration. All work efforts within Project limits shall focus on correcting ESC deficiencies. The Project will be formally re-inspected by the EMT within 72 hours. All required corrective actions shall be completed within the 72 hour period for the Project to be upgraded to a 'B'

rating. Failure to upgrade to a 'B' rating will result in the Project being rated an 'F'. Deductions from the Award Fee for ESC noncompliance and liquidated damages shall apply.

Rating F. The Project will receive an 'F' rating from the Administration if the score is less than 60.0 on Form OOC61, ESC Field Investigation Report; or if the Design-Builder has not obtained all appropriate permits and approvals, demarcated limits of disturbances, wetland and wetland buffers, floodplains, and tree protection areas; or is not proceeding according to the approved ESC plan and schedules. An 'F' rating indicates that the Project is in noncompliance, the ENTIRE Project will be shut down by the Administration until the Project receives a 'B' rating. All work efforts shall focus on correcting ESC deficiencies. The Project will be formally re-inspected by the EMT within 72 hours of receiving an 'F' rating. Deductions from the Award Fee for ESC noncompliance and liquidated damages shall apply.

Shutdowns. When a 'C' rating is given to Project, the Design-Builder shall have all deficiencies corrected within 72 hours. The Project will be formally re-inspected by the EMT at the end of this period. If it is found that the deficiencies have not been satisfactorily corrected, a 'D' rating will be given and all earthwork operations will be shut down until the Project receives a 'B' rating.

When a consecutive 'C' rating is given for other deficiencies and the original deficiencies were corrected, the Design-Builder will be alerted that the overall effort is marginal and a shut down of all earthwork operations for the Project is imminent if ESC efforts do not substantially improve within 72 hours. The Project will be formally re-inspected by the EMT at the end of the 72 hour period. If it is found that the deficiencies have not been satisfactorily corrected or other deficiencies are identified by the EMT that result in a score of less than 80 on form number OOC61, a 'D' rating will be given and all earthwork operations will be shut down until the Project receives a 'B' rating.

When a disregard for correcting these deficiencies is evident, an 'F' rating will be given and the ENTIRE Project will be shut down until the Project receives a 'B' rating.

When degradation to a resource could occur, or if the Design-Builder is unresponsive to direction to take corrective action, the Administration may elect to have these corrective actions taken by another contractor or by Administration maintenance staff. All costs associated with this work will be billed to the original Design-Builder.

Incentive Payment / Liquidated Damages: The Administration has included an incentive payment to the Design Builder for ESC compliance as part of the Award Fee in Project. When an average score equal to or greater than 85 for the entire rating period is given to the Project by the Environmental Management Team (EMT) there will be no deduction from the Award Fee, Section 2.1 Environmental Compliance for ESC noncompliance, however other rating factors

contribute to the Environmental Compliance Award Fee. Incentive payments will be made to the Design-Builder in accordance with the Award Fee procedures. The Design-Builder shall not be eligible for the Environmental Compliance portion of the Award Fee for any period that liquidated damages are imposed as a result of poor performance regarding ESC. When, for the duration of the Project, the Design-Builder does not receive a 'D' or 'F' ESC Quality Assurance Rating and the overall average score given to the Project by the EMT is equal to or greater than 85 the final incentive payment (see Award Fee, ADFP 9) will be made to the Design-Builder at final Project close-out. If a time extension is granted to the Design-Builder, additional quarterly incentive payments will be drawn from the final incentive payment.

If a 'D' or 'F' rating is given to the Project by the EMT for any inspections, the Administration will impose liquidated damages on the Design-Builder in addition to a shutdown as described above and sediment spill response expenses incurred. A rating of 'B' is required to suspend the daily monetary penalty and shutdown.

The daily penalty to be assessed when a rating of 'D' is given will be $X,000.00. The daily penalty to be assessed when a rating of 'F' is given will be $X,000.00.

Payment of the liquidated damages shall be made within thirty days from imposition of the liquidated damages and shall not be allowed to accrue for consideration at final Project close-out.

Award Fee: Refer to Award Fee for details on ESC incentives.

If the Project receives two 'F' ratings, the ESC certification issued by the Administration shall be revoked from the Project superintendent and the ESCM for a period of not less than six months and until successful completion of the Administration's Erosion and Sediment Control Certification Program. Neither the Design-Builder's superintendent nor the ESCM shall be allowed to oversee the installation and maintenance of ESCs during the period that the certification is revoked on this or any other Administration project. The Design-Builder shall provide certified personnel to replace the Design-Builder's superintendent and the ESCM.

Design-Builder Responsibilities: The Design-Builder shall demarcate with stakes and flagging and maintain for the duration of the Project boundaries of all wetlands, wetland buffers, floodplains, tree protection areas, and the Limits of Disturbance (LOD) as specified. Prior to beginning any earth disturbing activity the Design-Builder shall have all demarcated wetlands, wetland buffers, floodplains, tree protection areas, and LOD inspected and approved by the Administration and MDE. The Design-Builder shall construct all ESC measures in conformance with this Specification. The Design-Builder shall have all control measures inspected and approved by the EMT and MDE Inspector prior to beginning any other earth disturbing activity. The Design-Builder shall ensure that all runoff from disturbed areas is directed to the sediment

control measures. The Design-Builder shall not remove any erosion or sediment control measure without the approval of the Administration and MDE Inspector.

Schedule: At least 14 days prior to initiating any earth disturbance on the Project, the Design-Builder shall submit an ESC Schedule to implement the ESC Plan to the Administration and MDE for approval,. The schedule shall indicate the sequence of construction, implementation and maintenance of controls, temporary and permanent stabilization, and the various stages of earth disturbance. After acceptance of the schedule by the Administration, it will be forwarded to MDE for formal approval. The schedule shall, as a minimum, include the following:

(a) Demarcation (and maintain demarcation for the duration of the local earth disturbing activity) of all wetlands, wetland buffers, 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 shall be used or blocked after construction

(g) Conversion of sediment basins to permanent SWM facilities.

(h) Final grading, landscaping, and stabilization.

(i) Removal of perimeter controls.

No earth disturbing activities shall be started on-site or off-site until the ESC schedules and methods of operation have been accepted by the Administration and MDE. The Design-Builder's Project Superintendent and ESC Manager shall complete the Administration's ESC course successfully prior to initiation of any land disturbing activities on the Project.

Severe weather event: ESCs shall be maintained at all times. When a Severe Weather Event occurs, which for ESC purposes a Severe Weather Event is defined as 3.0 inches or more of rainfall within a 24 hour period, the Design-Builder shall maintain, repair or replace any damaged ESC devices within 48 hours or prior to the next rainfall event, whichever comes first. Qualification as a Severe Weather Event will be based upon rainfall data recorded at the Rockville 1 NE National Weather Service Station as reported by the National Climatic Data Center (NCDC), Asheville, NC. A lump sum payment of $*Dollar Amount* will be paid for each

Severe Weather Event occurring between the start of grading operations and removal of the ESCs. The purpose of the lump sum payment is to mitigate the Design-Builder's risk with regard to maintenance, repair and/or replacement of any and all ESC devices damaged by the event provided that a minimum rating of "B" is maintained immediately before and within 48 hours following the rainfall event. The Design-Builder shall be responsible for submitting the official weather records documenting the event.

3.10 ESC SPECIFIC DESIGN CRITERIA

A) Prior to permanent seeding and mulching, slopes outside the roadway hinge point, flatter than and including 2:1 slopes, shall be covered with 2 inches of topsoil. Slopes within the roadway hinge points, flatter than and including 2:1 slopes, shall be covered with 4 inches of topsoil.

B) Slopes steeper than 2:1 shall be evaluated for slope stability and prepared to promote vegetative growth in accordance with Geotechnical Performance Specification and Planting and Landscape Architectural Performance Specification.

C) Daily stabilization for land disturbance within any drainage areas adjacent to wetlands and streams shall be accommodated in the design and implementation of the ESC plans.

D) In order to protect and maintain the high value of natural resources located within the Montgomery County Special Protection Area (SPA), the Design-Builder shall present to the Administration, prior to proceeding with any construction operations, a written erosion and sediment control narrative describing how construction operations in the SPA will be addressed including redundancy of protective measures and other safeguards to afford the highest level of protection from sediment pollution. The Design-Builder shall participate in coordination with Montgomery County regarding design and construction within SPAs. Efforts that exceed MDE requirements in the SPA are expected and shall be documented with photos, written descriptions and other evidence (material receipts, etc.) as part of an as-built record. The as-built record shall be maintained up to date throughout construction and submitted to the Administration on a monthly basis and in final form upon project completion. At a minimum, the plan shall address measures to limit erosion potential, retain sediment on-site, and proactively manage the prosecution of grading operations, and maintenance and functionality of controls.

Potential strategies to limit the potential for erosion may include, but are not limited to, the following:

- The use of clear water diversions shall be used to the maximum extent feasible to limit the amount of area required to be controlled.
- More frequent stabilization than is currently required by MDE regulations to minimize the duration that disturbed soil is exposed.
- Staging the construction to limit clearing, grubbing and area of disturbance to what is necessary to carry on a grading operation (EDA) to minimize the area and duration of soil exposure.
- Providing artificial or organic erosion resistant ground cover on stockpiles, steep slopes, and other exposed or disturbed areas in sensitive locations, prior to the onset of a forecast rainfall event.
- Providing top of fill berms with pipe slope drains to convey discharge down steep slopes,
- Benching long cut or fill slopes to limit the risk of rilling on steep slopes and to lessen the slope of longitudinal ditches,
- Other innovative techniques presented by the Design-Builder with prior written concurrence from the Administration and approval from MDE prior to construction.

The Design-Builder shall make every attempt to retain sediment generated by construction operations within the site. This shall minimally entail the use of both primary and supplementary sediment control measures. Some examples of these may include, but are not limited to, the following:

<u>To address Sheet Flow discharge:</u>

- A layer of primary sediment control, such as Super Silt Fence plus a secondary layer of control such as mulch tubes or mulch berms to minimize the release of fine particles.

<u>To address Concentrated Flow discharge:</u>

Within Use III Watersheds, all areas within the limit of disturbance (LOD) must be protected by a layer of primary control such as a sediment trap or basin, supplemented by a secondary layer (or layers) of control such as:

- An additional trap or basin (space permitting) or additional trap or basin volume,
- Stone check dams, linings, or other erosion inhibitors in influent ditches to sediment traps,

- Ensuring 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),
- Efforts to minimize the potential for re-suspension of particulates, and

- Other innovative techniques presented by the Design-Builder with concurrence from the Administration and approval from MDE prior to construction.

4.0 SUBMITTALS

4.1 STORMWATER MANAGEMENT AND SURFACE DRAINAGE PLANS

The following items shall be included in the design plan documents:

A) Pipe profiles for all storm drain systems. Profiles shall be at a scale of 1 in. = 50 ft. horizontal and 1 in. = 5 ft. vertical. The 25-year hydraulic gradient and existing and proposed ground, proposed pipe, existing utilities and existing structures shall be shown on all storm drain profiles.

B) Details for all non-standard or modified drainage structures.

C) Stormwater Management Systems including spot elevations, contours, drawings and views as specified in MD-378.

D) Side, median and outfall ditch elevations, offsets, and configurations and surface treatments.

E) Underdrain connections, locations and outlets.

F) Cross culvert locations, headwater pool areas, and channel changes required to adjust streams to culverts.

G) Spring box and outlet locations and configurations.

4.2 EROSION AND SEDIMENT CONTROL PLANS

The Design-Builder shall develop ESC Plans that include the following in addition to the highway plan requirements.

A) At a minimum, plans for both initial and final stages of the construction are required. The plans will require 2 foot contouring and interim contours as needed for both existing (pre-construction) conditions and final grade at the same scale as the roadway plans.

B) The initial phase plan will detail the implementation of ESC measures necessary to complete the clearing and grubbing and the initial stages of the TCP.

C) Interim phase(s) of ESC may be required to address changes in drainage characteristics during construction or changes necessitated by multiple phase traffic control plans. Interim phase plans will require 2 foot contouring showing existing or previously constructed conditions and proposed grades to be established by each particular interim phase being addressed.

D) The final phase will detail the control measures required to move to final grade and accommodate interim traffic control phases. Final phase shall also address conversion of temporary sediment control basins to stormwater management ponds where appropriate.

E) Larger scale drawings (1 in. = 200 ft.) will 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.

F) 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-Builder shall be responsible for all revisions due to MDE review and comment.

G) All plans shall be sealed and signed by a Maryland Registered Professional Engineer.

H) Earth Disturbance Area (EDA) Plan as outlined in 3.8.1.C above.

4.3 STORMWATER MANAGEMENT REPORTS AND MANUALS

A SWM Engineering Report and SWM Maintenance and Operation Manual shall be completed for the Project. The SWM Engineering Report shall be prepared in conformance with MDE's Stormwater Management Guidelines for State and Federal Projects, July 2001, and these Specifications. The SWM Maintenance and Operation Report shall conform to these Specifications. Upon completion of Project, the Design-Builder shall submit 2 hard copies and 1-electronic copy in portable document format (.pdf) each of the approved, final Stormwater Management Engineering Report and Stormwater Management Maintenance and Operation Manual to the Administration. During the review and approval process, the SWM Engineering Report can be submitted in phases, as discussed below.

SWM Engineering Report Format

The report and accompanying mapping shall be compiled as follows:

A) The report shall be written in a clear, well organized and concise manner with all the pages 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 deletions and 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 and 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 mapping and exhibits. The electronic file shall be delivered to the Administration for their records.

SWM Engineering Report Contents

In addition to MDE requirements, the Stormwater Management Engineering Report shall contain the following:

A) A thorough discussion explaining the extent of improvements at each outfall and the proposed quantitative and qualitative methods of SWM, including those reasons why others were not selected.

B) An explanation of hydrologic/hydraulic analysis methodologies used (i.e., TR-20, HEC-RAS programs). Final supporting computations, maps, schematics, cross-sections, details and computer runs shall be included for each outfall location.

C) Outfall stability analysis including pre- and post-construction photographs taken of each outfall and receiving channel.

D) Computations for riprap sizing and outlet protection design.

E) 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 folded to 8-1/2” X 11” with map title showing and included in pockets within the report.

F) 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.

G) MDE Pond Summary Sheets (included with this package).

H) ICC Water Quality Summary (included with this package) submitted to the Administration for signature, and maps detailing the types of impevrious area treated and the amount of water quality treatment required and provided at each outfall.

I) NOI Form (Included with this package) filled out and submitted to the Administration.

J) SHA BMP Summary Sheet (included in this package) with SHA BMP numbers indicated. The Design-Builder is responsible to obtain BMP numbers for all structural SWM facilities from the Administration.

4.4 SWM MAINTENANCE AND OPERATION MANUAL FORMAT

Because the ICC Stormwater Management Systems may require proprietary or specific maintenance procedures to ensure peak performance and long term effectiveness, the Design-Builder shall produce and submit to the Administration a written document for reference by future stormwater management maintenance forces.

A) The Manual shall be written in a clear, well organized and concise manner with all the pages numbered and dated.

B) The report shall be placed in an 8½ by 11 inch, 3-hole binder that allows for insertion of revisions, removal of old data, and addition of maintenance inspection field reports. Final manual sheets to be used for field reference shall be laminated to prevent damage from handling or the elements.

C) 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.

D) The final approved report shall be converted to a Portable Document Format (pdf) file, including all mapping and exhibits. The electronic file shall be delivered to the Administration for their records.

SWM Maintenance and Operation Manual Content

The SWM Maintenance and Operation Manual shall contain the following:

A) An overview discussion explaining the BMPs included on the Project, as well as the purpose (quality or quantity control) of each.

B) Design details including GIS points and datums required for adequate maintenance of each type of facility.

C) Mapping and photos of maintenance vehicle parking and facility access locations.

D) Removed material testing and disposal requirements, if any.

E) Manufacturer and supplier information for proprietary devices, if any. Lists of maintenance materials and procedures required for non-proprietary items.

F) Listing of special certifications or training required to safely perform maintenance activities. The Design-Builder shall provide for the training of up to 4 Administration designated staff required to safely and adequately maintain SWM facilities constructed on the PROJECT.

G) Maintenance inspection form.

H) Other information that the Design-Builder feels is necessary to adequately maintain each stormwater management facility.

4.5 (SURFACE) DRAINAGE REPORT

A Final Drainage Report shall be prepared by the Design-Builder and submitted to the Administration for review and acceptance prior to final Project close-out. The Drainage Report shall include all surface drainage design computations performed to demonstrate compliance with the SHA Highway Drainage Manual and these specifications, along with drainage area mapping and schematics necessary to complete the design of the stormwater conveyances for the Project.

Surface Drainage 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 and 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.

Surface Drainage Report Contents

The report shall include but not be limited to the following:

A) All drainage computations performed including clear references to the appropriate charts used.

B) Culvert Analysis reports, when necessary for Waterway Construction Permit review and approval, shall be included as an attachment to the Drainage Report. The content shall be in conformance with COMAR 26.17.04 and MDE's Waterway Construction Guidelines, MDE comment letter(s) and approval, or subsequent requirements issued by MDE in the review and approval process.

C) Storm sewer design computations including schematics, inlet drainage area maps, spacing, capacity and spread, and hydraulic gradients and structural design for special drainage structures.

D) Culvert analysis including 2, 10, 25 and 100 year frequency storms and design storms.

E) An explanation of hydrologic/hydraulic analysis methodologies used (i.e., TR-20, GIS-Hydro, HEC-RAS programs). Final supporting computations, maps, schematics, cross-sections, details and computer runs shall be included for each culvert location.

F) Ditch computations and drainage area maps for ditch capacity, freeboard and lining stability.

G) Evaluation of stable outfalls and outfall protection design.

H) Any deviations from the guidelines and SHA acceptance for the same.

PS 309 - ROADWAY PERFORMANCE SPECIFICATION

1.0 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

2.0 STANDARDS AND REFERENCES

2.1 STANDARDS

Roadway design and construction shall be in accordance with this specification and requirements of the following Standards unless otherwise stipulated in this specification. Standards and References specifically cited in the body of this specification establish requirements that shall have precedence over all others. Should the requirements in any Standard conflict with those in another, the Standard assigned the highest priority 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. Unless noted below, the most recent version as of the date of issuance of this RFP for each Standard shall apply.

TABLE 1
STANDARDS FOR ROADWAY

Priority	*Author or Agency*	*Title*	*Document Provided?*
1	AASHTO	A Policy on Geometric Design of Highways and Streets, 2001	NO
2	AASHTO	Roadside Design Guide, 2002	NO
3	FHWA	Manual on Uniform Traffic Control Devices, 2003	NO
4	AASHTO	Guide for the Development of Bicycle Facilities, 1999	NO
5	AASHTO	Guide for Park-and-Ride Facilities, 2004	NO
6	MDSHA	Accessibility Policy & Guidelines for Pedestrian Facilities along State Highways	YES
7	ADA	ADA Guidelines Americans with Disabilities Act	NO
8	MDSHA	Standard Specifications for Construction Materials for items identified as Standard in Attachment A of Part 3-Resign Requirements	NO
9	MDSHA	Book of Standards Highway and Incidental Structures for items identified as Standard in Attachment B of Part 3-Resign	NO

TABLE 1
STANDARDS FOR ROADWAY

Priority	*Author or Agency*	*Title*	*Document Provided?*
		Requirements	
10	MDSHA	Roundabout Design Guidelines a supplement to the MUTCD.	YES
11	KDOT	Kansas Roundabout Guide – A Supplement to FHWA's Roundabouts: An Information Guide	YES
12	FHWA	Roundabouts: An Information Guide	NO

2.2 REFERENCES

Use the references listed in Table 2 as supplementary guidelines for the design and construction of the Roadway. These publications have no established order of precedence.

TABLE 2
REFERENCES FOR ROADWAY

Author or Agency	*Title*
MDSHA	Book of Standards Highway and Incidental Structures for items identified as Standard in Attachment B of Part 3-Resign Requirements
MDSHA	Guidelines for Traffic Barrier Placement and End Treatment Design

3.0 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 standards as referenced above, outlined in these specifications, and in accordance with sound engineering principles.

B) Accommodate traffic volumes and levels of service as outlined in Traffic Performance Specification.

C) Adhere to all considerations and commitments contained in the Record of Decision Commitment Matrix.

D) Accommodate future improvements to the ICC, crossing, adjacent, and proposed roadways as outlined in the contract documents.

E) All Roadway components shall be constructed within the defined right of way and easements. All roadway components shall be constructed within the limits of disturbance as shown on the RFP plans in environmentally sensitive areas.

4.0 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 standards for roadway design.

The RFP Plans show a conceptual design for the Project. These RFP 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.

4.1 DESIGN CRITERIA

I-370 and ICC Mainline Criteria	
Design Speed	60 mph
Posted Speed	55 mph
Functional Classification	Freeway
Terrain	Rolling
Minimum length of Horizontal Curve	1,000' (1)
Maximum Superelevation	6%
Maximum Grade	4%
Minimum Grade	0.5%
Superelevation Transition Design	Per AASHTO

(1) – 1,800' long curve is desirable. Between 1,799' and 1,000' must be justified by the Design-Builder. Less than 1,000' is subject to Administration approval.

I-370 and ICC Ramp Criteria	
Design Speed	Loop Ramps - 30 mph minimum(3) Outer Ramps – 40 mph minimum Directional Ramps – 45 mph minimum
Posted Speed	Varies
Terrain	Rolling
Minimum length of Horizontal Curve	Length in feet equals 15 times design speed in mph (2)
Maximum Superelevation	8%
Maximum Grade	Per AASHTO
Minimum Grade	0.5%
Superelevation Transition Design	Per AASHTO

(2) – Excluding speed transition curves at ramp terminals applied per AASHTO

(3) – 25 mph speed is acceptable only for the existing ramps listed below with a 25 mph design speed. Modifications to the ramp design that do not utilize the existing ramp paving require that the ramp be upgraded to 30 mph.

Local Roadway Criteria	
Design Speed	Varies (see below)
Functional Classification	Varies (see below)
Posted Speed	Varies (see below)
Terrain	Rolling
Maximum Superelevation	4%
Maximum Grade	Per AASHTO
Minimum Grade	0.5%

Superelevation Transition Design	Per AASHTO

A) Design speeds for ramps and local roadways shall be, at a minimum:

Ramp / Roadway	Design Speed	Posted Speed	Functional Classification
Metro Access Interchange Ramp A	50 mph	n/a	n/a
Metro Access Interchange Ramp B	40 mph	n/a	n/a
Metro Access Interchange Ramp C	45 mph	n/a	n/a
Metro Access Interchange Ramp D	25 mph	n/a	n/a
Metro Access Interchange Ramp E	25 mph	n/a	n/a
Metro Access Interchange Ramp F	50 mph	n/a	n/a
Metro Access Interchange Ramp G	40 mph	n/a	n/a
Metro Access Interchange Ramp H	45 mph	n/a	n/a
Metro Access Interchange Ramp I	25 mph	n/a	n/a
Metro Access Interchange Ramp L	40 mph	n/a	n/a
Metro Access Interchange Ramp M	30 mph	n/a	n/a
Metro Access Interchange Ramp N	30 mph	n/a	n/a
MD 97 Ramp A	30 mph	n/a	n/a
MD 97 Ramp B	30 mph	n/a	n/a
MD 97 Ramp C	50 mph	n/a	n/a
MD 97 Ramp D	45 mph	n/a	n/a
MD 97 Ramp E	30 mph	n/a	n/a
MD 97 Ramp F	45 mph	n/a	n/a
MD 97	55 mph	50 mph	Principal Arterial
MD 97 Service Road	25 mph	25 mph	Secondary Residential
Shady Grove Road	45 mph	40/45 mph	Principal Arterial
Metro Access Road	60 mph	50 mph	Freeway
Redland Road	40 mph	35 mph	Primary Residential
Overhill Road	25 mph	25 mph	Secondary Residential
Overhill Road Extended	25 mph	25 mph	Secondary Residential
Olde Mill Run	25 mph	25 mph	Secondary Residential
Needwood Road	40 mph	30 mph	Primary Residential
Muncaster Mill Road	50 mph	40 mph	Arterial
Emory Lane	40 mph	30 mph	Arterial

B) The presence of roadway lighting shall not reduce the requirements for vertical sight distance on sag curves.

C) Cul de Sacs shall have a diameter of at least 90’ for all roadways with a length of greater than 300’.

D) Roadways shall be designed such that low points (sumps) are not located on a bridge or within the limits of the bridge wingwalls.

E) Provisions to eliminate headlight glare from opposing roadways and/or ramps shall be considered in the design where necessary.

F) For interchange ramps serving opposite directions on the same roadway, single divergence points shall be used when interchange geometry allows. Six foot wide striped separations will be allowed in lieu of barrier separation.

4.2 DESIGN EXCEPTIONS

The RFP Plans may contain certain elements that do not meet the established Project design criteria; a partial listing is shown below. The presence of such elements in the RFP Plans or listed below does not constitute their acceptability to the Administration. The Design-Builder shall design and construct the Project in accordance with this Performance Specification. If such case that the Design-Builder believes that a design exception may be justified, the Design-Builder shall follow the design exception procedures outlined in the General Provisions.

Stopping Sight Distance (ICC or Side Roads)

Location	SSD Design Speed achieved in RFP	SSD Design Speed Required
Metro Access Road Ramp A	40 mph	50 mph
Metro Access Road Ramp H	37 mph	45 mph
MD 355 Ramp L	35 mph	40 mph

4.3 TYPICAL SECTIONS

4.3.1 ICC and Side Road Typical Sections

The RFP Plans include Directive Drawings that reflect typical sections for the ICC, ramps, and cross streets in the Project. These specify the general number of lanes, lane and shoulder widths, medians, curb and gutter, sidewalks, offsets from roadway to sidewalk, fence location, and other cross section elements. Any proposed modifications to these cross sections shall be consistent with requirements outlined in these Performance Specifications and Project commitments. Modifications to typical sections shall be subject to approval by the Administration and may require approval by additionally affected agencies, including Montgomery County.

4.3.2 Special Configuration for ICC within the Metro Access

The ICC through the Metro Access Roadway Interchange shall be designed and constructed as described above in accordance with the Directive typical sections to include three basic lanes on the ICC for both Westbound and Eastbound. However and for Westbound ICC, the Design-Builder shall use pavement markings to provide a lane configuration where one lane from the ICC drops as Ramp C, two ICC lanes are carried through the interchange, and one lane from Ramp A adds to the ICC on the west side of the interchange. The ICC Mainline in the eastbound direction through the Metro Access Interchange shall be designed, constructed and striped for three through lanes.

4.4 CROSS STREET IMPROVEMENTS

The Plans include improvements to local and State owned roadways crossing or interchanges with the ICC. The general extent and limits of these improvements are shown in the RFP Plans and typical sections. Cross streets shall be constructed to the full cross street typical section within the required

limits of work based on the required horizontal and vertical changes. Cross streets shall then be tapered to meet the existing typical section.

4.5 DESIGN VEHICLE

The design vehicle for turning movements and acceleration/deceleration lengths for the ICC mainline, ramps, and associated intersections shall accommodate the WB-65, WB 67 and bus.

4.6 CLEARANCES

Minimum vertical clearances over specific environmental features are required. The following table specifies the minimum PGL elevation and baseline for each feature. In the event of a conflict between this table and the permit requirements, the permit requirements shall govern.

Location	Control Station (FEIS)	Control Elevation (PGL)
Sta. 240+/- Rock Creek	Sta. 239+50	Elev. 395.98
Sta. 319+/- North Branch Rock Creek	Sta. 318+80	Elev. 380.58
Sta. 328+/- Trib. To North Branch Rock Creek	Sta. 328+05	Elev. 387.52

Horizontal clearances to obstructions shall be designed in accordance with the applicable Standards. Location of bridge abutments or associated non traversable slopes or piers excluding median piers within the clear zone or sight distance clear area of the roadway shall be considered a design exception.

4.7 ROADSIDE BARRIERS

Use of any type of roadside barrier shall be minimized to the extent practicable in favor of a clear zone graded typical section.

4.7.1 Traffic Barrier W-Beam

Where a roadside barrier is warranted by AASHTO or other Standards, traffic barrier W-beam shall be used. Existing roadside traffic barrier W-beam, if warranted based on the proposed design, shall be replaced.

Weathering steel traffic barrier W-beam shall be used on the ICC Mainline east of the Metro Access Road Interchange. Weathering steel shall be used on ramps within the MD 97 interchange from the ICC Mainline up to the intersection / gore area with MD 97. The actual start and stop locations of weathering steel W-beam shall be coordinated with the overall aesthetic theme for the ICC and subject to the Administration's review and comment. The portion of post that is buried plus three inches exposed above grade shall be metallized in accordance with the special provisions. Where weathering steel W-beam contacts others surfaces such as bridge parapets that could be exhibit rust staining the W-beam shall be painted/coated to match the weathering steel W-beam in accordance with the Special Provisions.

Galvanized steel traffic barrier W-beam shall be used for all other areas.

The number and type of end treatments shall be minimized to the extent practical. Permanent Sand Filled Barrels will not be allowed. Traffic barrier end treatments shall match the finish of the adjacent W-beam traffic barrier. End treatments not available in weathering steel shall be painted/coated to match the weathering W-beam in accordance with the weathering steel W-beam special provision.

4.7.2 Single Face Concrete Traffic Barrier

Proposed use of single face concrete barrier will be subject to Administration approval and is generally to be avoided. Flaring of the barrier such that it reduces the width of the roadway including shoulder will not be permitted. Concrete barrier shall be 42" F-shape and shall include two 3" diameter PVC conduits.

4.7.3 Curb

Use of concrete curb on the ICC mainline and ramps will not be allowed, with the exception that curb may be used within close proximity of ramp intersections with side roads. Barrier curb will not be allowed on any roadway with a posted speed greater than 40 mph.

Asphalt curb will not be allowed.

4.8 MEDIAN BARRIERS

The Design-Builder shall design and construction median barrier for the total length of the ICC and I-370 regardless of median width.

4.8.1 Traffic Barrier W-Beam Median Barrier

Median barrier shall be traffic barrier W-beam median barrier located as required by AASHTO. Where permissible and reasonable, a single run of double faced W-beam median barrier shall be used as opposed to two runs of single face W-beam traffic barrier. Existing traffic W-beam median barrier shall be replaced if it does not meet performance requirements.

Weathering steel traffic barrier W-beam median barrier shall be used on the ICC generally east of the Metro Access Road interchange. Weathering steel shall be used on ramps within the MD 97 interchange up to the intersection / gore area with MD 97. The actual start and stop locations of weathering steel W-beam shall be coordinated with the overall aesthetic theme for the ICC and subject to the Administrations review and comment. The portion of post that is buried plus three inches exposed shall be metallized in accordance with weathering steel W-beam special provision. Where weathering steel W-beam contacts others surfaces such as bridge parapets that could be exhibit rust staining the W-beam shall be painted/coated to match the weathering steel W-beam in accordance with the special provisions.

Galvanized steel traffic barrier W-beam median barrier shall be used for all other areas.

The number and type of end treatments used shall be minimized to the extent practical. Permanent Sand Filled Barrels will not be allowed. Traffic barrier end treatments shall match the finish of the adjacent traffic barrier W-beam median barrier. End treatments not available in weathering steel shall be painted/coated to match the weathering W-beam in accordance with the weathering steel W-beam Special Provision.

4.8.2 Concrete Median Barrier

Use of concrete median barrier other than as shown on RFP Plan typical section shall require the prior approval of the Administration and is generally to be avoided. Concrete median barrier shall be 42" F-shape and shall include two 3" diameter PVC conduits. Flaring of the barrier such that it encroaches on the width of the roadway including shoulder shall not be allowed.

4.8.3 Curb

Use of concrete curb or asphalt curb in the median of the ICC mainline median will not be allowed.

4.9 SIDEWALKS AND SHARED USE PATH

Shared Use Path, also referred to as Bike Path, shall be a minimum of 10' wide, unless otherwise designated on the RFP Plans. The Shared Use Path shall meet SHA Accessibility Policy & Guidelines for Pedestrian Facilities along State Highways and ADA requirements. Switchback style ramps on the path shall not be used. Shared Use Path profile grades shall be designed such that landings or level rest areas are not required. Access points shall be as shown on the RFP plans.

Except where shown on the RFP Plans for bridge crossings, the Shared Use Path shall be located outside the clear zone of the ICC roadway. The Shared Use Path shall be protected from the ICC roadway using W-beam traffic barrier and chain link fencing shall separate the ICC from the Shared Use Path.

For sidewalks and Shared Use Paths, grade separated crossings shall be used where feasible and as shown on the RFP Plans. Where at grade crossing are used, Shared Use Paths and sidewalks shall cross side roads at signalized intersections. The number of at grade crossings shall be minimized.

Sidewalks shall be constructed using concrete, unless existing adjacent sidewalk has been constructed using asphalt in which case asphalt shall be acceptable. Sidewalks that do not connect to existing sidewalks shall be truncated at the limits of the required improvements on the cross streets. Sidewalks that connect to existing sidewalks shall be connected at the proposed typical section location to the limits of the required roadway work, after which the sidewalk shall be tapered to meet the existing sidewalk.

4.10 RAMP ENTRANCES AND EXITS

Parallel style entrances and exits shall be provided. When determining length of auxiliary lanes for entrances and exits, the Design-Builder shall consider the desirable length for traffic operations in addition to the acceleration and deceleration length. Directive standard details are shown in the RFP Plans.

Where feasible given the interchange type, design and forecast traffic volumes, interchange ramps shall be combined to provide a single diverge point provided that the ramp destinations are opposing directions on the same roadway. Use of a 6 foot striped separation will be acceptable.

5.0 DESIGN CHANGES

5.1 BASIC DESIGN CHANGES

The basic configuration of the Project with respect to bridges over or under crossing roadways shall be maintained as shown in the RFP Plans.

5.2 INTERCHANGE CONFIGURATION CHANGES

Interchange configurations shall provide the specified level of service. Left hand entrance or exit ramps shall not be acceptable except as provided in the Plans. The basic number of lanes and lane continuity shall be maintained except as provided in the RFP Plans.

6.0 NOISE WALLS

Noise walls shall not be located within the clear zone of the ICC except as shown in the RFP Plans. Noise walls shall be on the roadway side of the bike path, including on structures.

7.0 EMERGENCY CROSSOVERS

One emergency median crossover meeting AASHTO requirements shall be provided on the Project between the Metro Access Road Interchange and MD 97.

Two Emergency Vehicle Only ramps shall be provided at MD 115, as generally shown in the RFP Plans. Ramps shall have gates to prevent unauthorized vehicle access and to prevent access from the adjacent Shared Use Path.

8.0 PARKING LOTS/PARK AND RIDES

The Design-Builder's design shall accommodate the future construction of a 200 space park and ride facility in the southwest quadrant of the MD 97 interchange. The Design-Builder shall demonstrate how the site will accommodate the necessary grading, utilities, access, SWM, etc. The park and ride concept shall be configured to facilitate efficient entrance and exit of buses from the ICC via MD 97. The Design-Builder shall accommodate minimization of visual, noise, and lighting impacts to the adjacent community. An earth berm in accordance with section 12.1 shall be constructed between the adjacent community and the future park and ride.

9.0 ACCESS TO SWM FACILITIES & ITS EQUIPMENT

Maintenance vehicle access shall be provided to SWM, ITS and other facilities in accordance with Planting and Landscape Architecture, Drainage, ITS and ETC Performance Specifications.

10.0 RESPONSIBLE ENGINEER

Design of roadways shall be supervised by a licensed professional engineer in the State of Maryland with a minimum of 10 years experience documented in the design of projects with similar complexity and magnitude. This Responsible Engineer shall supervise design, sign and stamp all design plans, reports, specifications, and as-built drawings for each roadway component.

11.0 PLANNED PROJECTS

11.1 MID COUNTY HIGHWAY

The Design-Builder shall accommodate the future extension of Mid County Highway (M-83) to an interchange with the ICC as shown on the RFP Plans. The Design-Builder shall design to sufficient level to demonstrate that all facilities on M-83 east of Redland Road can be constructed in the future to provide 1 lane of access from M-83 Eastbound to ICC Eastbound and 1 lane of access from ICC Westbound to M-83 Westbound. The Design-Builder shall design the Project to accommodate M-83 in an economically and environmentally sensitive manner. The Project shall be designed and constructed so that no future reconstruction of Project features are required to accommodate future M-83. No modifications to the deck over structure shall be required for the construction of M-83.

11.2 CRABBS BRANCH WAY

The Design-Builder shall accommodate the future extension of Crabbs Branch Way under the ICC and interchange ramps. The Design-Builder shall design to a sufficient level that demonstrates all facilities on

Crabbs Branch Way from its existing terminus south of the ICC extending on a tangent as shown in the RFP Plans using Montgomery County typical section MC-213.01. The Design-Builder shall demonstrate that the ICC has been designed to accommodate the extension of Crabbs Branch Way in an economically and environmentally sensitive manner and in keeping with adjacent development plans. The Design-Builder shall be responsible for obtaining the latest plans and coordinating with the adjacent developer.

11.3 MD 97 BUSWAY

The Design-Builder shall accommodate the future construction of a two way busway in the median of MD 97 as shown on the RFP typical sections by reserving a 54 foot median area. The reserved area may be reduced by left turn lane(s) providing that a minimum of 32 foot median is reserved. The length of the median with less than 54 feet shall be minimized. The Design-Builder shall provide design to sufficient level and applicable standards and demonstrate the future alignment of the busway on all plans. The Design-Builder shall demonstrate that the ICC has been designed to accommodate the MD 97 busway in an economically and environmentally sensitive manner.

11.4 MD 97 AT MD 28 INTERCHANGE

The Design-Builder shall accommodate the future construction of the MD 97 at MD 28 interchange. The Design-Builder shall consider and coordinate the design and operational requirements of the ICC at MD 97 interchange with the existing signalized intersection at MD 97 and MD 28 as well as with the planned grade separated interchange at MD 97 and MD 28. The design shall also accommodate access to and from MD 97 via Thistlebridge Drive.

12.0 BERMS AND EXCESS EARTH DISPOSAL

12.1 MD 97 INTERCHANGE

The Design-Builder shall construct earthen berms within the MD 97 Interchange area at the following minimum approximate locations and as noted on the plans:

ICC STA. 370+00 to 381+00, Left
Ramp F, Right
Between Future Park and Ride and the adjacent community

The earthen berm shall attain a minimum of 10 feet and maximum height of 20 feet as measured at the limit of berm grading on the community side of the berm. The width of the crest of the berm shall maximized, with a minimum width of 10. The berm shall be designed and constructed using varying side slopes and curvilinear contours to achieve an aesthetically pleasing appearance in accordance with the Planting and Landscape Architecture Performance Specification. The existing jogging path shall not be impacted and shall remain open throughout construction.

12.2 AVERY PARK DRIVE

The Design-Builder shall construct an earthen berm from approximately STA 278+00 to 291+00, RT. To the extent possible the berm shall be continued along the west side of Muncaster Mill Road south of the ICC within the limits of work. Where applicable, the berm shall be a continuation of the existing berm at the rear of the Avery Park Drive residences, and shall be designed and constructed such that the existing

line of trees on the existing berm are not impacted. The earthen berm shall attain a minimum of 10' and maximum of 20' in height above the crest of the existing berm or where there is no existing berm as measured at the limit of berm grading on the community side of the berm. The crest of the berm shall be a minimum of 10' in width. The berm shall be landscaped in accordance with the Planting and Landscape Architecture Performance Specification.

12.3 SOUTHWEST QUADRANT OF MD 97 INTERCHANGE

At the Design-Builder's option and upon exhausting reasonable opportunities within the Project right-of-way, the Design-Builder may dispose of excess soil generated by the Project within the southwest quadrant of the MD 97 Interchange. The placement of excess soil shall be limited to a maximum depth of 30 feet and shall be placed using varying side slopes, curvilinear contours, and sufficiently large top of embankment areas to achieve an aesthetically pleasing appearance without creating the perception of a stockpile. The disposal of excess soil shall be limited by all other current and future uses of the site required by the Project, including but not limited to the provisions for a future park and ride, and the field offices for the Administration.

13.0 INTERFACE WITH ICC CONTRACT B

The Design-Builder shall match exactly the horizontal and vertical profile shown in the RFP Plans within 500 feet of the eastern limit of work for the Project. Exceptions to this requirement may be considered at the sole discretion of the Administration. The Design-Builder shall make available all plans and calculations within 7 days of request by the Administration that are deemed necessary for the Contract B Design-Builder to proceed. This shall include, but is not limited to, horizontal, vertical, superelevation, typical sections, drainage, grading, erosion and sedimentation control, and storm water management.

14.0 NOTICE-MD 97 INTERCHANGE

The Project is shown crossing under MD 97 in the RFP Plans. However, the final determination of the Project over or under MD 97 has not been made. For the purposes of this Contract, the Design-Builder shall proceed with the current alignment passing beneath MD 97.

15.0 INTERIM CONDITIONS AT MD 97

The ICC Contract A project may be opened to traffic by the administration before the completion of the remaining ICC Contracts. The Design-Builder shall make necessary modifications to the design, both permanent and/or temporary, to ensure that the roadway and particularly the MD 97 interchange function in accordance with the required interim level of service as described in the Traffic Performance Specification. This requirement may require the design and construction of modifications to the MD97 at MD 28 signalized intersection.

16.0 BASELINE STATIONING

The Design-Builder is notified that the RFP plan baselines, FEIS baselines, and baseline of right way for the Project approximate one another but are not equal. In order to reduce confusion, the Design-Builder shall use stationing in the 10+000 series for the definitive plans ICC baseline. The definitive plans baseline stationing shall be easily referenced to the FEIS stationing.

17.0 CONSTRUCTION STAKEOUT

The Design-Builder shall, as part of the construction stakeout operation, before any clearing operation commences, demarcate the right of way, wetlands, the limit of disturbance (LOD) and other pertinent features identified in PS 303 and PS 310 throughout the entire project as shown in the RFP Documents.

17.1 MATERIALS

The material for flagging the LOD shall be a 3 in. international orange vinyl material with "CLEARING LIMIT" printed on it with 2 in. letters. The material for demarcating wetlands shall be orange safety fence as described in the Environmental Performance Specification.

17.2 LINE AND GRADE.

The Administration will provide the Design-Builder with the control point data for horizontal and vertical control as shown in the RFP Documents. The Design-Builder shall establish two bench marks, one on each end of bridge structures and also provide 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.

17.3 HORIZONTAL REFERENCING

The Design-Builder shall 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 (Administration) yellow cap affixed to the top. Caps will be supplied by the Administration (Plats and Surveys Division). In areas unsuitable for rebar, markers of a stable, permanent nature shall be used, (crosses in concrete, PK nails, Railroad spikes, etc.)Wooden hubs shall 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.

17.3.1 VERTICAL REFERENCING:

The Design-Builder shall place and establish permanent bench marks on structures along the project baseline. These marks will be pre-stamped brass discs supplied by the Administration (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.

Bench marks 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 bench marks shall be established by differential leveling and return loop check.

In the horizontal and vertical referencing process, all work shall be shown and documented in Administration Field Survey book/s supplied by the Administration (Plats and Surveys Division). Upon Project Final Completion, all books shall be returned to the Administration (Plats and Surveys Division) for archiving.

For questions regarding the Administration's specifications for baseline referencing or examples of Administration construction stakeout bookwork, the Design-Builder may contact the Administration's Plats and Surveys Division in Baltimore, Maryland at 410-545-8940.

17.4 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.

17.5 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.

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 that are not a member of MISS UTILITY and obtain a stakeout of their respective facilities.

(c) Request the Administration (Office of Traffic & Safety's Signal Operations Section) to provide information on Administration maintained traffic signal facilities for stakeout by the Design-Builder.

(d) Request the Administration (District Engineer) to provide information on the Administrations lighting facilities for stakeout by the Design-Builder.

17.6 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.

17.7 FLAGGING

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 demarcation has been destroyed and 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 Administration may proceed to have the area reflagged. The cost of the reflagging by the Administration 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.

PS 310 - ENVIRONMENTAL PERFORMANCE SPECIFICATION

1.0 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 Intercounty Connector Final Environmental Impact Statement (FEIS), Record of Decision (ROD), Section 106 Memorandum of Agreement (MOA), Clean Water Act Sections 404 and 401 authorizations/permits, floodplain permits, approvals, and all other necessary permits and approvals required by the Project.

1.1 GENERAL ENVIRONMENTAL PHILOSOPHY

The Intercounty Connector Project passes through an area of rich and diverse environmental, community, and cultural resources. Protection of these resources is of paramount importance. The philosophy followed by the Federal Highway Administration, Maryland Transportation Authority, and the Maryland State Highway Administration (Administration) during the development of the RFP Plans and the FEIS was to incorporate environmental stewardship measures and avoid and minimize impacts to the natural, community and cultural resources 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 Ppecification. These innovative approaches include incentives for reductions to forest impacts, increases to on-site reforestation areas, and reductions to wetland and stream impacts with premium incentives paid for reductions to wetland and stream impacts within the Special Protection Areas. In addition, the Administration is also offering award fee incentives based on performance in various areas including the Off-Road Diesel Emission Reduction Program and the Erosion and Sediment Control Program.

2.0 STANDARDS AND REFERENCES

The Design-Builder shall design and implement Environmental requirements in accordance with the relevant requirements of the standards listed by priority in Table 1 unless otherwise stipulated in this specification. Standards specifically cited in the body of this specification establish requirements that shall have precedence over all others. Should the requirements in any Standard below conflict with those in another, the Standard listed with the higher priority 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.

2.1 STANDARDS

Appropriate professional standards and regulations shall be utilized for design and construction implementation of all commitments, considerations, permit conditions and approval requirements. Standards shall include, but are not limited to the following:

TABLE 1
STANDARDS FOR ENVIRONMENTAL

Priority	*Author or Agency*	*Title*
1		Section 106 of the National Historical Preservation Act (16 USC § 470f)
2		Section 4(f) of the Department of Transportation Act (23 USC § 138)
3		Code of Federal Regulations (CFR)
4		Code of Maryland Regulations (COMAR)
5	ACOE	Clean Water Act Section 404 Permit Application and Authorization
6	MDE	Clean Water Act Section 401, Water Quality Certification for ICC
7	MDE	Nontidal Wetland and Waterway Construction Permit Application and Authorization for ICC
8		Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (1983 and successors)
9		Standards and Guidelines for Archeological Investigations in Maryland (Shaffer and Cole 1994)
10		Standards and Guidelines for Architectural and Historical Investigations in Maryland (Maryland Historical Trust, 2000)
11		Recommended Approach for Consultation on Recovery of Significant Information from Archeological Sites, ACFIP 1999 (64 FR 27085-27087)
12		Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Past 68)
13	MDSHA	Standard Specifications for Construction and Materials for items identified as Standard in Attachment A of Part 3-Resign Requirements
14	MDSHA	Book of Standard for Highways, Incidental Structures and Traffic Control Applications for items identified as Standard in Attachment B of Part 3-Resign Requirements

2.2 REFERENCES

The discussion of environmental, community, parkland, and cultural resource impacts, mitigation measures, conditions and commitments included in the references listed below shall serve as a guideline/reference for the Design-Builder in developing strategies for avoiding impacts, minimizing impacts and working closely with the public. These technical reports can be obtained from the Administration's ICC project website-http://iccstudy.org/DEIS/index.php.

Table 2

References for Environmental

Author or Agency	Title
FHWA/MDSHA/MdTA	Intercounty Connector Natural Environmental Technical Report for the ICC (November 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Air Quality Technical Report (November 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Environmental Stewardship Technical Memorandum (July 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Impact Assessment Technical Report (September 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Noise Quality Technical Report (November 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Secondary & Cumulative Effects Analysis Technical Memorandum (November 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Socioeconomic and Land Use Technical Report (November 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Initial Site Assessment (ISA)Technical Report (August 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Initial Site Assessment (ISA) Technical Report, Addendum I-Preliminary Site Investigation Screening (August 2004)
FHWA/MDSHA/MdTA	Intercounty Connector Supplemental ISA Technical Report (October 26, 2005)
FHWA/MDSHA/MdTA	Intercounty Connector Final Environmental Impact Statement (January 2006)
FHWA	Intercounty Connector Record of Decision for the ICC (2006)
FHWA/MHT	Intercounty Connector Section 106 MOA
MDSHA	ISDT Stream Design Process Guidelines

2.3 OWNER'S ENVIRONMENTAL ROLES AND RESPONSIBILITIES

The Administration has conducted extensive coordination with various environmental and regulatory agencies and the public through the planning and permitting processes. During that time, commitments and considerations have been made that are recorded in the FEIS, ROD, Section 106 MOA and various permits and approvals. The Administration has compiled these commitments and considerations in a Commitment Tracking Database (CTD), which is included as Appendix C to this Part 3-Design Requirements. The database will be updated upon receipt of permits for the Project. The Administration will manage and update the database periodically.

The Administration will provide an Environmental Management Team (EMT) that will work with the Design-Builder's Environmental Manager and Staff to confirm the Design-Builder's plans and construction methods are in compliance with the CTD. The EMT will:

A) Review plans as they are developed;

B) Perform Erosion and Sediment Control Quality Assurance Ratings, as defined in the Drainage Performance Specification;

C) Review the Design-Builder's environmental compliance implementation; and

D) Notify the Design-Builder's Environmental Manager of deficiencies in the compliance with the commitments, considerations, permits and approvals.

The Administration will provide an Independent Environmental Monitor (IEM), on behalf of the USACE and MDE, as required by permit conditions. The IEM will monitor the design and construction of the Project full-time to assure that all regulatory permit conditions and commitments are met.

2.4 DESIGN-BUILDERS RESPONSIBILITIES

The Design-Builder shall be responsible for compliance with the CTD throughout design and construction of the Project. The Design-Builder shall demonstrate compliance by producing a CTD Compliance Report at each design milestone, which tracks and confirms compliance with each commitment applicable to the design of the Project. During construction, the Design-Builder shall produce a compliance Report each quarter which tracks and confirms compliance with each commitment pertaining to the construction of the Project, and also track impacts to wetlands and waters of the US. The report shall be submitted to the Administration within one week after the end of each quarter.

The Design-Builder shall provide an Environmental Manager (EM) as one of the key staff managers. The EM shall have a minimum of 10 years experience with demonstrated expertise in environmental permitting, environmental design, and construction management and compliance on large, complex transportation projects in environmentally sensitive areas.

The EM and his/her team shall be responsible for all environmental design and construction issues required for the Project. The EM shall report directly to the Design-Builder's Project

Manager and will be the primary liaison to the Administration for environmental issues. The EM shall be committed full-time, on-site with environmental management as this individual's sole responsibility. The EM shall have the authority to stop and/or direct construction activities should the need arise.

2.5 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 CTD, while considering reasonable cost and practicality.

A) The totals that are currently authorized to be impacted for the Project are listed below. Any increase to the impacts at the specific stream and wetland locations will require a permit modification (refer to Section 3.1 Permit Modifications and Approvals of this Performance Specification for the requirements). Decreases in wetland and/or stream impacts may not require a permit modification. A portion of the Project is located in the Upper Rock Creek Special Protection Area (refer to the Drainage Performance Specification for special requirements). The totals that are currently authorized are:

1) 10,479 linear feet of permanent and 274 linear feet of temporary impacts to perennial/intermittent nontidal streams;

2) 5.82 acres of permanent impact to nontidal wetlands;

3) 2,138 linear feet of permanent and 25 linear feet of temporary impacts to nontidal ephemeral streams;

4) 0.28 acre of permanent impact to nontidal open water;

5) 16.50 acres of permanent impact to 100 year floodplain;

6) 206 acres of forest impacts;

7) 20.2 acres of direct habitat impact and 52.1 acres of converted habitat to Forest Interior Dwelling Species (FIDS); and

8) 1.6 acres of impact to the Redland Spring Ecologically Sensitive Area.

B) The Administration will provide the following permits and approvals based on the RFP Plans:

1) U.S. Army Corps of Engineers - Section 404 Clean Water Act Permit;

2) Maryland Department of the Environment- Section 401 Clean Water Act - Water Quality Certification;

3) Maryland Department of the Environment- Nontidal Wetland and Waterways Permit;

4) Maryland Department of the Environment - Coastal Zone Management Program Federal Consistency Determination;

5) Maryland Department of Natural Resources- Scenic and Wild Rivers Approval;

6) Maryland Department of Natural Resources- Forest Impacts and potential on-site reforestation areas approval; and

7) State Board of Public Works- Priority Funding Areas law compliance

C) The Design-Builder shall obtain the following permits and/or approvals:

1) Maryland Department of the Environment General Mineral Mining Permits (for batch plants);

2) Maryland Department of the Environment Water Appropriations Permits (for withdrawals from surface and groundwater);

3) Maryland Department of the Environment Erosion and Sediment Control Approval;

4) Maryland Department of the Environment Stormwater Management Approval;

5) Maryland Department of the Environment Air Quality/Emissions permits during construction;

6) National Pollutant Discharge Elimination System (NPDES) Notices of Intent (NOI);

7) Administration approval for noise compliance during night and holiday construction;

8) Maryland Department of Natural Resources Roadside Tree Permit and

9) The Design-Builder shall procure 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.

D) The Design-Builder shall conduct a pre-construction meeting with the Administration, USACE, and MDE to discuss permit conditions, compliance measures, design review and coordination, and scheduling.

3.0 PERFORMANCE REQUIREMENTS

3.1 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 will not result in additional costs to the Administration.

The Design-Builder shall not alter the concept activities 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, illustrated in the RFP Plans and defined in the Joint Permit Application 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 obtain the permits, approvals or modifications from the regulatory agencies. The Administration will be responsible for requesting regulatory agency approval for modifications to permits listed in Section 2.5B of this Performance Specification. The Design-Builder shall be responsible for obtaining modifications to permits listed in Section 2.5C of this Performance Specification. Request for modification to the permits listed in section 2.5B shall be accompanied by documentation to demonstrate that there is no practical alternative. Additional mitigation required with approval of modifications shall be the responsibility of the Design-Builder.

3.2 RE-EVALUATIONS

Modifications proposed by the Design-Builder, which occur inside or outside of the planning study area that were not evaluated in the FEIS, such as staging areas, borrow pits or alignment shifts, etc. shall be evaluated by the Design-Builder for NEPA clearance, including evaluations of the natural, social and cultural environments.

The Design-Builder shall provide the above evaluations in a narrative to the Administration in accordance with the FHWA re-evaluation regulations (23 CFR 771.129(b)) and guidelines (Technical Advisory T6640.8A, Section XI). The Administration will coordinate approvals of the document changes with FHWA.

3.3 NATURAL RESOURCES

3.3.1 Groundwater

For details of groundwater protection during construction and stormwater management, see the Drainage Performance Specification.

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 design measures must be approved by the Administration prior to implementation.

The Design-Builder shall provide protective measures at cut slopes or ditching adjacent to non impacted or temporarily impacted wetlands to ensure that a hydrologic connection 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, as per COMAR, 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 mitigation.

3.3.2 Surface Water

For details on Erosion and Sediment Control and Stormwater Management, see the Drainage 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.

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 waters of the US. 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.

The Design-Builder shall be responsible for furnishing automated water quality data loggers as well as the installation, maintenance, calibration, data downloading and handling, reporting, and all incidentals. The water quality data loggers shall record baseline data, during-construction data and post-construction data for pH, Turbidity, Temperature, and Dissolved Oxygen levels every 15 minutes from one month after Notice to Proceed of the Project until one year after all contributory watersheds are deemed fully stabilized by the Administration. Upon Administration approval, the Design-Builder shall remove data loggers. The Design-Builder shall monitor water quality at the upstream and downstream Right-of-Way limit of all perennial streams (Stations 5051+00, 209+00 Ramp B I-370, 114+00, 123+50, 129+00, 151+00, 173+00, 174+50, 110+50 Needham Road, 207+00, 276+50, 239+00, 300+00, 312+00, 313+50 NBSVP, 328+00 NBSVP, and 415+00) within the Project. Data shall be downloaded and submitted unaltered to the Administration with a narrative report each quarter. The Design-Builder shall review the data and make adjustments daily.

Should the data reveal that construction discharges violate Maryland water quality thresholds identified in COMAR, the Design-Builder shall immediately notify the Administration and resolve any project related deficiencies within 24 hours.

The Administration may request spot-check downloads at any time to verify compliance.

3.3.3 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) Perform fish relocation, which shall include at least two passes with a net and/or an electrofishing unit of the dewatered work area. All fish shall be released downstream of the work area. The Design-Builder's Environmental Manager shall provide to the Administration documentation in the form of a memorandum within one week of the work detailing the fish relocation activities.

C) Comply with all water quality standards stated in the COMAR for the protection of aquatic biota.

D) Conduct all in stream work for culverts and bridges in compliance with the Maryland mandated stream closure periods for the designated use class of the stream stated in COMAR and the permits. Temporary crossings, permanent culverts and 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.

3.3.4 Wetlands and Waters of the US

Direct impacts to wetlands and waterways are anticipated to occur under the Project. The Tables in the Joint Permit Application present the total impacts permitted for the ICC project. All wetlands and waterways were identified, delineated and surveyed within the Project. A summary of the delineation information can be obtained from the FEIS and the NETR. Surveyed boundaries of waterways and wetlands are depicted on the RFP Plans. 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, identified in the Section 404 Permit, 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. All personnel of the Design-Builder or subcontractors shall be alerted to these designated protection areas.

3.3.4.1 Occupying Wetlands/Waterways

The Design-Builder is hereby alerted to the importance of protecting waterways and wetland areas. The Administration, in conjunction with the various environmental regulatory agencies, have developed RFP Plans, which minimized or eliminated disturbance and damage to existing waterways and wetland areas. To the extent practical, the Design-Builder shall further avoid and minimize impacts to wetlands and streams in the development of final design plans and during construction. In order to accomplish this, the following must be adhered to:

A) The Design-Builder shall not impact any wetland or waterway, whether it is permanent or temporary unless permitted and approved as an authorized action by the appropriate regulatory agency.

B) The Administration shall be immediately notified of inadvertent impacts to wetlands or waterways for which activities are not permitted. Areas shall be immediately restored to the full satisfaction of the Administration and the environmental regulatory agencies. The cost of restoration and mitigation of the impacted areas shall be the responsibility of the Design-Builder.

C) The Design-Builder shall prepare and submit a revised permit package at the conclusion of construction for the Administration's use in coordinating with the environmental regulatory agencies. The Design-Builder shall survey as-built conditions of the entire Project and submit the information on standard 11x17 half-scale plans in the same format as the RFP Plans. In addition the Design-Builder shall revise the tables in the Joint Permit Application to reflect the final wetland and waterway impacts.

3.3.4.2 Best Management Practices for Work in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains

A) No excess fill, construction material, equipment or debris shall be stockpiled or stored in nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.

B) Materials shall be placed 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.

C) Excavated material shall not be used 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 shall that are free of waste metal products, debris, toxic material, or any other deleterious substance.

D) The Design-Builder shall not operate heavy equipment in a manner that will damage 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 and regulatory agencies.

G) 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). 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 the Drainage and Planting and Landscape Architectural Performance Specifications for details.

H) After construction has been completed, the Design-Builder shall make post construction grades and elevations the same as the original grades and elevations in temporarily impacted areas.

I) To protect aquatic species, in-stream work is prohibited as determined by the classification of the stream

J) Stormwater runoff from impervious surfaces shall be controlled to prevent the washing of debris into the waterway.

K) Disposal areas for excess excavation shall not impact wetlands or waterways. The Design-Builder shall track the disposal of all excess excavation to ensure that there is no unauthorized discharge of fill in regulated wetlands or waterways.

3.3.4.3 Conversion from Forested and Scrub-Shrub Wetlands to Emergent Wetlands

Several palustrine forested and/or scrub-shrub wetland areas were identified under proposed bridges. Wetlands under bridges with greater than 30 foot clearance are classified as potential temporary impacts. Wetlands under bridges with less than 30 foot clearance are considered potential wetland conversion from palustrine forested or scrub-shrub wetlands to emergent wetlands. In these converted wetlands areas, vegetation may be cleared but shall not be grubbed except for areas excavated for bridge piers. The topography and hydrology connections shall remain the same as pre-construction conditions.

The specific location of conversion to emergent wetlands for this Project is between RFP Plans station 325 and 330, west of MD 97, wetland 1Z. The conversion impact is 436 square feet (0.01 acre). The area shall be revegetated with a native wetland emergent seed mix that has been submitted to, and approved by, the Administration prior to its use. Additional emergent wetland remediation efforts shall be implemented by the Design-Builder, if after one year of monitoring by the Administration the area is not a functioning wetland. The Design-Builder shall be responsible to mitigate at a 1:1 ratio for the lost resource if remediation does not prove successful one year after the remediation efforts were implemented.

3.3.4.4 Temporary Impacts to Streams

Temporary stream impacts are anticipated by the construction of the Project. Temporary impacts are defined as waterways that are temporarily altered during construction, but are restored to pre construction conditions after construction is completed. Impacts shall be avoided and/or minimized to the greatest extent possible. No grubbing of vegetation that grows beneath the proposed bridges over Rock Creek and North Branch Rock Creek shall be allowed, except where needed to construct foundations or to place slope protection. The Design-Builder shall minimize

the impacts to wetland areas beneath structures that are designated for slope protection/riprap to the greatest extent possible.

Restoration of temporarily impacted waterways to pre-construction elevations shall be performed by the Design-Builder. There are NO temporary wetland impacts identified or permitted in the Project. The specific location of the anticipated temporary stream impacts are provided in the tables in the Joint Permit Application. Construction details of any temporary stream crossings, temporary stream diversions, temporary stream relocations, and utility installations across waterways shall be submitted to the Administration for approval, prior to proceeding with their construction. Earthen materials shall not be permitted in the construction of temporary stream diversions; stream crossings; or cofferdams, due to the potential for washout during storm events.

Only one temporary stream crossing shall be constructed at each bridge or culvert location. At Rock Creek (station 240), North Branch Rock Creek (station 319) and the tributary to North Branch Rock Creek (station 328) temporary stream crossings shall be accomplished using bridges that completely span the stream, and no other type of temporary crossing shall be considered.

3.3.4.5 Temporary Impact Stream Restoration Efforts

The restoration plan for the temporary impacts shall include the following elements:

A) Removal of all construction and temporary fill material;

B) De-consolidation and/or scarify compacted soils;

C) Replacement of topsoil lost to erosion and sediment control measures;

D) Re-establishment of grades to preconstruction conditions;

E) Remove temporary stream crossings;

F) Restore stream banks with woody vegetation as specified in Planting and Landscape Architectural Performance Specification and Drainage Performance Specification and

G) Replant any pre-existing vegetation within 30 feet of a stream bank that was disturbed temporarily with the exception of underground utility corridors. Refer to Planting and Landscape Architectural Performance Specification for details.

Monitoring by the Administration to ensure successful restoration of temporary impacts will continue for one year following the restoration effort. Additional remediation efforts shall be implemented by the Design-Builder if it is determined necessary, after one year of monitoring. The Design-Builder shall be responsible to mitigate for the lost resource if remediation does not prove successful one year after the remediation efforts were implemented.

3.3.4.6 Stream Relocations

The Design-Builder shall relocate the tributary to North Branch Rock Creek at centerline Station 328+05 beneath the structure. Retaining walls or wing walls shall be used to ensure that the

structure and fill are no closer than 20 feet to any streambank and that the impact to wetland 1Z is minimized in accordance with the RFP Plans. If riprap is required to be placed on the floodplain floor, it shall be buried so as not to impede wildlife passage.

Other locations for anticipated stream relocations are at: Station 174 (Mill Creek), Station 370 (1DD), MD 97 Interchange (4A) and Station 110 (Overhill Road (IIA). During design, the Design-Builder shall evaluate whether it is possible to avoid stream channels, or to relocate, if possible, to avoid the Project area, especially at MD 97 Ramp B Station 200-216.

All stream relocations shall be designed to the geomorphic characteristics of stable local streams to avoid downstream scour, channel degradation, and reduce the potential for creating fish blockages. The Design-Builder shall relocate streams around SWM facilities where feasible. All stream relocation designs shall be approved by the Administration and MDE prior to implementation.

3.3.4.7 Vernal Pools

The project will directly impact 11 vernal pools, located in the North Branch Rock Creek watershed and one vernal pool in the Upper Rock Creek watershed, approximately 764 square feet. Vernal pools shall be constructed to replace vernal pool habitat being impacted by the Project. The Administration will provide the location(s) of the proposed vernal pools to the Design-Builder within the LOD/Right of Way.

3.3.4.8 Avoidance and Minimization

The Administration proposed avoidance and minimization techniques during the planning and preliminary engineering phase consisted of alignment shifts, replacement of culverts with bridges where practicable, avoiding placement of piers in stream channels, avoiding skewed stream crossings where possible, increased headwall heights for culverts, and reductions in overall roadway section width at stream crossings where safety considerations allow.

The Design-Build Team shall focus its efforts to continue to minimize impacts to wetlands, waterways, floodplains, parks and forest in all areas of the Project, especially sensitive areas. 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. Refer to the Geotechnical Performance Specification. Bridges are proposed in the RFP Plans at the major stream crossings. No in-stream bridge piers shall be constructed in any major stream crossing.

3.3.4.9 Wetland and/or Waterway Impact Reduction Incentive

Upon Acceptance for Maintenance of the constructed Project, including completion of as-built plans and approval of permit modification by the agencies, the Design-Builder will be reimbursed for any wetland impact reduction in minimum increments of 0.25 acre and will be reimbursed for any perennial/intermittent stream impact reduction in minimum increments of 100 linear feet. This incentive applies to relocation of stream channels in place as long as the function and value of the stream remains unchanged. The reimbursement only pertains to reduced impacts within the limit of disturbance below the permitted thresholds. This determination will be made by comparing the verified impacts submitted in the as-built plans against the impacts permitted by the agencies in the initial Permits. This incentive will be paid at $300,000/ acre and $400/LF saved outside of the Special Protection Area boundary and $450,000/acre and $600/LF saved inside the Special Protection Area boundary.

3.3.4.10 Wetland and/or Waterway Impact Increase Disincentive

There is no onsite or offsite wetland or stream mitigation to be constructed in the Project for the direct impacts identified in the Joint Permit Application. However, the Design-Builder shall be responsible for the mitigation for any additional wetland or stream impacts proposed within the Design-Builder's Work beyond those originally permitted for the Project. This responsibility may include a site search, agency reviews and approvals, design, obtaining right of way and construction. Increase in wetland and stream impacts beyond the permitted threshold is strongly discouraged and will not be approved by the Administration, unless the Design-Builder can demonstrate that no practicable alternative exists.

3.3.4.11 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 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 designing, implementing, and monitoring additional mitigation, if required by the change. 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 which result from obtaining a modification approval will be borne by the Design-Builder.

The Design-Builder shall be solely responsible for the permits, and modifications thereto, issued to the Design-Builder

3.3.5 Reforestation

Reforestation work shall include the performance of all required and applicable Maryland Roadside Tree Law, Reforestation Law and Maryland Forest Conservation Act work associated with the Project.

The direct impacts to forest vegetation approved, by the Maryland Department of Natural Resources (DNR), under the Project are approximately 206 acres.

3.3.5.1 Forest Avoidance and Minimization

Before reforestation is approved by the DNR, every reasonable effort must 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 must be utilized.

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, as well as requirements outlined in the Planting and Landscape Architectural Performance Specification.

Specimen trees (trees greater that 30" diameter at breast height measured 4.5' above the grounds) were identified and evaluated during the FEIS. 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.

The Design-Builder shall also be responsible for additional mitigation required as a result of additional forest impacts.

A plan and memorandum shall be prepared that shows the tree and forest locations and describes the alternative measures that the Design-Builder proposes to use to avoid or reduce impacts to these trees and forest, including alignment or typical section modifications or protective measures. The Administration will review provided written comments to plan and memorandum in conjunction with the grading plans.

3.3.5.2 Existing Reforestation Areas

There are two recently constructed reforestation areas within the I-370/Shady Grove Road Interchange (southwest quadrant). The Design-Builder shall implement measures to protect these new planting areas. If the Design-Builder impacts these areas, the Design-Builder shall replant two trees for each tree impacted in the same location where the impact occurred.

3.3.5.3 Forest Mitigation

Land disturbed by construction activities shall be revegetated as soon as practical after construction is completed in accordance with the Drainage and Planting and Landscape Architectural Performance Specifications. On-site reforestation shall be the responsibility of the Design-Builder. Approximately 74.5 acres of reforestation shall be accomplished on-site for the Project

Mitigation shall be the responsibility of the Design-Builder for additional impacts proposed beyond those originally approved by DNR for the Project. This responsibility may include a site search, agency reviews and approvals, design, and obtaining right of way and construction.

3.3.5.4 Forest Permit Modification

The Administration has received approval from DNR for forest impact up to 206 acres. Changes to the RFP Plans may result in modifications, which are subject to Administration approval.

The Design-Builder shall prepare and document the request for modifications for submission by the Administration's Landscape Architecture Division (LAD) and Landscape Operations Division (LOD) to the DNR for approval of impacts greater than 206 acres.

The Design-Builder shall request a field review with the LAD/LOD and provide the Administration with justification if additional trees are requested to be removed. The Design-Builder shall comply with terms of the modified approval(s) from DNR at no additional cost to the Administration.

3.3.6 Terrestrial Wildlife (TW)

3.3.6.1 TW Direct Impacts

Direct impacts to Forest Interior Dwelling Bird Species (FIDS) were determined by measuring the impact to forest interior habitat. Under the Project, 20.2 acres of forest determined to be FIDS habitat is anticipated to be directly impacted and another 52.1 acres of forest interior to be converted to edge habitat. FIDS impacts will occur in three areas, approximately between Station 238+00 and Station 245+00, Station 296+00 and Station 298+00, and Station 305+00 and Station 327+00 in the RFP Plans.

Direct impacts to seasonal pool amphibians, including wood frogs and spring peepers is anticipated to occur through the disturbance of spring seep breeding habitat of these two species on the east side of the Station 174+00 stream crossing.

3.3.6.2 TW Time of Year Restrictions

All impacts to forest habitat should be avoided, if reasonably possible, from April 1 to August 31 of any year, which is the breeding season for most FIDS.

The Design-Builder should avoid disturbance to the seasonal pool habitat for pool breeding amphibians between April 1 and June 30 of any year at the following locations: 170+00 to 175+00, 205+00 to 215+00, 275+00 to 280+00, and 315+00 to 330+00. The Design-Builder's Environmental Manager should monitor the seasonal pools weekly beginning in late March to evaluate the presence of seasonal pool breeding amphibians. Monitoring should continue through April 30 or until frog or salamander egg masses are discovered. If egg masses are discovered, the Design-Builder's Environmental Manager shall coordinate with the Administration to revisit the pools in mid June and determine whether larvae have transformed and vacated the pools. If no seasonal pool amphibian egg masses are discovered by April 30, it will be assumed that breeding of these species will not occur, and construction can continue, upon Administration concurrence and assuming all other permits, regulations, and time of year restrictions for other resources are met.

3.3.6.3 TW Avoidance and Minimization

The Design-Builder shall minimize impacts to forest and FIDS habitat in Upper Rock Creek and North Branch Rock Creek.

The Design-Builder shall maintain connectivity between wildlife communities to the extent feasible and provide structures with adequate underpass space to allow safe passage of large wildlife under the roadway. Minimum size for deer culverts is a 12' x 12' box, with a natural substrate covered bottom. Minimum clear opening, if located in a floodplain, shall be set at an elevation that will result in no more than two foot thickness of natural sediment or no less than 10' high. The design needs to take into account any filling that may occur due to sediment deposition on the floodplain. There shall be no exposed riprap in either the bottom of the culvert or on the approaches to the culvert that would make the culvert inaccessible by deer. If other than a rectangular-shaped culvert is used, the cross section of the alternative-shaped culvert shall be large enough that a 12-foot by 12-foot box could fit inside it. For locations of deer culverts refer to Drainage Performance Specification.

Small mammal culverts shall be specially designed to accommodate small mammal passage. These culverts could include the use of a two-foot wide dry "shelf" alongside the waterway or the addition of a dry culvert cell alongside the culvert that carries the primary stream flow. For locations of small mammal culverts refer to the Drainage Performance Specification.

Culverts shall provide natural bottom substrates and a smooth bed transition from upstream to downstream allowing for reptile and amphibian crossing as well as fish movement. The Design-Builder shall provide protection for wildlife by installing wildlife and small animal exclusion fencing in appropriate areas along the highway. Refer to Planting and Landscape Architectural and Structures Performance Specifications for details.

If riprap is determined necessary on the flood plain floor under any bridges, the riprap shall be buried with material that is approved by the Administration and easily traversable by wildlife. In addition, the use of slope protection under bridges shall be minimized to retain as much of the natural terrain as possible for wildlife movement and to minimize the disturbance of earthwork in the vicinity of streams. If riprap is needed for energy dissipation at the end of a stream culvert, it shall be installed so the tip of the rip rap is no higher than the stream invert elevation, so as not to impede fish passage.

3.3.7 Rare, Threatened and Endangered Species (RTE)

3.3.7.1 RTE Direct Impacts

No federally listed rare, threatened, or endangered (RTE) species are anticipated to be directly impacted by construction of the Project. One state listed species, the trailing stitchwort (endangered) will be impacted under the Project within the North Branch Rock Creek watershed. In addition, the state listed Comely Shiner (threatened) could be impacted by work within the North Branch Rock Creek watershed. Other species of state or local concern that may also be impacted by the Project occur in the Rock Creek (shingle oak, Small's ragwort) and North Branch Rock Creek (low bindweed and shingle oak) watersheds.

3.3.7.2 RTE Time of Year Restriction

A special closure period is required by MDE and DNR, as the agency responsible for protection of the state-threatened Comely Shiner. A closure period, in addition to COMAR standards, applies to North Branch Rock Creek watershed, north of Maryland Route 115, from April 15 through July 31 for which the Design-Builder shall perform no in stream work within these limits. No waiver to this closure period will be considered by DNR or MDE.

3.3.7.3 RTE Avoidance and Minimization

The Design-Builder's Environmental Manager shall complete surveys before construction begins for shingle oak and Small's ragwort within the alignment through the Rock Creek watershed and for shingle oak, low bindweed, and trailing stitchwort through the North Branch Rock Creek watershed prior to construction to locate and determine if further avoidance and/or minimization is feasible. The Design-Builder's Environmental Manager shall complete surveys for the herbaceous Small's ragwort (May to June), trailing stitchwort (May to June), and low bindweed (June to August) during the appropriate flowering period for each species to locate and identify further avoidance and/or minimization. However, if the construction is not consistent with the flowering season, these surveys shall not delay the construction of the Project. All plants shall be marked and individuals outside of the zone of direct impact shall be protected by orange fencing or other means.

To minimize impacts to the Comely Shiner, the Design-Builder must adhere to the best available practices, approved by the Administration, to control erosion and sediment, to prohibit in stream construction during the closure period and to protect water quality during construction of the North Branch Rock Creek crossing. Silt loads, accidental in stream disturbance, or other activities lending themselves to an outcome that might reduce water quality in any way shall be strictly avoided.

3.3.8 Section 4(f) Parklands

Avoidance/minimization of the parkland impacts should include, but are not limited to: minimization of clearing and grading to the extent possible; use of BMPs for stormwater management and sediment and erosion control measures; minimization of habitat fragmentation to the extent reasonable; utilization of bridges to minimize ecological impacts; accommodation of trails; reforestation/revegetation of graded slopes and other disturbed areas; and coordination of Project design affecting parklands with Maryland National Capital Park and Planning Commission (MNCPPC), the Administration and the Design-Builder's Environmental Manager.

A) Three Section 4(f) Parkland resources are identified in the Project. Parkland impacts have been identified and specific measures are intended to avoid, minimize or mitigate impacts to parklands. The parks impact area for the Project for which mitigation is required are:

   1) Rock Creek Regional Park;

   2) North Branch Stream Valley Park; and

3) Mill Creek Stream Valley Park.

B) Minimization/mitigation measures outlined in the CTD are intended to accomplish the following:

1) Reduce Project footprint to the extent practicable;

2) Raise Project profile at selected locations to reduce environmental impact;

3) Construct retaining walls to minimize impacts, where appropriate and feasible;

4) Place stormwater facilities underground within the footprint of the ICC;

5) Utilize culverts designed with a deer passage cell to encourage safe wildlife crossing at select locations; and

6) Maintain trail connectivity and safe passage between sections of park bisected by Project.

3.4 CULTURAL RESOURCES

The Administration conducted a multi-phase Cultural Resources Management program to identify and evaluate cultural resources with in the Project's Area of Potential Effects (APE). The purpose of this program was to:

A) Identify cultural (historic and archaeological) resources listed on or eligible for the National Register of Historic Places (NRHP);

B) Assess the potential Project effects on these resources; and

C) Develop measures to avoid, minimize or mitigate potential adverse effects.

This program was developed in consultation with the Maryland State Historic Preservation Officer (MD-SHPO), and the Federal Highway Administration (FHWA). The treatment of the identified historic and archaeological resources was formalized in a Section 106 -Memorandum of Agreement (MOA). Refer to the CTD for specific Project requirements.

3.4.1 General Roles and Responsibilities

Except where otherwise noted below, the Administration will be responsible for conducting all cultural resources activities. These activities will include all historic and archaeological testing and data recovery, coordination with the Administration staff, consultation with all federal, state and local historic preservation agencies and public parties, including affected landowners.

A) Unauthorized Project Impacts are prohibited;

B) Material changes to the highway alignment that result in impact beyond those identified in the CTD 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 of applicable resource management agencies; and

D) Time and cost implications resulting from material changes for the convenience of the Design-Builder shall be solely borne by the Design-Builder.

3.4.2 Work Area Access During Design-Build Activities

The Design-Builder shall provide the Administration access to the work site to conduct cultural resources investigations as needed. The Design-Builder shall be responsible for coordinating an access plan that supports the timely completion of the required investigations. The Administration will make every effort to develop plans that avoid or minimize restriction of construction activities.

3.4.3 Discovered Archaeological Resources

Based on the Phase I identification study conducted by the Administration, one archeological site (18MO595-east of MD 97) was discovered within the Project, which is potentially National Historic Register-eligible and has been recommended for Phase II evaluation. The Administration will initiate the Phase II evaluations prior to any design/construction activity.

3.4.4 Unanticipated Discovery of Archaeological Resources

Prior to the initiation of any construction related activity, it is anticipated that all portions of the Project Limits of Disturbance (LOD) will have been the subject of formal cultural resources survey to identify and evaluate any subsurface archaeological resources by the Administration. Despite these efforts, it is possible that unidentified archaeological resources may exist within the LOD. In accordance with the stipulations of the Section 106 - MOA, the Design-Builder shall report the discovery of potentially significant archaeological resources and coordinate with the Administration's Cultural Resources Manager for investigation and evaluation.

Any evidence of human skeletal material or burials require construction to stop and the occurrence to be reported immediately to the Administration's Cultural Resources Manager until the materials can be examined and removed by appropriate archeological personnel.

Work shall be avoided in areas of significant intact subsurface archeological features such as stone/brick structural foundations, brick/stone-lined shaft features, trash filled pits and concentrated areas of burnt soil/charcoal. Discovery shall immediately be brought to the attention of the Administration's Cultural Resources Manager. The Administration will examine all reported features within 24 hours of being reported, and any necessary salvage investigations will proceed immediately, with anticipated time for examination/removal estimated as 2 to 4 working days. The contractor shall accommodate this impact in their schedule. Excavation assistance requested from the Design-Builder will be compensated through a Contract Modification.

A number of previously identified archeological sites are known to be located in the Project area. The discovery of small amounts of low-density concentrations of scattered prehistoric and historic period cultural material, such as glass, pottery, brick, stone tools can be expected, and do not require avoidance or notification of the Administration's Cultural Resources Manager. The

Design-Builder is encouraged to consult with the Administration if there is uncertainty whether uncovered items or features are archeologically significant.

3.4.5 Mitigation of Adverse Effects to Cashell Farms

The FHWA has determined that the Project will have an adverse effect on J. H. Cashell Farm (MIHP No. M: 22-25). Refer to Section 106-MOA and Planting and Landscape Architectural Performance Specification for the details on appropriate treatment of Cashell Farm.

3.5 AIR QUALITY

3.5.1 Off-Road Diesel Emission

In 2004, EPA released the latest in a series of regulations (called Tiers) since 1994 requiring off-road diesel engine companies, such as CAT, Detroit and International, to manufacture engines with reduced emissions. In light of significant environmental and public concerns associated with the Project, the Administration has implemented a Diesel Emissions Reduction Program. Accordingly, the Design-Builders are required to create and submit a plan demonstrating means and methods for compliance with the strategies below and/or submit a similar program for review by the Administration.

3.5.2 Control Methods

Diesel powered construction equipment with engine horsepower (HP) ratings of 60HP and above that are assigned to the contract for a period in excess of 30 days, shall meet the following requirements by engine manufacturer, or be properly retrofitted with Emission Control Devices and/or use Clean Fuels in order to meet the requirements. The total non-road diesel fleet (prime contractor and subcontractors) must meet as a minimum, the following EPA Tiered percent usage requirements:

A) EPA Tier 0: 10% Maximum

B) EPA Tier 1: 60% Maximum

C) EPA Tier 2: 20% Maximum

D) EPA Tier 3: 10% Maximum

All motor vehicles and/or construction equipment shall comply with all pertinent State and Federal regulations relative to exhaust emission controls and safety.

Any and all retrofit equipment shall consist of oxidation catalysts, or similar retrofit equipment control technology, that is included in the EPA Verified Retrofit Technology List.

Clean Fuels may consist of PuriNOx^{TM}, or other low NOx and PM emission diesel fuel.

The Design-Builder shall submit a list prior to the start of construction and each quarter during construction of the non-road 60+ HP diesel powered construction equipment which specifically demonstrates and details compliance with the percentages above. The list shall include:

1) The equipment number, type, make, and contractor/sub-contractor name;

2) Any emission control device make, model and EPA certification number; and

3) The type and source of fuel to be used.

Unnecessary idling of delivery and/or dump trucks, or other diesel powered equipment shall not be permitted.

Noncompliance with diesel emissions reduction program will require the Design-Builder to immediately submit a plan to regain compliance for approval by the Administration. If not approved or not successfully implemented within 5 working days, the Design-Builder will be required to discontinue use of any and all equipment necessary to regain compliance.

3.5.3 Control of Odors and Dust

The Design-Builder should to the best of their ability limit hazardous odors and nuisance odors encountered or created during Work on this Contract, including odors associated with site sanitation.

The Design-Builder shall also allay dust within the Project limits. Fugitive dust (beyond project limits) is strictly prohibited and shall be immediately addressed. Dust control shall include practices that will reduce or prevent the surface and air transport of dust during construction. Dust control measures for construction activities may include minimization of soil disturbance, applying mulch and establishing vegetation, water spraying, surface roughening, applying polymers, spray-on tackifiers, and barriers.

The practices shall be used to:

1) Reduce wind erosion and dust,

2) Minimize deposition of dust and wind transported soils into water bodies through run-off or wind action,

3) Reduce respiratory problems, and

4) Minimize low visibility conditions caused by airborne dust.

Dust Control measures shall be applied at any portion of the Project with dry exposed soils, which may be exposed to wind or vehicular traffic.

The Design-Builder shall comply with applicable federal, state and local laws, rules and regulations or permit requirements governing dust control during construction.

This specification establishes the minimum standards for design, installation, and the following performance requirements=:.

1) The implementation of dust control shall limit the area of exposed dust generation.

2) Asphalt and petroleum based products shall not be used for dust protection.

3) Mulch and vegetation-mulch or seed and mulch may be applied to protect exposed soil from wind erosion.

4) Water until the surface is wet and repeat as needed. Water shall be applied at rates so that run-off does not occur. Treated soil surfaces that receive vehicle traffic require a stone tracking pad or tire washing at all points of access.

5) Polymers can be an effective practice for areas that do not receive vehicle traffic. Dry polymers must be initially watered for activation to be effective for dust control.

6) Tackifiers and Soil Stabilizers Type A –Products must be selected from and installed at rates conforming to Administration and MDE standards.

7) Barriers may be placed at right angles to prevailing wind currents at intervals of about 15 times the barrier height. Solid board fences, snow fences, burlap fences, crate walls, bales of hay and similar material can be used to control air currents and blown soil.

8) Tillage-A control measure performed with chisel type plows on exposed soils. Tillage shall begin on the windward side of the site and is only applicable to flat areas.

The Design-Builder shall maintain opacity limits of 20% on site and 15% at the right of way line. The Design-Builder's Opacity Monitor shall be certified through EPA approved opacity training and certification course. The Design-Builder shall document compliance by conducting regular monitoring, which is defined as daily or as reasonably requested by the Administration, in accordance with EPA standards. The Administration will be conducting quality assurance monitoring for dust control to ensure compliance. Noncompliance with this performance specification requires timely modification and/or mitigation of activities to bring the operation into compliance within 2 hours of discovery, or cessation of any and all operations in sufficiency to bring the overall operation into full compliance with opacity thresholds will be required.

3.6 HAZARDOUS MATERIALS

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. The Initial Site Assessment

(ISA) for Hazardous Materials identifies the sites where the presence of hazardous materials and subsurface contamination are anticipated at Sites 628, 9574, and 9576.

A) Sites # 9574 and #9576 are in the Project and are located at 15508 and 15526 Georgia Avenue, respectively.

B) The ISA Addendum also listed Site #628 as a site where some contaminations may be encountered, but the result of the sampling showed only trace concentrations and a few contaminants. . This site is within the Project in MDSHA ROW at 17001 Redland Road.

C) The plan shall address worker safety and health in accordance with applicable federal, state, and local regulations.

D) 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.

E) Structure demolition will be required at 28 properties (21 residences, 4 state owned properties and 2 businesses) within the Project. The Design-Builder shall perform a pre-demolition survey to determine the presence of asbestos containing materials (ACM), lead based paint (LBP), universal wastes, and other regulated materials in each structure to be demolished. Results of the pre-demolition survey will be the basis for determining appropriate methods for structure demolition and management, transportation, and disposal of demolition debris. The Design-Builder shall provide a copy of the pre-demolition survey results to the Administration for review and comment before demolition proceeds.

3.7 CONSTRUCTION ACCESS AND MOBILITY PLAN

The Design-Builder shall diligently work to minimize impact upon the local environment and community. The Design-Builder shall submit an Access and Mobility Plan depicting major haul routes and access points. This plan shall include potential material staging areas, truck staging areas, and access routes through the Project limits. All documentation and/or permitting for off-site areas will be the responsibility of the Design-Builder including but not limited to NEPA, HPA, Section 7 of ESA, Section 401/404 of CWA, and MDE ESC/SWM.

The Design-Builder shall prevent the tracking of sediment onto private and public roads. The Design-Builder shall prevent fugitive dust and quickly resolve dust and air quality related issues during construction.

3.7.1.1 Tracking Recommendation

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.

3.8 CONSTRUCTION NOISE AND WORK HOURS

To minimize the potential disruption of daily human activity from construction related noise yet facilitate a flexible work schedule for ICC construction in a noise-sensitive context, the Design-Builder shall implement the following noise control strategy program:

A) Noise limit criteria, as measured from the nearest sensitive receptor* to the loudest component of a given operation:

* Sensitive Receptor: An entity, geographic area, and/or structure that requires reduced noise levels to fulfill an intended purpose. Sensitive receptors include residences, nursing homes, and hospitals. Sensitive receptors also include schools, libraries, parks, and recreational areas during hours of operations or use.

Construction Noise Limits in dBA, RMS fast					
Daytime (7 AM - 7 PM)		Evening (7 PM - 10 PM)		Night time (10 PM - 7 AM)	
Leq	Lmax	Leq	Lmax	Leq	Lmax
None	85dBA (excluding pile driving)	65 dBA Ambient+5 (whichever is louder)	85 dBA	Ambient+5 (if<60) Ambient (if>60)	Ambient

B) Proposed work from 7:00 PM on Saturdays to 7:00 AM on Mondays and all work on Holidays shall be considered “Night time” hours.

C) Pile driving shall be limited to daytime hours only (i.e. 7:00 AM to 7:00 PM) from Monday through Friday unless approved by the Administration.

D) Pile driving shall be limited to 10:00 AM to 4:00 PM on Saturdays and prohibited on Sundays and holidays unless approved by the Administration.

E) The Design-Builder shall notify the Administration at least 24 hours prior to working during evening hours. Notification will include the work activity and proposed equipment, ambient and projected noise level, and noise monitoring plan. The Design-Builder shall submit a noise monitoring report 24 hours after the start of the operation to confirm compliance with the Noise Limits (ambient and construction noise data, as necessary). Additional reports shall be submitted should conditions or operational parameters increase the potential for noise upon receptors. For extended operations (longer than 5 working days) a final report shall be prepared and submitted to the Administration documenting consistent compliance with the Noise Limits.

F) The Design-Builder shall submit a work plan for activities during night time hours to the Administration for approval, which documents ambient and anticipated construction noise levels and means and methods of compliance with the noise criteria. This plan shall include ambient and anticipated noise levels, equipment to be used, public outreach, and mitigation to be used to stay within the noise threshold. This shall be submitted at least one week (five working days) prior to anticipated start of work. The Design-Builder shall submit a noise monitoring report 24 hours after the start of the operation to confirm compliance with the Noise Limits (ambient and construction noise data, as necessary). Additional reports shall be submitted should conditions or operational parameters increase the potential for noise upon receptors. For extended operations (longer than 5 working days) a final report shall be prepared and submitted to the Administration documenting consistent compliance with the Noise Limits.

G) For known construction activities that will exceed the noise limits (i.e. blasting, etc.), the Design-Builder shall submit a justification for the activity, including public outreach, which must be approved by the Administration prior to commencing work. Potential noise reduction measures shall be considered and implemented to the extent possible and practical. This shall be submitted at least one week (five working days) prior to anticipated start of work.

H) Night work shall be limited to five consecutive nights in a specific area, after which there must be a period of two consecutive nights at ambient levels or less.

I) The Design-Builder shall consider establishing a hotel voucher program for night work which is anticipated to generate excessive noise or night work that generates valid complaints from neighboring residential areas.

J) The Design-Builder shall construct permanent noise barriers as a first order of work, where feasible.

K) The Design-Builder shall consider manually adjusted or ambient sensitive back-up alarms.

The above stated construction noise criteria are applicable to Design-Builder's staging, layover, and lay down areas, as well as batch plants, casting yards, borrow/fill pits, and other areas established to fully support and facilitate construction of the ICC which may be located beyond the Project limits-of-disturbance.

Noncompliance with this performance specification will require immediate modification and/or mitigation to bring the operation into compliance or cessation of any and all operations in sufficiency to bring the overall operation into full compliance.

4.0 SUBMITTALS

The Design-Biulder shall provide the following:

A) Surveyed as-built 11x17 plans of post construction conditions in the same format as the RFP Plans and revise the impact tables that were included in the Joint State/Federal Nontidal Wetlands and Waterways Permit application.

B) As Design and Construction proceeds, the Design-Builder shall provide updated Forest Impact Plans at a frequency commensurate with the amount of forest impacted.

C) Water Quality Monitoring Plan that identifies how and where the Design-Builder will monitor water quality at the upstream and downstream Right-of-Way limit of all perennial streams within the Project shall be submitted for Administration approval within two weeks of Notice to Proceed.

D) Spill Prevention Control and Countermeasures Plan (SPCC) and Stormwater Pollution Prevention Plan in accordance with CFR and COMAR shall be submitted for Administration approval within one month of Notice to Proceed.

E) Air Quality Plan (Off Road Diesel Emissions Reduction Program) shall be submitted for Administration approval prior to construction.

F) Hazardous Materials Plan shall be submitted for Administration approval prior to construction.

G) Access and Mobility Plan shall be submitted for Administration approval prior to construction.

PS 308 – STRUCTURES PERFORMANCE SPECIFICATION

1.0 GENERAL

Design and construct all structures in accordance with requirements of this specification, including performance requirements, standards and references, design and construction criteria, maintenance during construction, and required submittals. The minimum design life for all permanent structures shall be 75 years.

The requirements in this specification apply to the design and construction of temporary and permanent structures, including but not limited to: bridges; retaining walls; noise barriers; moment slabs; sign structures, toll gantries, and lighting structures; and culverts and drainage structures.

2.0 STANDARDS AND REFERENCES

2.1 STANDARDS

Structural and structure hydraulic analysis, design and construction shall be in accordance with this performance specification and the relevant requirements of the following Standards listed in Table 1, unless otherwise stipulated in this specification. Standards specifically cited in the body of this performance specification establish requirements that shall have precedence over all others. Should the requirements in any Standard below conflict with those in another, the Standard listed with the higher priority shall govern. It shall be the Design-Builder's responsibility to obtain clarification for any unresolved or perceived ambiguity prior to proceeding with design or construction.

Use the most current version of each listed Standard, including interim revisions, as of the initial publication date of this RFP unless modified by addendum or change order.

Table 1
Standards for Structures

Priority	Author or Agency	Title	Document Provided
1	MSHA	ICC Structural Standards (in RFP Plans)	Yes
2	MSHA	Office of Bridge Development, Policy and Procedure Manual	No
3	MSHA	Office of Bridge Development, Structural Standards Manual, Volumes I and II, as shown in Appendix B	Yes
4	MSHA	Noise Barrier Standards (See Engineering Data)	Yes
5	MSHA	Special Provisions and Special Provision Inserts to the Standard Specifications	Yes
6	MSHA	Standard Specifications for Construction and Materials for items identified as Standard in Attachment A of Part 3-Resign Requirements	No

Priority	Author or Agency	Title	Document Provided
7	MSHA	Office of Bridge Development Manual on Hydrologic and Hydraulic Design	Yes
8	MSHA	ABSCOUR Program	Yes
9	MSHA	Sound Barrier Policy	No
10	AASHTO	Standard Specifications for Highway Bridges, 17th Edition	No
11	ACI	Mass Concrete, ACI 207.1 R-99	No
12	AASHTO/AWS	D1.5M/D1.5: Bridge Welding Code	No
13	AASHTO	Standard Specifications for Transportation Materials and Methods of Sampling and Testing	No
14	AASHTO	Roadside Design Guide with errata	No
15	AASHTO	A Policy on Geometric Design of Highways and Streets, 2001	No
16	AASHTO	Guide Specification for Horizontally Curved Steel Girder Highway Bridges	No
17	AASHTO	Manual on Subsurface Investigations	No
18	AASHTO	Guide Specification for Highway Bridge Fabrication with HPS70W Steel	No
19	AASHTO	Manual for Condition Evaluation of Bridges	No
20	AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 4th Edition	No
21	AASHTO	Guide Specifications for Structural Design of Sound Barriers.	No
22	FHWA	Traffic Noise Model, Version 2.5	No
23	FHWA	Noise Analysis and Abatement Policy and Guidance	No
24	MDE	Code of Maryland Regulations Title 26.089-02 Water Quality	No
25	MDE	Code of Maryland Regulations Title 26.17.4 Water Management	No
26	CFR	Code of Federal Regulations Title 44, Part 9 and 10	No
27	CFR	Code of Federal Regulations, Title 23, Part 772	No
28	NFPA	NFPA 502: Standard for Road Tunnels, Bridges, and Other Limited Access Highways	No

2.2 REFERENCES

Use the references listed in Table 2 as supplementary guidelines for the design and construction of the structures. These references have no established order of precedence and are not intended to be all-inclusive.

Table 2
References for Structures

Author or Agency	Title	Document Provided
ICCCP	Noise Quality Technical Report	Yes
AASHTO	Guide Specifications for Fatigue Design of Steel Bridges	No
AASHTO	Guide Specifications for Thermal Effects on Concrete Bridge Superstructures	No
AISI	Integral Abutments for Steel Bridges	No
PCI	Precast/Prestressed Concrete Institute (PCI), Precast Prestressed Concrete Bridge Design Manual, Volumes 1 and 2 (MNL-133-97)	No
ASTM	Standards in Building Codes	No
	Parallel Barrier Effectiveness Under Free Flowing Traffic Conditions	No
	Fundamentals And Abatement Of Traffic Noise By Bolt, Barenek And Newman	No

3.0 DESIGN REQUIREMENTS

The design shall use Strength Design (Load Factor Design). Design calculations shall be performed in Customary U.S. units. Only Customary U.S. units shall appear on the plans.

3.1 STRUCTURE HYDRAULICS

All drainage structures and bridges along the ICC mainline and interchanges shall be designed to preclude overtopping by the 100 yr. flood.

3.1.1 Scour

A) Scour analysis shall be performed using the latest available SHA ABSCOUR program and the guidance in Chapter 11 of the Manual on Hydrologic and Hydraulic Design.

B) Scour analysis shall be based upon the 100 yr. flood (design flood). Structures shall be designed for the design flood and checked for stability under the 500 yr flood as per Chapter 11 of the Manual on Hydrologic and Hydraulic Design.

C) Lateral migration distances and vertical degradation amounts as shown in the Stream Morphology reports (provided as a reference) shall be used in conjunction with computed scour depths to determine total scour depths.

D) Scour analysis shall be performed on bottomless culverts.

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 abutments. Piers and abutments shall be structurally designed for the estimated scour depths for the 100-yr flood and checked for stability under the 500-yr flood.

G) All scour analyses shall be documented in accordance with the Office of Bridge Development Manual on Hydrologic and Hydraulic Design and submitted to the Administration for review concurrently with the Readiness for Construction/Interim Review Plans.

3.1.2 MDE Hydraulics

Major drainage structures shall be located and designed in accordance with the Office of Bridge Development Manual on Hydrologic and Hydraulic Design and MDE regulation COMAR 26.17.04 "Construction on Nontidal Waters and Floodplains". Major drainage structures shall generally be considered to be any pipe or culvert greater than 84" in diameter or with an equivalent hydraulic opening. The exact structures covered by this section shall be determined jointly by the Design-Builder and the Administration.

3.1.3 FEMA Hydraulics

Procedures within Federal Emergency Management Agency, Code of Federal Regulations Title 44, Part 9 and 10 shall be followed for approval of structures crossing FEMA regulated floodplains.

3.2 LOADS AND FORCES

All loads and forces applied to structures shall be in accordance with AASHTO Standard Specifications for Highway Bridges, 17th Edition (AASHTO) except as modified below.

3.2.1 Dead Loads

A) Bridges shall be designed for additional dead load of 15 pounds per square foot applied to the full width of the bridge to account for steel deck forms which remain in place.

B) Bridges shall be designed for a superimposed dead load of 25 psf to account for a future wearing surface.

3.2.2 Live Loads

A) All structures with spans greater than 30 feet shall be designed for an HS-25 design vehicle.

B) All structures with spans 30 feet or less shall be designed for an HS-27 design vehicle.

C) Live load fatigue stress range shall be computed using HS-25.

3.2.3 Thermal Forces

A) The Project site shall be considered to be located in a moderate climate in accordance with AASHTO.

B) The normal temperature assumed for setting structural steel, expansion joints, bearings, etc., shall be 60°F.

3.2.4 Earthquake

A) All bridges shall be designed in accordance with Division IA of AASHTO with acceleration coefficient, A = 0.06 and a Seismic Performance Category, SPC = A.

B) The appropriate site coefficient for each structure shall be determined from the relevant Geotechnical Data Report in accordance with Division IA of AASHTO.

C)

3.2.5 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 before developing a design using a live load in excess of that specified in 3.2.2.

3.3 FOUNDATION DESIGN

Refer to the Geotechnical Performance Specification for subsurface exploration requirements and specific design criteria for foundations.

3.4 LOAD RATING

Initial inventory and operating load rating for the controlling vehicle shall be provided on the plans in the general notes. The Inventory and Operating Rating factors for all vehicles shall be greater than 1.0. Consider the following vehicles using Load Factor Rating:

A) HS-25;

B) H-20;

C) Maryland T-3; and

D) 150-kip Permit Load Vehicle. This vehicle shall consist of 8 axles with loads of 8 kips, 26 kips, 26 kips, and five axles each with 18 kips. These axles shall be spaced at 11’-0”, 4’-0”, 30’-0” and 4 equal spaces of 4’-0” respectively. Only the Operating Rating Factor is required to be greater than 1.0 for this vehicle for all bridges.

3.5 MATERIALS

3.5.1 Foundations

A) Refer to the Geotechnical Performance Specification for all foundation related materials.

3.5.2 Structural Steel

A) Structural steel shall conform to M270, Grade 50/50W except that primary load carrying members shall also include cross frames.

B) The use of High Performance Steel may be considered to minimize structure depth and/or total weight of steel. Only M270 Grade HPS70W shall be permitted for high performance steel.

C) For secondary members such as maintenance walkways and cosmetic components, structural steel shall conform to M270 Grade 36 and Section 909.01 of the Administration's Standard Specification for Construction and Materials.

D) Steel tubes or pipes for traffic structures shall conform to Section 950.04 of the Administration's Standard Specification for Construction and Materials. The galvanized steel shall receive a dark brown fusion bonded polyester coating.

E) All bolts shall conform to M164.

F) Paint for new structural steel shall be Paint System B. Refer to Section 912 of the Administration's Standard Specification for Construction and Materials. Paint color shall be Federal Standard No. 595A, Standard Color No. 10076, Brown.

G) Paint for existing structural steel shall be Paint System C. Refer to Section 912 of the Administration's Standard Specification for Construction and Materials. Paint color shall match existing.

H) Steel for bridge railings shall receive a brown fusion bonded polyester coating.

3.5.3 Concrete

A) Concrete for bridge decks shall be High Performance Concrete as specified in the Special Provisions included in these documents.

B) Concrete for parapets and barriers shall be normal weight Mix No. 6 (4500 psi) concrete.

C) Concrete for precast noise barrier elements shall be normal weight Mix No. 6 concrete except that the minimum 28 day compressive strength shall be 5000 psi.

D) Concrete for footings and substructure units shall be normal weight Mix No. 3 (3500 psi) concrete.

E) Precast, prestressed concrete for beams shall have a minimum 28 day compressive strength of 7000 psi. Compressive strength of concrete at the time of initial prestress shall be a minimum of 80 percent of the 28 day compressive strength.

F) Subfoundation concrete shall be normal weight Mix No. 4 (3500 psi) concrete.

G) The use of lightweight concrete for structures is prohibited on this project.

H) Mass Concrete is defined as a structural concrete placement with the least dimension of the placed element of 72 inches or greater as defined in the Special Provisions included in the documents.

3.5.4 Reinforcement Steel

Epoxy coated reinforcement steel bars and WWF shall conform to Section 917.02 of the Administration's Standard Specification for Construction and Materials and shall be used at the following locations:

A) Deck Slabs;

B) Barriers and Parapets;

C) Bearing Seat Pads;

D) All Concrete Superstructure/Roadway Elements;

E) Abutment Back Walls;

F) Abutment Bearing Seat Areas;

G) Parapet Portion of Wing Walls;

H) Portions of Retaining Walls and Noise barriers located within 10 ft of the outside edge of the paved shoulder measured along any trajectory (excluding footings); and

I) 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 1'-6" of cover.

Unless noted otherwise minimum clear cover to reinforcement steel shall be as follows:

Location	Clear Cover
Top of Deck Slabs with no Overlay	2-1/2 in.
Bottom of Bridge Deck Slabs	1 in.
Abutment Footings – Bottom and Sides	3 in.
Top of Piers	3 in.
All other Locations – Main Reinforcement	2 in.
All other Locations – Stirrups	2 in.
Precast Concrete Elements	1-1/2 in.

Welding of reinforcement steel is prohibited.

Substructure units shall be designed so that the largest size of reinforcement steel bar utilized will be No. 11 bars or smaller.

3.5.5 Prestressing Steel.

A) All prestressing strands shall conform to Section 908.11 of the Administration's Standard Specification for Construction and Materials.

B) Prestressing steel strand parameters:

PROPERTY	LIMIT
Modulus of Elasticity	28 500 ksi
Guaranteed Ultimate Tensile Strength (GUTS)	270 ksi

Maximum Anchor Set	0.375”
Maximum Jacking Stress (80% GUTS)	216 ksi
Maximum Anchoring Stress (70% GUTS)	189 ksi
Friction Coefficient	0.25
Wobble Coefficient	0.0020 K/ft

K = Pounds Loss/Pound Prestressing Force/Foot of Duct

3.5.6 Bridge-mounted Noise Barrier Panels

The Noise Barrier shall consist of stacked perforated metal panels. The panels shall be comprised of aluminum sheet metal filled with mineral fiber planks. Individual panels shall be acoustically sealed with a bead of pre-formed caulk placed along the length of each panel at the panel seam.

3.6 AESTHETICS

Specific aesthetic details are intended for the various structures in the Project. More detailed information regarding the aesthetics is contained in the respective structure sections of this Performance Specification and in the RFP Plans. If the geometric layout of a structure is changed by the Design-Builder during design, the effects on the aesthetic details shall be included in the review submittals.

More specific aesthetic information is included under the sections titled Bridges, Retaining Walls, Noise Barriers, and Culverts and Drainage Structures in this Performance Specification.

3.7 BRIDGES

The following is a list of anticipated bridge structures to be constructed under this Project. Concept Plans for these bridges that contain site restrictions and other commitments are included in the RFP. This list is based on an alignment developed during preliminary studies and may vary according to the final documents developed by the Design-Builder. If the Design-Builder changes the following structures list, the proposed changes shall be submitted in writing to the Administration. The Administration may then develop any site specific requirements beyond those provided by the Design-Builder, to be used in the design of the structure. All design elements of this project shall be the responsibility of the Design-Builder. The requirements included in the Bridge Information and Commitments/Consideration Notes on the RFP Plans shall be incorporated by the Design-Builder.

Bridge ID	Bridge Description	
	Road	Crossed Road/Feature
BR-1	I-370	MD 355
BR-2	I-370	Ramp M
BR-3	Ramp L	Ramp M
BR-4	I-370	Oakmont Avenue
BR-5	I-370	CSXT/MARC
BR-6	Ramp B	Crabbs Branch Way /Future Road
BR-7	ICC	Crabbs Branch Way/Future Road
BR-8	Ramp A	Crabbs Branch Way/Future Road

Bridge ID	Bridge Description	
	Road	Crossed Road/Feature
BR-9	Ramp A	ICC
BR-10	Ramp A	Ramp C
BR-11	Ramp H	Ramp C
BR-12*	Shady Grove Road	I-370
BR-13	ICC	Ramp C
BR-14	ICC	Shady Grove Road
BR-15	Redland Road	ICC
BR-16	Winters Run Deckover	ICC
BR-17	ICC	Rock Creek
BR-18	Needwood Road	ICC
BR-19	Muncaster Mill Road (MD 115)	ICC
BR-20	ICC	North Branch of Rock Creek
BR-21	ICC	Tributary to North Branch of Rock Creek
BR-22	Emory Lane	ICC
BR-23	Georgia Avenue (MD 97)	ICC

*No construction is anticipated for BR-12.

Additional conceptual plans for the four bridge widenings on I-370 (BR-1, BR-2, BR-4, and BR-5) are included as reference documents in the RFP. These plans were originally developed anticipating issuance of a separate contract for their construction. Although these plans have been developed further than the other RFP Plans, they are not complete designs and shall still be considered conceptual. If the Design-Builder decides to use these concepts, it is the Design-Builder's responsibility to verify the adequacy of all aspects of the bridge design for elements shown and to perform the design for all elements not shown. The Administration accepts no liability for the design implied in these RFP Plans.

Any notes containing the word “shall” on Indicative RFP Plans shall be considered Directive and must be incorporated by the Design-Builder.

3.7.1 Geometry

Bridge geometric requirements (typical sections and horizontal dimensions) are shown on the RFP Plans for each structure. The Design-Builder shall adhere to the minimum horizontal dimensions shown on the RFP Plans and the minimum vertical clearances specified herein for each bridge. The Typical Section dimensions represent the desired structure configuration; structures on horizontal roadway curves or other roadway alignment features may require a wider structure. The Design-Builder shall obtain approval from the Administration in writing prior to changing any of these dimensions. The Design-Builder shall be responsible for determination of the final structure size, clearances, geometry and details that meet or exceed the requirements of the performance specification and the RFP Plans.

The minimum vertical underclearance for bridges over railroads shall be 23’-0”. For minimum vertical underclearance for bridges over roads or highways, refer to the Administration’s Office of Bridge Development Policy and Procedure Memorandum D-75-7(4).

Girder spacing which results in an effective deck span in excess of 10'-0" shall not be permitted. For minimum number of girders required at a bridge, refer to the Administration’s Office of Bridge Development Policy and Procedure Memorandum D-79-19(4).
Any notes containing the word “shall” on Indicative RFP Plans shall be considered Directive and must be incorporated by the Design-Builder.

3.7.2 Foundations

A) Refer to the Geotechnical Engineering Performance Specification for specific types of foundations.

B) Anticipated scour depth information shall be developed by the Design-Builder and incorporated into the foundation design.

C) 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.

D) Where pile bents are utilized, the piles shall be wrapped with fiberglass from the underside of the pile caps to an elevation 5 ft. below the proposed final grade.

3.7.3 Abutments

A) If MSE walls are used as abutment front walls, stub abutments behind the MSE wall shall be supported on piles placed through the reinforced earth zone. Horizontal forces on the abutment shall be accommodated by battered piles, ties to a deadman or other system.

B) If MSE walls are selected for abutment front walls adjacent to streams or floodplains, they shall be placed so that no stream flows up to the 100 yr flood elevation come in contact with the face of the wall or a solid concrete protective wall shall be used to protect the base of the wall in accordance with the Administration’s Office of Bridge Development Policy and Procedure Memorandum D-82-25(4). The protective wall shall be designed for scour.

C) Integral or semi-integral abutments may be utilized but shall not be used for bridges with curved girders, anticipated total thermal movement greater than 2.5” or skew angles greater than 30 degrees, measured from a line normal to the girders. The maximum pile head deflection shall be 1”.

D) The maximum slope provided in front of abutments shall not be steeper than two horizontal to one vertical (2:1).

E) The exposed face of abutments, measured from finished grade to beamseat elevation, shall not be less than 5’-0” nor greater than 20’-0”, unless otherwise specified on the RFP

Plans.

3.7.4 Bearings

Bronze bearings or spherical bearings, where required by design shall be used for steel beams or girders. Plain or steel-reinforced elastomeric bearings shall be used for concrete girders. Elastomeric bearings shall not be permitted at steel beams or girders.

3.7.5 Superstructure

A) Simple span steel girders made continuous for live load shall not be permitted on this Project.

B) For curved bridges, concrete girders erected on chords and made continuous for live load shall not be permitted on this Project.

C) Fracture critical main member structures are prohibited.

D) All bridges utilizing steel beams or girders shall be designed without the use of cover plates.

E) The use of longitudinal stiffeners is prohibited. Transverse stiffeners shall not be permitted on the exterior of fascia girders except for required bearing stiffeners, unless approved by the Administration.

F) Fatigue details Categories D, E, E' and F shall not, except for temporary conditions, be utilized in stress reversal or tension area of girders.

G) Partial depth cross frames shall not be permitted.

H) All girders within a single bridge structure, or both bridges of a dual bridge structure, shall utilize a single type of girder. For example, using steel and concrete girders for a single bridge shall not be permitted.

3.7.6 Decks

Decks shall be detailed in accordance with the SHA standard bridge deck slabs for HS-25 loading, Type XXI through Type XXIX, for the applicable effective slab span. Steel deck forms which remain in place shall be used for all bridges.

3.7.7 Overlays

Concrete overlays on bridges BR- 1, BR-2, BR-4 and BR-5 shall be latex modified concrete and shall have a minimum thickness of 1½".

3.7.8 Deck Joints

A) Neoprene strip seals shall be utilized on this Project to the fullest extent possible. For bridges with thermal movements beyond the capacity of strip seals, finger joints shall be utilized.

B) No intermediate joints shall be allowed. Only joints at the abutments shall be permitted.

3.7.9 Drainage

A) Where scuppers are required, the design shall be in accordance with Chapter 12 of the OBD Manual on Hydrologic and Hydraulic Design using OBD MPADD software.

B) Scupper drainage shall be collected and diverted to an appropriate storm water management facility for bridges crossing sensitive environmental resources as noted in the FEIS, ROD and JPA.

C) Drainage immediately off of the bridge shall be collected to prevent erosion of the embankment utilizing MSHA Standard M(0.03)-80-123.

3.7.10 Utilities

A) When utilities are supported on a bridge structure, the support requirements shall be coordinated with the utility owner and accommodated by the structural framing.

B) Utilities shall be supported between girders on a bridge. No portion of the utility or support system shall extend below the bottom flange of the girders. Utilities shall not be mounted to the fascia of a structure or supported from a concrete deck slab.

C) The existing electric line passing attached transversely to the underside of the I-370 bridge over Oakmont Avenue shall be relocated in accordance with the Utility Performance Specification.

D) For ITS and tolling requirements, refer to the ITS/ETC Performance Specifications.

3.7.11 Approach Slabs

Approach slabs shall be provided at each abutment.

A) Approach slabs shall be designed as simple spans, assuming no intermediate support from the abutment backfill.

B) Approach slabs shall be designed to span in the longitudinal direction of the bridge. Approach slabs shall not be supported on wingwalls.

C) Approach slabs shall be a minimum of 20 feet and a maximum of 30 feet in length for bridges with 90 degree skews. These lengths shall be increased for bridges with skews less than 90 degrees.

D) Approach slab width shall be equal to the curb-to-curb width.

E) Approach slab ends shall be oriented perpendicular to the traveled lanes of the bridge.

F) Approach slabs on skewed bridges may be stepped at shoulders and edges of lanes to reduce length.

G) At the ends of the bridge, approach slabs shall be supported by the abutment backwall. Approach slabs shall be connected to backwalls utilizing reinforcing steel dowels. Approach slabs shall not be poured until adjacent deck placement has been completed.

H) The cold joint between the approach slab and backwall shall be sealed with an approved

joint sealant.

I) If the approach slab is supported on a sleeper slab and the approach is a rigid pavement section, the sleeper slab shall also provide support for the approach pavement. Provide graded aggregate base course under sleeper slabs matching the type and thickness provided at the adjacent roadway section.

J) If the approach slab is supported on subgrade and the approach is a rigid pavement section, the end of the approach slab shall provide a shelf to support the approach pavement.

K) Where an integral or semi-integral abutment or a rigid approach pavement is used, approach slab design shall include details that will facilitate longitudinal movement.

L) All reinforcing steel in approach slabs shall be epoxy coated.

M) Bituminous pavement shall not be placed over approach slabs.

3.7.12 Traffic Barrier

A) Precast concrete traffic barriers shall not be permitted for use as permanent parapets on bridge decks.

B) Slip forming of concrete bridge parapets shall be prohibited where formliners are required or selected by the Design-Builder for use on parapets, or on bridges where active traffic is using the bridge.

C) Two 3” diameter conduits shall be provided in bridge parapets where indicated in the RFP Plans.

3.7.13 Slope Protection

Slope protection shall be required at all embankment slopes at abutments. For full cantilever abutments with little or no sloping embankment in front, the need for slope protection or other ground stabilization shall be evaluated and submitted for review. The use of riprap slope protection may be precluded, or require unique treatments, at some locations due to permit conditions or environmental commitments. Where riprap slope protection is used it shall be Class 1 and consist of earth tone shades of grey or brown (Federal Standard 595B colors: 30277, 30145, or 30219). See the accompanying photograph.

3.7.14 Signing

Signing shall not be mounted to bridge structures.

3.7.15 Railroad Coordination

Work on and over railroad right-of-way shall be performed in accordance with the railroad construction agreement. The Design-Builder shall be fully responsible for obtaining plan approval from the railroad, obtaining all required Right of Entry Agreements, and coordinating with railroad personnel during design

and construction.

3.7.16 Bridge Aesthetics

Aesthetics on bridges shall be in accordance with the requirements listed on the RFP Plans including as shown on the color renderings. Form liners shall be oriented level and plumb and shall not follow the profile of the road or proposed grade.

3.8 RETAINING WALLS

The following is a list of anticipated retaining walls to be constructed under this Project. This list is based on an alignment developed during preliminary studies and may vary according to the final documents developed by the Design-Builder. If the Design-Builder changes the following structures list, the proposed changes shall be submitted in writing to the Administration. The Administration may then develop any site specific requirements beyond those provided by the Design-Builder, to be used in the design of the structure. All design elements of this project shall be the responsibility of the Design-Builder.

Retaining Wall ID	Retaining Wall Description		Approximate Limits		Wall Finish*
	Location	Adjacent Neighborhood	Start Station	End Station	
RW - 01A	West of ICC off Ramp B	Shady Grove	205+50.00	206+75.00	D
RW - 01B	West of ICC off Ramp B	Shady Grove	207+75.00	208+00.00	D
RW - 02	South East Wing Wall of Ramp H	Shady Grove	909+00.00	910+50.00	D
RW - 03	North East Wing Wall of ICC over Ramp C	Shady Grove	310+00.00	312+50.00	D
RW - 04	North Side Of ICC from West Of Redland Road Crossing	Shady Grove	178+00.00	182+00.00	B
RW - 05	North Side of ICC Attached to BR-16 (Deckover)	Redland	211+50.00	220+50.00	F
RW - 06	South Side of ICC Attached to BR-16 (Deckover)	Redland	211+50.00	220+50.00	F
RW - 07	North Side of ICC Attached to BR-16 (Deckover)	Redland	227+00.00	230+00.00	F
RW - 08	South Side of ICC Attached to BR-16 (Deckover)	Redland	227+00.00	236+50.00	F
RW - 09	North West Wingwall	Oakdale	326+00.00	327+25.00	D

Retaining Wall ID	Retaining Wall Description		Approximate Limits		Wall Finish*
	Location	Adjacent Neighborhood	Start Station	End Station	
	of BR-21				
RW - 10	South West Wingwall of BR-21	Oakdale	326+50.00	328+50.00	D
RW - 11	South East Wingwall of BR-21	Oakdale	330+00.00	331+25.00	D
RW - 12	North of MD97 / ICC Crossing	Norbeck Memorial Park / Norbeck Village	226+00.00	238+00.00	B
RW - 13	North of Ramp D on ICC at the ICC/MD97 Crossing	Norbeck Village	408+00.00	409+50.00	D

*Refer to the ICC Structural Standards for finish types.

3.8.1 Geometry

A) Retaining walls on curved horizontal alignments may be constructed on chords provided the angle of deflection between segments does not exceed 5 degrees.

B) The top of retaining walls shall not be stepped to accomplish a change in elevation. The top shall be level or shall vary using a smooth linear transition.

C) The horizontal offset of a wall from the baseline shall not change abruptly. All changes in offset shall be accomplished using curves or chorded construction as described above.

D) Fencing shall be installed at a retaining wall wherever a wall is accessible from private property or the hiker–biker trail. A wall shall be considered accessible wherever there is no fence or other positive barrier located between the wall and private property or hiker-biker trail. Fencing may be placed on top of or behind the proposed wall. Fences at retaining walls shall be a minimum of 5 ft high measured from the finished grade on the high side of the retaining wall. Refer to the Planting and Landscape Architectural Performance Specification for other fencing requirements.

E) All retaining walls located in the flood plain shall be evaluated for scour in accordance with the Administration's Office of Bridge Development Manual for Hydrologic and Hydraulic Design, and the foundation design shall consider computed scour.

3.8.2 Type

A) Retaining walls shall be gravity, cantilever, cast-in-place, top-down or Mechanically Stabilized Earth (MSE) walls. MSE Walls and Proprietary Walls to be used on the Project shall include only those wall systems that have been pre-approved by the Administration and listed below, except as provided in B) below.

B) The Design-Builder may propose a proprietary wall system that is not currently included

in the pre-approved list; however, it will be necessary to submit all information in accordance with the Administration's Office of Bridge Development Policy and Procedure Memorandum D-82-25(4), "Proprietary Retaining Walls." If accepted, the proprietary wall system may be used on this Project and will be included in the pre-approved list of proprietary retaining walls.

C) Exposed metal walls including bin walls and sheet pile walls, recycled material walls, timber walls, or walls utilizing geofabrics shall not be used for permanent retaining walls.

D) Pre-approved Proprietary Wall Systems.

If a pre-approved proprietary wall system is selected for use, the manufacturer shall be selected from the following pre-approved list:

MANUFACTURER	PHONE	WALL TYPE/NAME
Keystone Retaining Wall Systems 4208 Six Forks Road, Suite 247 Raleigh, NC 27609	919-783-5422	Key System I
Anchor Wall Systems 5959 Baker Road, Suite 390 Minnetonka, MN 55345-5996	800-473-4452	Landmark Retaining Wall System l
Tensar Earth Technologies, Inc. 586 Defense Highway Crownsville, MD 21032	410-573-9799	MESA
Doublewall Corporation 7 West Main Street Plainville, CT 06062	860-739-0295	Doublewall
Jeff Zell Consultants 1031 4th Avenue Coraopolis, PA 15108	412-262-2022	Dura Hold & Dura Hold II
The Neel Company 8328-D Traford Lane Springfield, VA 22152	703-913-7858	Isogrid Retaining Wall System
Reinforced Earth Wall Company 8614 Westwood Center Dr. Suite 1100 Vienna, VA 22182	703-821-1175	Reinforced Earth
Foster Geotechnical 1372 Old Bridge Road, Suite 101 Woodbridge, VA 22192	703-499-9818	Retained Earth
Hanson Pipe and Products P.O. Box 955 Pottstown, PA 19464	610-970-2216 800-970-2216	Strengthened Earth System
The Neel Company 8328-D Traford Lane	703-913-7858	T-wall

MANUFACTURER	PHONE	WALL TYPE/NAME
Springfield, VA 22152		

3.8.3 MSE Walls in Floodplain

If MSE walls are selected for retaining walls adjacent to streams or floodplains, they shall be placed so that no stream flows up to the 100 yr flood elevation come in contact with the face of the wall or a solid concrete protective wall shall be used to protect the base of the wall in accordance with the Administration's Office of Bridge Development Policy and Procedure Memorandum D-82-25(4). The protective wall shall be designed for scour.

3.8.4 Design

Design of retaining walls shall be in accordance with the Geotechnical Performance Specification. When Top-Down construction is used for retaining walls, the required cast-in-place concrete facing applied to permanent construction shall not be a structural element. All loads shall be resisted by the soldier piles, precast lagging, or other elements in direct contact with the retained soil.

3.8.5 Wall Aesthetics

For retaining walls designated to receive a specific aesthetic finish, proprietary wall systems shall not be used unless the manufacturer can demonstrate the ability to provide the specified finish. Form liners shall be oriented level and plumb and shall not follow the profile of the wall.

3.9 NOISE BARRIERS

3.9.1 General

The construction of a Noise Abatement System is a prime consideration of the Project, with a preliminary estimate of approximately 5 miles of noise barriers. The Design-Builder shall closely coordinate noise barrier design and construction with other work items such as landscaping, utilities, drainage, stormwater management, sediment control, and bridge and retaining wall design.

3.9.2 Noise Abatement System Locations and Analysis

The Design-Builder shall design and construct noise abatement systems composed of a combination of noise barriers and/or berms to protect residences adjacent to the Project alignment. Noise barriers may be located adjacent to the roadway shoulders, at the top of cut slopes, on top of or immediately behind retaining walls, and on bridges. Preliminary studies indicated that noise abatement is anticipated at the following locations:

Noise Barrier Location		Aesthetic Finishes	
Offset from ICC	Barrier Limits	ICC Face	Back Face
North Side	Station 120+ to Station 183+	Aesthetic Option 1	"Fuzzy" Rake or Exposed Aggregate
South Side	Station 115+ to Station 156+	Aesthetic Option 1	"Fuzzy" Rake or Exposed Aggregate
North Side	Station 190+ to Station 238+	Aesthetic Option 2	"Fuzzy" Rake or Exposed

			Aggregate
South Side	Station 191+ to Station 238+	Aesthetic Option 2	"Fuzzy" Rake or Exposed Aggregate
North Side	Station 328+ to Station 345+	Aesthetic Option 4	"Fuzzy" Rake or Exposed Aggregate
South Side	Station 351+ to Station 392+	Aesthetic Option 3	"Fuzzy" Rake or Exposed Aggregate

A) Notwithstanding the above anticipated locations, a complete acoustical analysis shall be performed and the noise abatement system shall be designed as follows:

B) Acoustical analysis, impact determination, and feasibility and reasonableness assessment shall be completed in conformance with the criteria described in 23CFR772 and SHA Sound Barrier Policy

C) Analysis and design shall be completed in consultation with the Administration

D) Traffic data used in the acoustical analysis shall be as shown in Appendix A of the ICC Noise Quality Technical Report (NQTR)

E) Ambient measurements shall be as shown in Appendix C of the NQTR. The Design-Builder may supplement these ambient measurements with additional ambient measurements

F) Wall panels shall have an absorptive surface on the highway side with a minimum noise reduction coefficient (NRC) of 0.80.

G) The noise abatement system shall break the line of sight at all impacted residences.

H) The mitigated noise level at any impacted residence resulting from the noise abatement system provided by the Design-Builder shall not exceed the mitigated noise level shown in the ICC Noise Quality Technical Report for the receptor.

3.9.3 Noise Barrier Community Relations

The Design-Builder shall develop information for and assist the Administration in community meetings to present details of proposed noise barriers. The views of the impacted residents in adjacent communities shall be obtained through voting as described in the MSHA Sound Barrier Policy.;

3.9.4 Geometry

A) The horizontal alignment shall be smooth and shall roughly follow the Project alignment within the Project right-of-way.

B) Consistent post spacing shall be used across the entire noise barrier.

C) The vertical profile of the top of noise barrier shall be above the acoustic profile and

roughly follow the corresponding finished ground line.

D) The minimum height for a proposed noise barrier shall be 6 ft. above the finished ground line. The maximum height for a proposed noise barrier shall be 34 ft. above the finished ground line.

E) The top surface of individual noise barrier panels shall be level. Exceptions will be made for the panels at the beginning and end of the proposed wall.

F) Vertical steps between the adjacent top panels shall be a minimum of 3 in. and a maximum of 12 in.

G) At the top of barrier elevation transitions, the elevation difference between the tops of panels shall be established so that the increment is constant for the entire transition.

H) The top of wall at the bottom of a sump curve in the acoustic profile shall be raised to provide a long level section at the top of the wall.

I) Provide a smooth transition where the noise barrier structure transitions into a berm such that the elevation of the end of the noise barrier is approximately equal to the height at the top of the berm.

3.9.5 Noise Barrier Types

A) Noise barrier shall be designed and detailed utilizing the Noise Barrier Standard Drawings or a pre-approved proprietary noise barrier system, except as provided in C) below.

B) The noise barrier standards and noise abatement systems shall include, but may not be limited to, the standards, criteria and policies established by the Administration and are included in Section 2.1- Standards of this Performance Specification.

C) The Design-Builder may propose a proprietary noise barrier system that is not currently included in the pre-approved list. However, it will be necessary for the Design-Builder to submit all information in accordance with the Administration's Policy and Procedures Memorandum D-94-45(4), "Proprietary Noise Walls", for acceptance of a proposed noise barrier system. If accepted, the noise barrier will be added to the pre-approved list of proprietary noise barriers.

D) Pre-approved Proprietary Noise Barrier Systems

If a pre-approved proprietary noise barrier system is selected for use, the manufacturer shall be selected from the following pre-approved list:

MANUFACTURER	PHONE	WALL TYPE/NAME
Hanson Pipe and Products, Inc. Pottstown Industrial Complex Pottstown, PA 19464	(800) 970-2216	Precast Concrete Post and Panel
Smith-Midland Corporation	(703) 439-3266	Sierra Noise Barrier

MANUFACTURER	PHONE	WALL TYPE/NAME
Midland, VA 22728		

3.9.6 Noise Barrier Components

A) Concrete or steel posts will be permitted for noise barriers. A single type of post shall be used for an entire length of noise barrier. Posts on bridges shall not be connected to the vertical faces of parapets.

B) Only concrete panels shall be used for noise barriers, except on bridges. Noise barriers on bridges shall conform to the requirements of Section 3.5 of this Performance Specification and shall be connected to the top of the bridge parapet. To accommodate these connections, parapets will need to be modified and widened. Connections to the back of parapets shall not be allowed.

C) Only drilled shaft foundations shall be permitted for ground-mounted noise barriers unless otherwise required for previously approved noise barrier systems.

D) Location of access doors and fire department connections shall be coordinated with the jurisdictional fire department and the Administration.

3.9.7 Noise Barrier Design

Design of noise barrier elements shall be in accordance with AASHTO Guide Specifications for Structural Design of Sound Barriers.

3.9.8 Noise Barrier Foundation

Design of noise barrier foundations shall be in accordance with the Geotechnical Performance Specification.

3.9.9 Noise Barrier Aesthetic

Final acceptance of the aesthetic treatment for any proposed noise barrier shall be in conformance with these specifications and the RFP Plans including the color renderings. A variety of complementary noise barrier finishes is desired along the Project corridor. However, a single length of noise barrier and noise barriers immediately opposite each other shall utilize a single aesthetic option.

Form liner joint seams shall not be visible in the noise barrier system unless they are an integral part of the noise barrier system's aesthetic design. This applies to all components of the noise barrier system (panels, posts, etc.) and applies to both full height and stacked panel designs. Patterns for formliners shall be oriented level and plumb and shall not follow the profile of the noise barrier. Caulking and coating material shall be compatible with the aesthetic aspects and acoustical requirements of the proposed noise barrier system.

Noise barrier panels and posts are integral parts of the aesthetic design of the noise barrier system. Post type and design shall be compatible with the panel design in terms of texture, color, acoustical profile, and scale. The anticipated appearance of the completed noise barrier system, in place, shall be the criteria

for acceptance of the proposed aesthetics design.

Incidental items such as access doors, etc. shall be incorporated in a manner consistent with the aesthetic aspects of the noise barrier system.

3.10 CULVERTS AND DRAINAGE STRUCTURES

For a list of anticipated drainage structures and information regarding culverts and drainage structures not covered herein, refer to the Drainage Performance Specification.

3.10.1 Alignment

A) Design of kinked culverts shall consider hydraulic forces acting on the kink.

B) Precast culvert section wingwalls and headwalls may be used.

3.10.2 Chamfers

All interior corners of concrete box culverts shall be chamfered 6” by 6”.

3.10.3 Headwall heights

The maximum headwall height permitted shall be 10’-0” above the top of a culvert or drainage structure.

3.10.4 Minimum/Maximum lengths

The maximum and minimum culvert lengths shall be governed by hydraulic and grading requirements. Culverts greater than 150 ft. will require a waiver from MDE. For culverts intended to facilitate deer/small mammal passage, the length of all cells of the culvert shall be set based on a 10'-0" headwall height above top of culvert. Refer to the Environmental and Drainage Performance Specifications for minimum culvert dimensions required to accommodate deer/small mammal passage.

3.10.5 Natural Bottom

To achieve a natural bottom, all paved bottom culverts shall be buried a minimum of 1.0 ft. below the existing thalweg elevation (stream channel invert).

3.10.6 Foundations

Refer to the Geotechnical Performance Specification for foundation requirements for drainage structures. Foundation design shall consider the anticipated scour depths computed by the Design-Builder.

3.10.7 Inlet/Outlet scour protection

Inlet and outlet scour protection may be required if it is necessary as a permit condition, environmental commitment, or to meet regulations as set forth in MDE regulation COMAR 26.17.04 “Construction on Nontidal Waters and Floodplains” concerning inlet and outlet velocities and froude numbers.

3.10.8 Aesthetics

All culverts intended to provide pedestrian passage shall receive a formliner finish on the headwalls and wingwalls. See the ICC Structural Standards for details.

3.11 TRAFFIC STRUCTURES

Refer to the Geotechnical Performance Specification for foundation design for traffic structures.

3.11.1 Sign Structures

A) Sign structures on existing cross streets (MD 355, Shady Grove Road, MD 97) shall be designed and detailed in accordance with SHA standard details, which are provided by the Administration.

B) Where new sign panels are required on structures on I-270 and I-370, the existing structures shall be re-used to the extent possible. If an existing sign structure cannot accommodate the proposed sign panels, details for new structures shall utilize MSHA standard details for sign structures and shall match the finish of the existing structures on those roadways. Bridge mounted sign structures shall be treated in the same manner.

C) New sign structures on ICC mainline shall be developed in accordance with the ICC Structural Standards and relevant AASHTO specifications. Design signs for structures spanning the roadway shall be the height of the tallest sign proposed for the structure and the width of the traveled roadway, excluding shoulders. Design signs for cantilever structures shall be the width of the proposed sign for the structure and 125% of the height of the proposed sign. In all cases the exit panels shall be in addition to the design sign. Vertical elements in the horizontal span of the structure shall only be located behind the proposed sign panels. The sign panel assembly shall be connected to the vertical elements. The structure shall be designed to allow future changes to the sign panel sizes and locations by permitting the removal and installation of vertical members at various locations along the horizontal span.

D) For all sign structures at the MD 97 interchange, the structure shall be designed for the worst case of either the interim signing required prior to completion of Contract B or the ultimate signing required after completion of Contract B.

E) Regardless of the sign structure configuration and member types used for the various structures on the Project, the Design-Builder shall detail the sign structures to prevent cables installed on the interior of structures from being pulled across or resting on corners. Cable hooks, curved saddles, or other appurtenances shall be installed at all corners.

3.11.2 Toll Gantry Structures

Toll gantry structures shall be designed to accommodate the loads from DMS signing, electronic toll collection (ETC) equipment, and all other appurtenances. The gantry structures shall be designed and configured to allow maintenance access to all signing, lighting, and ETC equipment without requiring lane closures on the ICC. Gantry structures shall be similar in appearance to sign structures.

3.11.3 Light Poles

Partial interchange light poles as described in the Traffic Performance Specification (PS 305) shall be detailed in accordance with the ICC Structural Standards. Anchorage requirements for light poles shall be developed in accordance with the relevant AASHTO specifications.

4.0 DESIGN DEVELOPMENT REVIEW

The Design-Builder shall follow DB GP Section 11, Design Management and Design Quality Assurance/Quality Control, with the following additions and modifications for all structures designed for this Project.

It is highly recommended that the Design-Builder prepare the plans, excluding working drawings, in accordance with the Administration's Office of Bridge Development Policy and Procedure Memorandum and standard practices with the intention of using the plans as the basis for the ultimate submittal of the Final Plans.

The anticipated Administration review schedule will follow DB GP Section 11 except that BR-16 and BR-17 will require longer review periods.

4.1 DEFINITIVE DESIGN

The Design-Builder shall submit Definitive Design plans that represent Type, Size & Location (TS&L) for each individual structure. The submittal shall identify the general design of each structure including the Geotechnical Interim Design Memorandum, preliminary foundation type and proposed aesthetics. The final concurrence of the Definitive Design is contingent upon CSXT, MDE and/or FEMA approval for applicable structures.

The Design-Builder shall submit the hydraulic analysis and reports for applicable structures to the Administration for review prior to submitting to MDE and/or FEMA.

4.2 READINESS FOR CONSTRUCTION (OR INTERIM DESIGN)

Readiness for Construction Design shall include a Scour Analysis Report for applicable structures. Any proposed scour countermeasures shall be included in the appropriate Readiness for Construction plans.

4.3 FINAL DESIGN

The Design-Builder shall prepare Final Design plans representing 100% complete construction documents for each structure using the latest SHA MicroStation CADD Standards and Plan Development Checklists available from the Administration. All structure plans shall be prepared on the Maryland Transportation Authority's standard border and title block sheet.

Plan Development Checklists are available for various types of structures (Steel Girder Bridges, Concrete Girder Bridges, Retaining Walls, etc.) and indicate the minimum amount of information that is required on the Final Design plans. If a checklist is not available for the type of structure that is proposed by the Design-Builder, the existing checklists shall be used as a general guide to provide similar information.

A structure key plan sheet shall be developed to show the location of multiple structures. The complete set for each structure shall include one mylar original of all plan sheets that bear the stamped seal of the Responsible Engineer (generally this will be the General Plan and Elevation sheet of each structure Design Unit), one set of CADD files, and one set of scanned (.tiff) files provided on CD.

Six copies of the complete, assembled Final Design plans shall be submitted to the Administration and shall serve as the record set of plans for the Design Unit, unless modified through a formal revision, and/or until As-Built plans are developed.

4.4 WORKING PLANS

All Working Plans related to the Design Units shall be developed and reviewed in accordance with the Administration's Policy and Procedure Memorandum OP-82-34 (G).

4.5 AS-BUILTS

The complete As-Built plan set for each structure shall include one mylar original of all plan sheets that bear the stamped seal of the Responsible Engineer, one set of CADD files, and one set of scanned (.tiff) files provided on CD.

5.0 SUBMITTALS

5.1 STRUCTURE COMPUTATIONS

The Design-Builder shall furnish a complete set of computations, including computer input/output, for the final geometry, structure hydrology and hydraulics (where required), and structural design/analysis for the designed elements of each structure. Computations for each structure shall be included with the submission of the Final Design plans. This record submission shall comprise of complete documentation for the design work.

The computations shall be scanned and submitted on CD in .pdf format and subdivided into relevant design sections. Each CD shall contain only one structure and shall be clearly marked with the structure number and location. An introduction page shall be included in the beginning of each CD that is signed and sealed by the Responsible Engineer of the structural element.

The computations may not be subject to a formal review but will be retained for information relative to design related inquiries that may arise during and after construction.

5.2 STRUCTURAL INVENTORY SUBMISSION

Upon completion of construction for each structure, the Design-Builder shall provide all the necessary input for the Structure Inventory and Appraisal (SI&A)/PONTIS bridge data system. This includes element and quantity values for the PONTIS system and all relevant information requested on the SI&A input sheets.

Completed input sheets shall be submitted to the Administration within 30 days of completion for the pertinent structure. Submission of input sheets is a condition of Final Acceptance.

5.3 NUMBERING OF STRUCTURES

Final structure numbers will be provided by the Administration for each permanent bridge, noise barrier, retaining wall, culvert, toll gantry, and sign structure. Numbers shall be placed on the structures in accordance with standard details.

PS 301 – PLANTING & LANDSCAPE ARCHITECTURAL PERFORMANCE SPECIFICATION

1.0 GENERAL

The Design-Builder shall design and construct Landscape Architecture and plantings associated with the Project in accordance with this specification.

This Project requires particular attention to the aesthetic and landscape architectural design elements of the highway corridor. The Project corridor traverses through a variety of existing land use types that include: residential, urban, open landscape, parkland, and riparian buffer/stream valleys. The Project corridor also includes an historic structure site and discrete access nodes/community gateways.

2.0 STANDARDS AND REFERENCES

2.1 STANDARDS

Design and construct the Landscape & Aesthetics in accordance with the relevant requirements of the Standards listed by priority in Table 1, unless otherwise stipulated in this specification. Standards specifically cited in the body of this specification establish requirements that shall have precedence over all others. Should the requirements in any Standard below conflict with those in another, the Standard listed with the higher priority 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.

Use the most current version of each listed Standard as of the initial Publication Date of this RFP.

Table 1
Standards for Landscape

Priority	Author or Agency	Title
1	MDSHA	Standard Specifications for Construction and Materials for items identified as Standard in Attachment A of Part 3-Resign Requirements
2	MDSHA	Integrated Vegetation Management Manual for Maryland Highways
3	MDE	2000 Maryland Stormwater Deign Manual, Appendix A, Landscaping Guidance for Stormwater BMPs
4	FHWA/MSHPO/MTA/MDSHA	Memorandum of Agreement Among the Federal Highway Administration, The Maryland State Historic Preservation Officer, The Maryland Transportation Authority and The Maryland State Highway Administration regarding The Intercounty Connector Project, Section I: Treatment of Architectural Historic Properties, Item A: J. H. Cashell Farm (M: 22-25)
5	ANSI A300 (Part 1)	Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance – Standard Practices
6	ANSI A300 (Part 2)	Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance – Standard Practices – Part 2 – Fertilization
7	ANSI A300 (Part 3)	Tree Care Operations – Tree, Shrub and Other Woody Plant - Standard Practices – Part 3 – Tree Support Systems
8	ANSI Z60.1	American Standard for Nursery Stock
9	NRCS	Pond Code 378, Visual Resource Design. Page 9
10	AASHTO	Roadside Design Guide Chapters 4, 5, 6 and 10
11	ASSHTO	T88 and T194
12	MDSHA	Highway Hydraulic Division Stormwater Management Facility Safety Policy for Design
13	COMAR	Nutrient Management Law
14	MDSHA	Storm Water Management Safety Policy

2.2 REFERENCES

Use the references listed in Table 2 as supplementary guidelines for the design and construction of the Landscape & Aesthetics. These publications have no established order of precedence.

Table 2
References for Landscape

Author or Agency	Title
ANSI Z133.1	Safety Requirements for Pruning, Trimming, Repairing, Maintaining, and removing Trees, and for Cutting brush
Hortus Third	A Concise Dictionary of Plants Cultivated in the United States and Canada (L. H. Bailey Hortorium 1976)
AASHTO	A Guide for Transportation Landscape and Environmental Design
MDSHA	Rock Creek Option C through Winters Run Design Program Elements
AASHTO	Guide for the Development of Bicycle Facilities, AASHTO
DNR	Department of Natural Resources Article 5-103 – Maryland Reforestation Law; and Maryland Forest Conservation Act
MDSHA	Draft Aesthetics Design Guidelines for Section Engineers
MDSHA	Natural Environmental Technical Report for the ICC
MDSHA	Final Environmental Impact Statement for the ICC
MDSHA	Record of Decision for the ICC

3.0 LEAD LANDSCAPE ARCHITECT AND OTHER PERSONNEL REQUIREMENTS

This Project requires the Design-Builder to have an experienced landscape architectural design team to 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 landscape architectural team shall be led by a Maryland Registered Landscape Architect (RLA) with more than 10 years of landscape architectural design experience related to highway corridor design and construction. The lead landscape architect shall have a working knowledge and experience with the implementation process of Context Sensitive Design/Solutions; be familiar with native vegetation of the Mid-Atlantic Region; be familiar with the requirements of the Maryland reforestation Law and the Maryland Forest Conservation Act; and be familiar with stormwater management/bioretention planting.

4.0 PLANTING ZONES AND LANDSCAPE REQUIREMENTS

4.1 PLANTING ZONE TYPES

The Design-Builder shall prepare a Planting Plan for the Landscape and Reforestation Plantings, based on the RFP Landscape Concept Plans. The Landscape Concept Plans designate Planting Zones Types, location, and approximate square footage. The landscape planting concept shall be developed to reflect the use of native plants and t revegetate disturbed areas within the Project to the fullest extent possible. Large masses or groupings of trees and shrubs shall be created whenever possible to create naturalistic plantings that have continuity from one planting zone to the next. Seasonal interest shall be provided to the fullest extent possible. The Design-Builder shall be responsible for coordinating the Planting Plan for the Landscape and Reforestation with all other elements of work to be performed under the Project, including but not limited to final grading, stormwater management best management practices (BMP) locations, highway clear zones and sight distances, storm drain and stormwater management BMP outfalls and cross culvert outfalls, utilities, signing/lighting and the

location of earth reinforcement. Trees shall be offset a minimum of 40 feet from edge of travel lanes, 30 feet from bridge abutments, and minimum 10 feet from the community side of sound barriers. If the Design-Builder determines a conflict from one or more of these elements, the Design-Builder shal be responsible for modifying the concept plans, while still retaining the intent of the design. Areas used for stormwater management BMPs shall not be used for Landscape and Reforestation Plantings. 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 corridor.

The approved plant species, minimum acceptable sizes, and minimum spacing are listed below. Requests for substitution of other species shall be submitted in writing to the Administration.

4.1.1 Bridge Abutment/Embankment Areas (RFP Landscape Concept Plan Symbol "BR")

The Design-Builder shall prepare planting plans for the areas adjacent to the bridge abutments and embankment areas. The planting shall be integrated with the Landscape Concept Plan for the roadway corridor and compatible with the existing landscape of the adjacent land uses and surroundings. The Design-Builder shall employ this plant association consisting of shrubs in all areas within 20 feet of bridge abutments. Plant selections shall be appropriate for the field conditions of the planting site.

PLANT MATERIAL: Bridge Abutment/Embankment Areas – "BR"

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Shade Trees			
Acer rubrum	Red Maple	25' OC	2-1/2" Cal. B&B
Acer saccharum	Sugar Maple	25' OC	2-1/2" Ca. B&B
Betula nigra	River Birch	20' OC	8' Ht. B&B
Liquidambar styraciflua	Sweet Gum	25' OC	2-1/2" Cal. B&B
Platanus occidentalis	American sycamore	25' OC	2-1/2" Cal. B&B
Quercus coccinea	Scarlet Oak	25' OC	2-1/2" Cal. B&B
Quercus palustris	Pin Oak	25' OC	2-1/2" Cal. B&B
Quercus phellos	Willow Oak	25' OC	2-1/2" Cal. B&B
Flowering Trees			
Cercis Canadensis	Eastern Redbud	15' OC	2" Cal. B&B
Chionanthus virginicus	White Fringetree	15' OC	6' Ht. B&B
Hamamellis virginiana	Witch Hazel	15' OC	5' Ht. B&B
Magnolia virginiana	Sweetbay Magnolia	15' OC	6' Ht. B&B
Shrubs			
Physocarpus opulifolius	Ninebark	4' OC	30" Ht. Cont.
Rhus aromaticae	Fragrant Sumae	3' OC	24" Ht. Cont.
Rosa Carolina	Pasture Rose	3' OC	24" Spd. Cont.
Viburnum dentatum	Arrowwood Viburnum	4' OC	30" Ht. Cont.

4.1.2 Mixed Use Path/Bike Trail Areas (RFP Landscape Concept Plan Symbol "BT")

The Design-Builder shall prepare Landscape Plans for the Planting adjacent to the bike trails shown

on the RFP Plans. The planting shall be integrated with the landscaping concept chosen for the roadway corridor and compatible with the existing landscape of the adjacent land uses and surroundings. Plantings shall be arranged as accents and not as continuous groupings. Edges of plantings shall move in and out in relation to the trail. Plantings shall be placed to promote the visibility and personal safety of trail users. Minimum safety clearances from the edge of the bike trail shall be in accordance with the Guide for the Development of Bicycle Facilities, AASHTO. Plant selections shall be appropriate for the field conditions of the planting site.

PLANT MATERIAL: Bike Trail Areas – "BT"

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Flowering Trees			
Cercis anadensis	Redbud	15" OC	2" Cal. B&B
Shrubs			
Hypericum calycinum	St. Johnswort	18" OC	24" Ht. Cont.
Ilex verticillata	Winterberry	3' OC	24" Ht. Cont.
Itea virginica	Sweetspire	3' OC	24" Ht. Cont.
Juniperus chinensis Pfitziana	Conpact Pfitzer Juniper	4' OC	3' Ht. Cont.
Rosa Knockout	Knockout Rose	24" OC	24" Ht. Cont.

4.1.3 Cashell Farm MOA (RFP Landscape Concept Plan Symbol "CF")

The Cashell Farm shall receive the landscape treatments described in the MEMORANDUM OF AGREEMENT AMONG THE FEDERAL HIGHWAY ADMINISTRATION, THE MARYLAND STATE HISTORIC PRESERVATION OFFICER, THE MARYLAND TRANSPORTATION AUTHORITY AND THE MARYLAND STATE HIGHWAY ADMINISTRATION REGARDING THE INTERCOUNTY CONNECTOR PROJECT, Section I: Treatment of Architectural Historic Properties, Item A: J. H. Cashell Farm (M: 22-25). See the MOA planting plan for the required plant list.

4.1.4 Deckover Structure (RFP Landscape Concept Plan Symbol "DO")

The Design-Builder shall prepare Landscape Plans for the areas identified as Deckover Structure on the RFP Plans according to the specifications entitled Rock Creek Option C through Winters Run – Design Program Elements included elsewhere in this RFP. The plantable area within the footprint of the deckover shall be planted with turf grasses only. The planting areas directly outside of the deckover footprint shall be planted with informal groupings of screen plantings. Reference illustrative sketch below. The planting shall be integrated with the Landscape Concept Plan for the roadway corridor and compatible with the existing landscape of the adjacent land uses and surroundings. Plant selections shall be appropriate for the field conditions of the planting site.

INSERT ILLUSTRATION HERE

PLANT MATERIAL: Deckover Structure – "DO"

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Evergreen Trees			
Pinus Strobus	Eastern White Pine	15' OC	8' Ht. B&B

Pinus rigida	Pitch Pine	15'OC	8' Ht. B&B
Juniperus virginiana	Red Cedar	8' OC	8' Ht. B&B
Ilex opaca	American Holly	12' OC	5' Ht. B&B
Acer rubrum	Red Maple	25'OC	2-1/2 cal.
Shade Trees			
Acer rubrum	Red Maple	25' OC	2-1/2" Cal. B&B
Betula nigra	River Birch	20' OC	8' Ht. B&B
Quercus palustris	Pin Oak	25' OC	2-1/2" cal. B&B
Quercus rubra	Red Oak	25' OC	2-1/2" cal. B&B
Shrubs			
Amelanchier Canadensis	Serviceberry	15' OC	8' Ht. B&B
Cornus sericea	Redtwig Dogwood	5' OC	3' Ht. Cont.
Ilex verticillata	Winterberry	5' OC	3' Ht. Cont.
Ilex glabra	Inkberry Holly	4' OC	3' Ht. Cont.
Viburnum acerfolium	Mapleleaf viburnum	6' OC	3' Ht. Cont.
Viburnum dentatum	Arrowwood viburnum	6' OC	3' Ht. Cont.
Viburnum prunifolium	Blackhaw viburnum	6' OC	3' Ht. Cont.
Lonicera fragrantissima	Fragrant Honeysuckle	5'	3' Ht. Cont.
Myrica pensylvanica	Northern Bayberry	6' OC	3-1/2' Ht. Cont.

4.1.5 Forest Edge (RFP Landscape Concept Plan Symbol "FE")

The Design-Builder shall prepare Landscape Plans for the areas identified as indigenous forest edge plantings. This planting zone occurs in areas where the roadway construction requires that a portion of the existing forest be removed, exposing plant material that was once "inside" the forest. The intent is that a new "edge" will be replanted using plant material and will include shrubs, understory trees, and overstory tree species. The Design-Builder shall employ this planting association at the edges of clearing of existing forest, as indicated on the conceptual Landscape Plans. The plant association shall be designed as a band between the forest edge and the safety/clear zone limits, in accordance with the Administration's Slope Management Standards in the Integrated Vegetation Management Manual for Maryland Highways and the AASHTO Roadside Design Guide. The plantings shall, at a minimum, consist of random mix of tree and shrub groupings. Density of plantings shall be 1 shade tree for each 1,500 square feet, 1 evergreen tree for each 3,000 square feet, 1 flowering tree for each 1,500 square feet, and 1 shrub for each 400 square feet. A minimum of 3 tree species and a minimum of 3 shrub species shall be selected for use. Plant selections shall be appropriate for the field environmental conditions of the planting site. The approved plant species, minimum acceptable sizes, and minimum spacings are listed below.

PLANT MATERIAL: Forest Edge – "FE"

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Shade Trees			
Acer rubrum	Red Maple	40' OC	2" Cal.B&B
Amelanchier Canadensis	Serviceberry	25' OC	2" Cal.B&B
Betula nigra	River Birch	20' OC	6' Ht. B&B
Liquidambar styraciflua	Sweetgum	30' OC	2" Cal. B&B
Quercus rubra	Red Oak	30' OC	2" Cal. B&B

Flowering Trees			
Cercis Canadensis	Eastern Redbud	20’ OC	6’ Ht. B&B
Cornus florida	Flowering Dogwood	20’ OC	2” Cal. B&B
Shrubs			
Cornus racemosa	Gray Dogwood	10’ OC	3’ Ht. Cont.
Hamamelis virginiana	Witch Hazel	10’ OC	6’ Ht. B&B
Ilex opaca	American Holly	18’ OC	5’ Ht. B&B
Ilex verticillata	Winterberry	6’ OC	3’ Ht. Cont.
Juniperus virginiana	Eastern Red Cedar	15’ OC	6’ Ht. B&B
Lindera benzoin	Spicebush	8’ OC	3.5’ Ht. Cont.
Rhus glabra	Smooth Sumac	8’ OC	3.5’ Ht. Cont.
Viburnum prunifolium	Blackhaw Viburnum	8’ OC	3.5’ Ht. Cont.
Viburnum dentatum	Arrowood Viburnum	8’ OC	3.5’ Ht. Cont.

4.1.6 Interchanges/Gateways Areas (RFP Landscape Concept Plan Symbol “IG”)

The Design-Builder shall prepare Landscape Plans for the Interchanges/Gateways identified on the conceptual plans. The planting shall be integrated with the landscaping concept chosen for the roadway corridor. The intent is to use the Interchanges/Gateways to create gateways into the adjacent communities and the Intercounty Connector. The planting concept for all of the Interchanges/Gateways shall incorporate shade trees, evergreen trees, flowering trees, a mix of evergreen and deciduous shrubs, ornamental grasses, perennials, and bulbs from the approved planting list. Density of plantings shall be 1 shade tree for each 1,500 square feet, 1 evergreen tree for each 3,000 square feet, 1 flowering tree for each 1,500 square feet, and 1 shrub for each 400 square feet. A minimum of 3 tree species and a minimum of 3 shrub species shall be selected for use. The Design-Builder shall employ this plant association as indicated on the Landscape Conceptual Plans. The plantings located within the areas designated as Interchanges/Gateways shall include the areas indicated on the Landscape Concept Plans. The approved plant species, minimum acceptable sizes, and minimum spacings are listed below.

PLANT MATERIAL: Interchanges/Gateways – “IG”

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Shade Trees			
Acer rubrum	Red Maple	25’ OC	2-1/2” Cal. B&B
Acer saccharum	Sugar Maple	25’ OC	2-1/2” Cal B&B
Betula nigra	River Birch	20’ OC	8’ Ht B&B.
Liquidambar styraciflua	Sweet Gum	25’ OC	2-1/2” Cal. B&B
Platanus occidentalis	American Sycamore	25’ OC	2-1/2” Cal. B&B
Quercus coccinea	Scarlet Oak	25’ OC	2-1/2” Cal. B&B
Quercus palustris	Pin Oak	25’ OC	2-1/2” Cal. B&B
Quercus phellos	Willow Oak	25’ OC	2-1/2” Cal. B&B
Evergreen Trees			
Ilex opaca	American Holly	15’ OC	5’ Ht. B&B
Pinus strobus	Eastern White Pine	20’ OC	10’ Ht. B&B
Flowering Trees			

Cercis Canadensis	Eastern Redbud	15’ OC	2” Cal. B&B
Chionanthus virginicus	White Fringetree	15’ OC	6’ Ht. B&B
Hamamellis virginiana	Witch Hazel	15’ OC	5’ Ht. B&B
Magnolia virginiana	Sweetbay Magnolia	15’ OC	6’ Ht. B&B
Shrubs			
Ilex verticillata	Winterberry	5’ OC	2.5’ Ht. Cont.
Physocarpus opulifolius	Ninebark	4’ OC	2.5’ Ht. Cont.
Rhus aromatica	Fragrant Sumac	3’ OC	2’ Ht. Cont.
Rosa Knockout	Knockout Rose	3’ OC	2’ Spd. Cont.
Viburnum dentatum	Arrowood Viburnum	6’ OC	2.5’ Ht. Cont.
Perennials and Grasses			
Andropogon scoparius	Little Bluestem	3’ OC	1 Qt. Cont.
Asclepias tuberose	Butterfly Weed	1.5’ OC	1 Qt. Cont.
Aster laevis	Smooth Blue Aster	1.5’ OC	1 Qt. Cont.
Aster novae-angliae	New England Aster	1.5’ OC	1 Gal. Cont.
Baptisia australis	False Blue Indigo	3’ OC	1 Gal. Cont.
Coreopsis grandiflora	Tickseed	2’ OC	1 Qt. Cont.
Liatris spicata	Grayfeather	3’ OC	1 Gal. Cont.
Panicum virgatum	Switchgrass	3’ OC	1 Gal. Cont.
Echinacea purpurea	Purple Coneflower	2’ OC	1 Qt. Cont.
Phlox paniculata	Summer Phlox	2’ OC	1 Qt. Cont.
Penstemon digitalis	Beardtongue	2’ OC	1 Qt. Cont.
Solidago nemoralis	Goldenrod	2’ OC	1 Qt. Cont.

4.1.7 Median Areas – 50 ft. Median Width (RFP Landscape Concept Plan Symbol “M50”)

The Design-Builder shall prepare Landscape Plans for the 50 foot width median areas shown on the Landscape Concept Plans. Medians with a minimum 50 foot width shall be planted with predominantly turf grasses and in situations where warranted, shrub beds with a minimum of 75 shrubs per grouping to provide screening and reduce headlight glare. Plant materials shall be placed to avoid conflicts with median SWM facilities, guardrail, signage and highway appurtenances. Shrubs and grasses shall not be installed above underground SWM facilities. Plant selections shall be appropriate for the field conditions of the planting site.

PLANT MATERIAL: Median Areas – 50’ Median Width – M50

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Shrubs			
Cornus sericea	Red-Osier Dogwood	5’ OC	3’ Ht. Cont.
Ilex verticillata	Winterberry	6’ OC	3’ Ht. Cont.
Lindera benzion	Spicebush	6’ OC	3.5’ Ht. Cont.
Myrica pensylvanica	Bayberry	6’ OC	3.5’ Ht. Cont.
Rhus glabra	Smooth Sumac	6’ OC	3.5’ Ht. Cont.
Viburnumdentatum	Arrowood Viburnum	6’ OC	3’ Ht. Cont.
Viburnum prunifolium	Blackhaw Viburnum	6’ OC	3.5’ Ht. Cont

Grasses			
Panicum virgatum	Switchgrass	6’ OC	3.5’ Ht. Cont.

4.1.8 Roadside Screening Areas (RFP Landscape Concept Plan Symbol “RB”)

The Design-Builder shall identify areas that require screening and shall prepare Landscape Plans. Areas to be screened are where the roadway is adjacent to residential or institutional types of land uses. The goal is to create an attractive landscape screen adjacent to sensitive areas. The planting shall be integrated with the landscaping concept chosen for the roadway corridor. The Design-Builder shall employ this planting association between the roadway and adjacent land uses, as indicated on the Landscape Concept Plans. The plant association shall be designed for maximum screening between the roadway and adjacent land use. Evergreen materials shall be included in the mix, and may predominate. The plantings shall, at a minimum, consist of a random mix of tree and shrub groupings. Shrubs shall be planted in continuous mulched beds. Mulched beds shall be extended to include individual trees when those trees are within 3 feet of the mulched bed boundary. Density of plantings shall be 1 major deciduous tree for each 1,500 square feet, 1 flowering tree for each 1,500 square feet, 1 evergreen tree for each 2,000 square feet, and 1 shrub for each 400 square feet. A minimum of 5 Major Tree species, a minimum of 3 Flowering Tree species, a minimum of 3 Evergreen Tree species and a minimum of 3 Shrub species shall be selected for use. Plant selections shall be appropriate for the field environmental conditions of the planting site. The approved plant species, minimum acceptable sizes, and minimum spacings are listed below.

PLANT MATERIAL: Roadside Buffer – “RB”

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Shade Trees			
Acer rubrum	Red Maple	25’ OC	2-1/2” Cal. B&B
Acer saccharum	Sugar Maple	25’ OC	2-1/2” Cal. B&B
Betula nigra	River Birch	20’ OC	8’ Ht. B&B
Celtis occidentalis	Common Hackberry	25’ OC	2-1/2” Cal. B&B
Liquidambar stryciflua	Sweet Gum	25’ OC	2-1/2” Cal. B&B
Liriodendron tulipfera	Tulip Poplar	25’ OC	2-1/2” Cal. B&B
Nyssa sylvatica	Black Gum	25’ OC	2-1/2” Cal. B&B
Platanus occidentalis	Amererican Sycamore	25’ OC	2-1/2” Cal. B& B
Quercus coccinea	Scarlet Oak	25’ OC	2-1/2” Cal. B&B
Quercus palustris	Pin Oak	25’ OC	2-1/2” Cal. B&B
Quercus phellos	Willow Oak	25’ OC	2-1/2” Cal. B&B
Quercus prinus	Chestnut Oak	25’ OC	2-1/2” Cal. B&B
Sassafras albidum	Sassafras	15’ OC	2-1/2” Cal. B&B
Evergreen Trees			
Cupressocyparis leylandii	Leyland Cyprus	10’ OC	6’ Ht. B&B
Ilex opaca	American Holly	18’ OC	8’ Ht. B&B
Juniperus virginiana	Eastern Red Cedar	10’ OC	8’ Ht. B&B
Pinus rigida	Pitch Pine	20’ OC	8’ Ht. B&B
Pinus strobus	Eastern White Pine	20’ OC	8’ Ht. B&B
Flowering Trees			
Amelanchier canadensis	Serviceberry	15’ OC	6’ Ht. B&B
Cercis Canadensis	Eastern Redbud	15’ OC	2” Cal. B&B

Chionanthus virginicus	White Fringetree	15’ OC	6’ Ht. B&B
Crataegus crus-galli	Cockspur Hawthorn	15’ OC	2 Cal. B&B
Hamamellis virginiana	Witch Hazel	15’ OC	5’ Ht. B&B
Magnolia virginiana	Sweetbay Magnolia	15’ OC	6’ Ht. B&B
Shrubs			
Ilex verticillata	Winterberry	5’ OC	2.5’ Ht. Cont
Juniperus Chinensis Pfitzeriana Compacta	Compac Pfitzer Juniper	8’ OC	3.5’ Ht. Cont.
Lindera benzoin	Spicebush	6’ OC	3’ Ht. Cont.
Myrica pensylvanica	Northern Bayberry	6’ OC	3.5’ Ht. Cont.
Physocarpus opulifolius	Ninebark	3’ OC	2’ Ht. Cont.
Rhododendron maximum	Rosebay Rhododendron	6’ OC	3’ Ht. Cont.
Vaccinium corymbosum	Highbush Blueberry	5’ OC	2.5’ Ht. Cont.
Viburnum dentatum	Southern Arrowood	6’ OC	3’ Ht. Cont.
Viburnum prunifolium	Black Haw	6’ OC	3’ Ht. Cont.

4.1.9 Re-forestation Areas (RFP Landscape Concept Plan Symbol “RV”)

In the design and execution of reforestation plantings, the Design-Builder shall comply with the requirements of the Reforestation Law, as specified in the Environmental Performance Specification. Project reforestation plantings shall be within right-of-way limits, easements, limits of disturbance and/or parcels acquired by the Administration. Reforestation plantings shall be accommodated in all areas within the Project corridor in which invasive species shall be eradicated and permanently removed. In designing and executing the reforestation plantings, the Design-Builder shall employ a method of “random spacing” and a density of 200 stems per acre. A full 70% of the species shall be “Overstory” species, and 30% shall be “understory” species, chosen from the list of approved species, below. A minimum of 5 major Deciduous Tree species shall be selected for the Overstory, and a minimum of 3 flowering Tree, Evergreen Tree, or Shrub species shall be selected for the understory. In no case shall 3 of the same plant genus constitute the minimum selection. In addition to the reforestation-sized planting stock, each reforestation area shall contain, interspersed randomly among the reforestation stock, trees chosen from the Major Deciduous Tree List, which are a minimum of 2.5 inches in caliper, at a planting density of 20 trees per acre. Plant selections shall be appropriate for the field environmental conditions of the planting site. The approved plant species, minimum acceptable sizes, and minimum spacing are listed below. The Administration will consider requests for substitution of other species, submitted in writing.

PLANT MATERIAL: Revegetation – “RV”

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Overstory Species (Major Deciduous Trees)			
Acer rubrum	Red Maple	15’ OC	2” Cal. B&B
Betula lenta	Sweet (Black) Birch	15’ OC	2” Cal. B&B
Cladrastris kuntuckea	American Yellowwood	15’ OC	2” Cal. B&B
Liquidambar styraciflua	Sweetgum	15’ OC	2” Cal. B&B
Liriodendron tulipifera	Yellow Poplar	15’ OC	2” Cal. B&B
Nyssa sylvatica	Blackgum	15’ OC	2” Cal. B&B
Quercus alba	White Oak	15’ OC	2” Cal. B&B
Quercus palustris	Pin Oak	15’ OC	2” Cal. B&B

Quercus rubra	Northern Red Oak	15’ OC	2” Cal. B&B
Understory Species (Flowering Deciduous Trees)			
Amelanchier arborea	Downy Serviceberry	15’ OC	5’ Ht. CG
Amelanchier laevis	Allegheny Serviceberry	15’ OC	5’ Ht. CG
Amelanchier canadensis	Shadblow Servicberry	15’ OC	5’ Ht. CG
Cercis canadensis	Eastern Redbud	15’ OC	5’ Ht. CG
Cornus florida	Flowering Dogwood	15’ OC	5’ Ht. CG
Hamamelis virginiana	Common Witchhazel	15’ OC	5’ Ht. CG
Magnolia virginiana	Sweetbay Magnolia	15’ OC	5’ Ht. CG
Evergreen Trees			
Ilex opaca (approved varieties)	American Holly	15’ OC	3’ Ht. CG
Juniperus virginiana	Eastern Red Cedar	15’ OC	3’ Ht. CG
Pinus taeda	Lobolly Pine	15’ OC	3’ Ht. CG
Pinus strobus	White Pine	15’ OC	3’ Ht. CG
Understory Species (Shrubs)			
Aronia arbutifolia	Red Chokeberry	8’ OC	3’ Ht. CG
Cornus amomum	Silky Dogwood	8’ OC	3’ Ht. CG
Cornus racemosa	Gray Dogwood	8’ OC	3’ Ht. CG
Cornus sericea	Redtwig Dogwood	8’ OC	3’ Ht. CG
Ilex verticillata	Winterberry	8’ OC	3’ Ht. CG
Itea Virginia	Virginia Sweetspire	5’ OC	3’ Ht. CG
Rhus aromatica	Fragrant Sumac	8’ OC	3’ Ht. CG
Rhus glabra	Smooth Sumac	8’ OC	3’ Ht. CG
Rhus typhina	Staghorn Sumac	8’ OC	3’ Ht. CG
Lindera benzoin	Spicebush	8’ OC	3’ Ht. CG
Viburnum acerifolium	Mapleleaf Viburnum	8’ OC	3’ Ht. CG
Viburnum dentatum	Southern Arrowwood	8’ OC	3’ Ht. CG
Viburnum lentago	Nanyberry Viburnum	8’ OC	3’ Ht. CG
Viburnum prunifolium	Blackhaw Viburnum	8’ OC	3’ Ht. CG

4.1.10 Street Tree (RFP Landscape Concept Plan Symbol “RS”)

The intent is to provide street trees on roadways that intersect the Intercounty Connector within the limits of disturbance. All street tree plantings shall be in accordance with requirements of the property owner and local jurisdiction. It is the responsibility of the Design-Builder to determine street tree locations based on existing and proposed signs, utility locations, and adjacent land uses. The Design-Builder shall employ this planting association along the roadside, as indicated on the conceptual Landscape Plans. The Design-Builder shall submit a site analysis plan indicating the planting opportunities for this category. The Design-Builder shall maximize planting whenever possible. The plantings shall, at a minimum, consist of a single row of shade trees, planted in long groups of the same genus. Areas of separation between groups of plants shall serve as the starting point for changing to a different plant genus. Density of plantings shall be as indicated below and as presented to the Administration for consultation and written comment. Plant selections shall be appropriate for the field environmental conditions of the planting site. The design shall maintain sight lines at all times. The approved plant species, minimum acceptable sizes, and maximum spacings are listed below:

PLANT MATERIAL: Street Tree – "RS"

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Shade Trees			
Platanus acerfolia	Planetree	25' OC	2-1/2" Cal. B&B
Quercus rubra	Red Oak	25'OC	2-1/2" Cal. B&B
Ulmus parvifolia	Paperbark Elm	25' OC	2-1/2" Cal. B&B
Acer rubrum	Red Maple	25' OC	2-1/2" Cal. B&B
Quercus phellos	Willow Oak	25' OC	2-1/2" Cal. B&B
Metasequoia glyptostroboides	Dawn Redwood	25' OC	8' Ht. B&B
Flowering Trees			
Malus sp.	Crabapple	15' OC	8' Ht. B&B
Craetegus cruss-galli	Hawthorn	15' OC	8' Ht. B&B
Amelanchier canadensis	Serviceberry	15' OC	8' Ht. B&B
Lagerstroemia indica Natchez'	Natchez Craemyrtle	15' OC	8' Ht. B&B

4.1.11 Storm Water Management Areas (RFP Landscape Concept Plan Symbol "SWM")

Planting plans shall be prepared for stormwater management (SWM) facilities and shall be integrated with the Landscape Concept Plan for the roadway corridor and compatible with the existing landscape of the adjacent land uses and surroundings. Plant selections at SWM areas shall be as appropriate for each facility type.

The goal of planting at SWM facilities is to provide maximum environmental value (water quality, wildlife, bio-diversity) while providing low maintenance, native landscapes within curvilinear-shaped SWM facilities. In order to create a highway corridor that maximizes Maryland's native beauty, fall color shall be maximized in the choice of native trees and shrubs, and the winter structure shall be maximized in the choice of native grasses and forbs.

See the Drainage Performance Specification for engineering requirements at SWM facilities.

4.1.11.1 SWM Minimum Planting Requirements

Planting configurations for native SWM landscape schemes shall not be uniform, static patterns such as grids or lines. Instead, the planting configurations shall mimic natural colonization in natural plant communities. A relaxed sense of order shall be provided while avoiding the appearance of plants randomly dotted about the terrain. The arrangement of species in planting zones that require uniform cover of plant material (e.g., emergent, floating aquatic or shallow marsh areas) shall be arranged in homogenous groupings that intermingle with groupings of other species. See Figure 4.1.11.A, below. The arrangement of species in plant zones that require loose arrangements of individual plants (e.g., perimeter shade zone) shall be placed in naturalistic drifts of same species intermingled with individual species providing ornamental interest. See Figure 4.1.11.B.

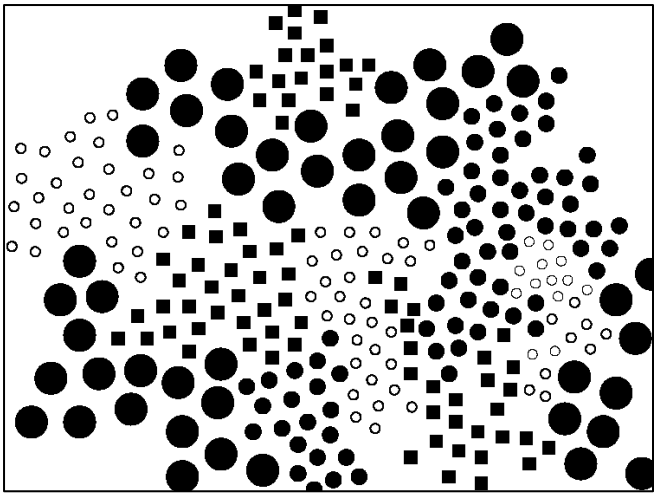

Figure 4.1.11.A – Natural Plant Placement.
Each shape and size represents a different species. The placement of each species relative to the others involves intermingling while forming somewhat homogeneous colonies at the same time.

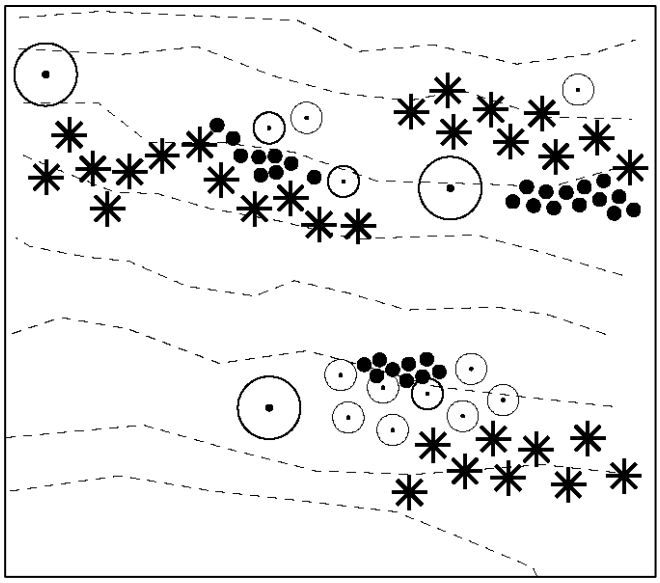

Figure 4.1.11.B – Naturalistic Drifts of Trees and Shrubs. Groups of plants are placed in loose drifts interspersed with individual plants of different species that provide ornamental interest. Drifts flow parallel to the contours.

The Design shall adhere to the following list of minimum planting requirements. A concept sketch of the planting zones follows each facility type. Lists of approved species for each facility type and planting zone are provided in the next section.

The table below for SWM ponds and wetlands, Table 4.1.11.A, lists all the possible planting zones for these types of SWM facilities. The design shall provide planting according to the zones

required by the particular facility being designed. Ponds shall have aquatic benches that are emergent & floating aquatic zones; water depths greater than 48 inches that are submerged aquatic zones and storm elevations for up to the 10-year storm that are frequently fluctuating zones. Wetlands will have micro-pools or deep pools that are submerged aquatic zones, shallow wetland areas that are emergent & floating aquatic zones and water fluctuations up to the 10 year storm that are frequently fluctuating zones. Both SWM ponds and wetlands are required to have the perimeter shade planting, which covers the emergent zone through the frequently fluctuating zone.

Table 4.1.11.A – Minimum Planting Requirements at SWM Ponds and Wetland Hydrologic Zones

Min. Quantity/ Placement Considerations	Min. Size/Rate	Root Condition
Submerged Aquatic Zone (48 in. or greater depth permanent water)		
1 plant per 9 cu. ft. of water volume for water depths 48 in.. or deeper. Min. 2 species with no one species being greater than 60% of the total plants in this zone	8 in. ht./length	Bare root
Emergent & Floating Aquatic Zone (up to 18 in. depth permanent water)		
24 in. centers max. spacing (2.9 plants per 10 sq. ft.) Min. 3 species shall be provided with no one species being greater than 50% of the total plants in this zone Min. 30% of the species shall be broadleaved or floating leaved	24 in. ht.	Container grown
Frequently Fluctuating Zone (permanent water surface to 10 yr. water storm elev.)		
Live Fascines or Wattles 3 species in each fascine bundle Place parallel to contours Min. one layer of fascines at water's edge Do not use when facility is lined	4 in. diameter by 6 ft. length	Bound bundles
Plug Planting Min. 3 species of plugs shall be provided with no one species being greater than 50% of the total plants in this zone Plugs shall be spaced at max. 24 in. centers (2.9 plants per 10 sq. ft.)		

Table 4.1.11.A – Minimum Planting Requirements at SWM Ponds and Wetland Hydrologic Zones

Min. Quantity/ Placement Considerations	Min. Size/Rate	Root Condition
Seed and Mulch Shall be included to provide permanent stabilization SWM Seed Mix SHA Special Purpose Mix Mulch shall be according to Standard Specification for Construction Materials (SSCM) 2001, Section 705.03.01(f). No straw mulch shall be used at SWM facilities	16 lbs./ac. 10 lbs/ac.	
Perimeter Shade Planting (emergent & floating aquatic zone to 10 yr. water storm elev.)		
Canopy Trees 1 tree if areas is ≤ 4,000 SF (measured at 10 YR water surface contour line) 3 trees if (4,000 SF < area ≤ 8,000 SF) 5 trees if (8,000 SF < area ≤12,000 SF) If area > 12,000 SF, add 1 additional tree for each additional 4,000 SF If facility is lined, do not plant trees or woody shrubs within the limits of the liner	3 inch cal.	B & B
Understory or Flowering Trees 2 if area is ≤ 4,000 SF, add 1 additional tree for each additional 1,000 SF Multiple stemmed trees shall have a min. of 3 trunks.	2 in. cal.	B & B
Woody Shrubs 5 for every understory or flowering tree required	24 in. ht. or spread	Container Grown

Table 4.1.11.A – Minimum Planting Requirements at SWM Ponds and Wetland Hydrologic Zones

Min. Quantity/ Placement Considerations	Min. Size/Rate	Root Condition
Planting Bed Preparation Mulched beds shall not be used at SWM facilities below the 10 YR water surface elevation. Instead, individual plants shall be installed in plant pits that are not mulched. Areas between planting pits shall be stabilized with seed and mulch		
Seed and Mulch See Frequently Fluctuating Zone seed and mulch requirements.		

Table 4.1.11.B – Minimum Planting Requirements for SWM Filtering Practices

Min. Quantity/ Placement Considerations	Min. Size/Rate	Root Condition
Sod Flow shall be diverted from filter practices until 2 in. ht. of permanent turf stabilization has been established In cases where flow cannot be diverted, sod shall be applied to the filter surface Sod shall be applied to all grass weirs except emergency spillways (which shall be established in permanent turf).	Section 708 Section 920 (SSCM 2001)	
Seed and Mulch SWM Seed Mix Special Purpose Mix No straw mulch shall be used at SWM facilities. Mulch shall be according to Section ___, SSCM 2001.	 8 lbs / ac. 10 lbs / ac.	
Bioretention		
Trees min. 0.76 trees per 100 SF (filter surface area measurement)	2 inch cal.	B&B

Table 4.1.11.B – Minimum Planting Requirements for SWM Filtering Practices

Min. Quantity/ Placement Considerations	Min. Size/Rate	Root Condition
If the facility has underdrains or is lined, large canopy trees shall not be placed directly in the bioretention facility. Instead, they shall be used adjacent to the facility to provide shade to understory plants. In this case, plant large trees 5 feet away from the perimeter of the filter medium/underdrains or liner.		
Shrubs Min. 2.8 shrubs per 100 SF (filter surface area measurement)	24 in. ht. or spread	Container Grown
Herbaceous layer 3 perennials or grasses can be substituted for 1 required shrub No more than 50% of plants shall be perennial or grasses	#1 container	Container Grown
Mulch 3 in. depth shredded hardwood mulch, evenly distributed and raked smooth	Section 920 (SSCM 2001)	

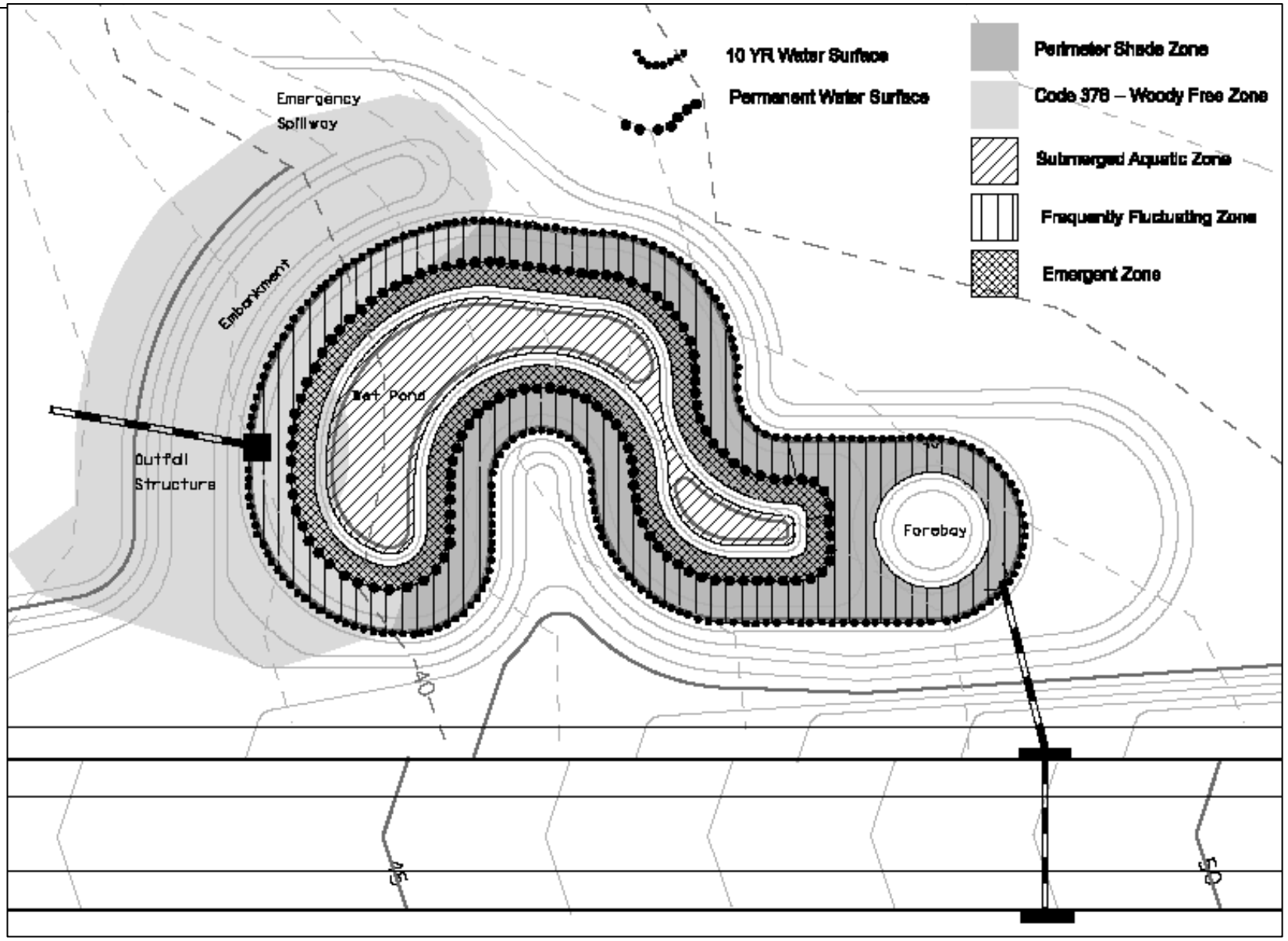

Figure 4.1.11C. – Stormwater Pond Planting Zones

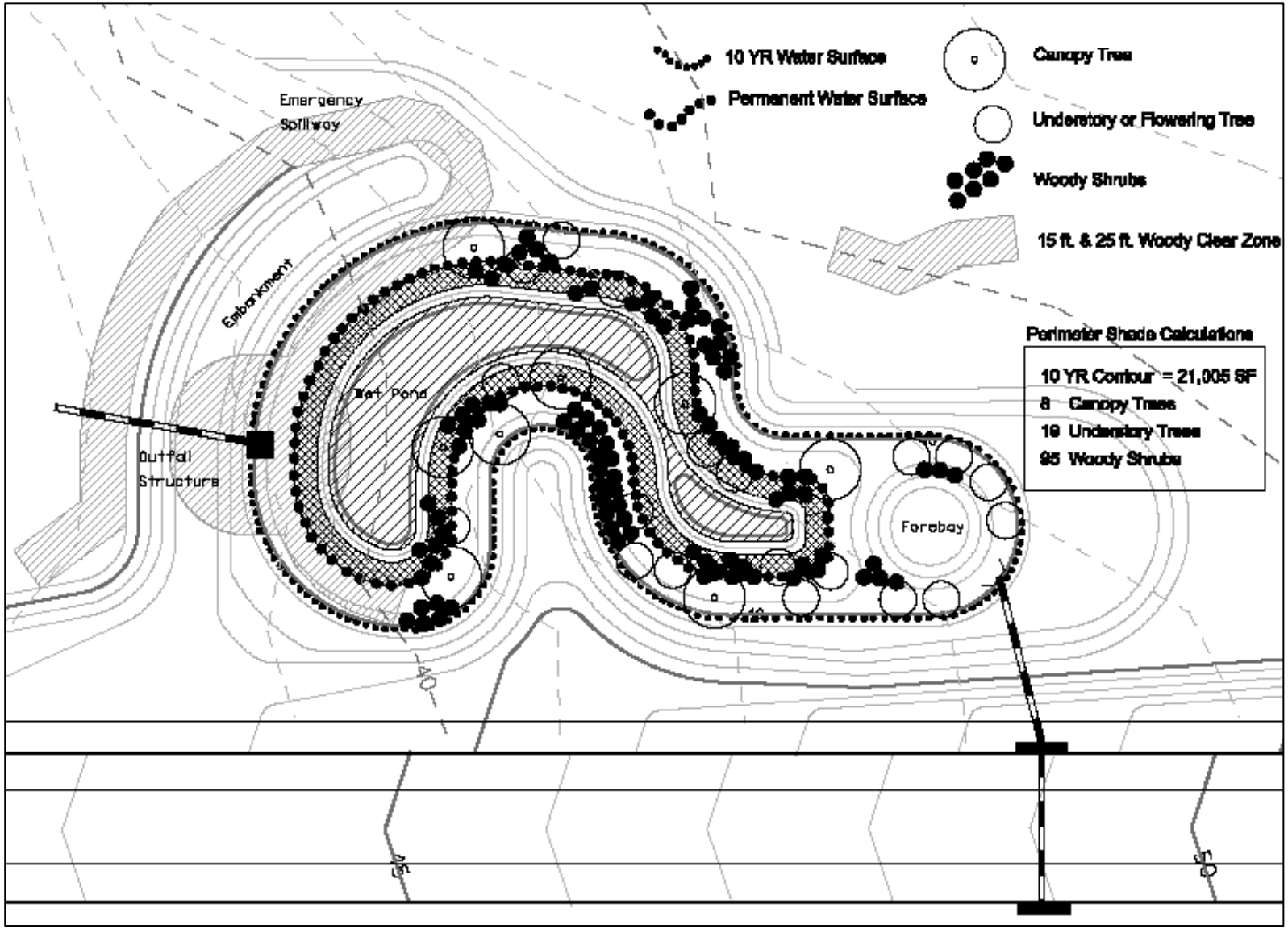

Figure 4.1.11.D – Stormwater Pond Planting Plan Based on Minimum Planting Requirements

Table 3.1.13.C – Minimum Planting Requirements for SWM Open Channels

Min. Quantity/ Placement Considerations	Min. Size/Rate	Root Condition
Dry Swale		
Seed and Mulch SWM Seed Mix SHA Special Purpose Mix No straw mulch shall be used at SWM facilities. Mulch shall be according to Section ___, SSCM 2001.	 8 lbs / ac. 10 lbs / ac.	
Wet Swales		
Emergent Species Grasses, rushes or grass-like species. No broadleaf species. 24 in. centers max. spacing (2.9 plants per 10 sq. ft.)	#SP4	Container Grown

4.1.11.2 Suggested Plant Material at SWM Areas

Plant selections for SWM areas can come from the following list. Native species are preferred but non-natives can be used if compelling reasons exist. The Design-Builder shall solicit Administration approval before using non-native plant material or material not on the following lists.

Submerged Aquatic Planting Zone

Botanical Name	Common Name
Elodea Canadensis	Waterweed
Potamogeton pectinatus	Sago Pond Weed
Potamogeton perfoliatus	Redhead Grass
Vallisneria Americana	Wild Celery

Emergent & Floating Aquatic Planting Zone

Botanical Name	Common Name
Emergents	
Acorus calamus	Sweet Flag (broadleaf)
Iris versicolor	Blue Flag (broadleaf)
Juncus canadensis	Canada Rush
Juncus effuses	Soft Rush
Nuphar luteum	Spatterdock (broadleaf)
Osmunda regalis	Royal Fern (broadleaf)

Peltandra virginica	Arrow Arum (broadleaf)
Pontederia cordata	Pickerelweed (broadleaf)
Sagittaria latifolia	Duck Potato (broadleaf)
Scirpus cyperinus	Woolgrass
Scirpus pungens	Common Three-square
Floating Aquatics	
Nelumbo lutea	Lotus
Nymphaea odorata	Fragrant Water Lily

Frequently Fluctuating Zone

Botanical Name	Common Name
Live Fascines:	
Salix nigra	Black Willow
Salix sericea	Silky Willow
Cornus amomum	Silky Dogwood
Cephelanthus occidentalis	Buttonbush
Plugs: (Note: Inclusion on this list does not guarantee availability in plug form)	
Chelone glabra	White Turtlehead
Dennstaedtia punctilobula	Hay-Scented Fern
Erythronium americanum	Trout Lily
Eupatorium dubium	Joe-Pye Weed
Eupatorium perfoliatum	Common Boneset
Lilium canadense	Canada Lily
Lilium superbum	Turk's Cap Lily
Lobelia cardinalis	Cardinal Flower
Lobelia siphilitica	Great Blue Lobelia
Oenothera fruticosa	Narrow-leaved Sundrops
Osmunda cinnamonea	Cinnamon Fern
Osmunda regalis	Royal Fern
Panicum virgatum	Switchgrass
Sisyrinchium atlanticum	Coastal Blue-eyed Grass
Solidago rugosa	Wrinkle Leaf Goldenrod
Thelypteris palustris	Marsh Fern
Tripsacum dactyloides	Gama Grass
Verbena hastate	Blue Vervain

Perimeter Shade Planting

Botanical Name	Common Name	Fall Color
Emergent Zone		
Canopy Trees:		
Acer rubrum	Red Maple	Yellow to Brilliant Red
Betula nigra	River Birch	Yellow
Carya cordiformis	Bitternut Hickory	
Carya glabra	Pignut Hickory	Rich Golden Yellow
Liquidambar styraciflua	Sweet Gum	Rich Yellow-Purple-Red
Nyssa sylvatica	Black Gum	

Perimeter Shade Planting

Botanical Name	Common Name	Fall Color
Platanus occidentalis	American Sycamore	
Populus deltoides	Eastern Cottonwood	
Populus heterophylla	Swamp Cottonwood	
Quercus bicolor	Swamp White Oak	Yellow (Red-purple)
Quercus michauxii	Swamp Chestnut Oak	
Quercus phellos	Willow Oak	Yellow, Bronze-Orange, Yellow-brown, Russet-red
Understory and Flowering Trees:		
Alnus serrulata	Smooth Alder	
Amelanchier canadensis	Serviceberry	
Magnolia virginiana	Sweetbay Magnolia	
Viburnum prunifolium	Black haw	
Shrubs:		
Aronia arbutifolia	Red chokeberry	
Cephalanthus occidentalis	Buttonbush	
Hypericum densiflorum	Dense St. John's Wort	
Rhododendron maximum	Rose Bay Rhododendron	
Rhododendron periclymenoides	Pink Azalea	
Rhododendron viscossum	Swamp Azalea	
Rubus allegheniensis	Allegheny Blackberry	
Sambucus canadensis	Common Elderberry	
Viburnum prunifolium	Black Haw	
Frequently Fluctuating Zone:		
Canopy Trees:		
Betula lenta	Sweet or Black Birch	Golden Yellow
Carya alba (tomentosa)	Mockernut Hickory	Deep Golden Yellow to Golden Brown
Carya ovata	Shagbark Hickory	Rich Yellow to Golden Brown
Diospyrus virginiana	Common Persimmon	Yellow-green, Yellow or Reddish Purple
Fagus grandifolia	American Beech	Golden Bronze
Fraxinus americana	White Ash	Yellow to Deep Purple/Maroon
Juniperus virginiana	Eastern Redcedar	Bronze to Yellow Brown
Pinus echinata	Shortleaf Pine	
Pinus strobes	White Pine	
Pinus virginiana	Virginia Pine	
Prunus serotina	Black Cherry	
Quercus alba	White Oak	Russet, Bronze, Red
Quercus coccinea	Scarlet Oak	
Quercus palustris	Pin Oak	Russet, Bronze or Red
Quercus rubra	Northern Red Oak	Russet-red, Bright-red
Quercus stellata	Post Oak	
Quercus velutina	Black Oak	
Tilia americana	American Basswood	

Perimeter Shade Planting

Botanical Name	Common Name	Fall Color
Tsuga canadensis	Eastern Hemlock	Evergreen
Ulmus rubra	Slippery Elm	
Understory and Flowering Trees:		
Carpinus caroliniana	American Hornbeam	
Corylus americana	American Hazelnut	
Cercis canadensis	Eastern Redbud	
Chiananthus virginicus	White Fringetree	
Cornus florida	Flowering Dogwood	
Crataegus crus-galli	Cockspur Hawthorn	
Ilex deciduas	Possom Haw	
Kalmia latifolia	Mountain Laurel	
Ilex opaca	American Holly	Evergreen
Juniperus virginiana	Eastern Redcedar	
Sassafras albidum	Sassafras	
Shrubs:		
Comptonia peregrine	Sweet Fern	
Cornus amomum	Silky Dogwood	
Euonymus americanus	Strawberry Bush	
Hamamelis virginiana	Witchhazel	
Hydrangea arborescens	Wild Hydrangea	
Leucothoe racemosa	Fetterbush	
Lyonia ligustrina	Male-berry	
Gaylussacia baccata	Black Huckleberry	
Rhus glabra	Smooth Sumac	
Vaccinium corymbosum	Highbush Blueberry	
Vaccinium stamineum	Deerberry	
Vaccinium vacillans	Early Lowbush Bluberry	
Viburnum acerifolium	Maple-Leaved Arrowwood	
Viburnum dentatum	Southern Arrowwood	

Bioretention Planting

Botanical Name	Common Name	
Trees:		
Acer rubrum	Red Maple	
Betula lenta	Sweet Birch	
Carya glabra	Pignut Hickory	(if no underdrains)
Cercis canadensis	Eastern Redbud	
Chionanthus virginicus	White Fringetree	
Cornus florida	Flowering Dogwood	
Crataefus crus-galli	Cockspur Hawthorn	
Diospyrus virginiana	Common Persimmon	(if no underdrains)
Juniperus virginiana	Eatern Redcedar	
Nyssa sylvatica	Black Gum	(if no underdrains)
Pinus echinata	Shortleaf Pine	(if no underdrains)
Pinus strobes	White Pine	(if no underdrains)

Bioretention Planting

Botanical Name	Common Name	
Pinus virginiana	Virginia Pine	(if no underdrains)
Quercus rubra	Northern Red Oak	(if no underdrains)
Quercus velutina	Black Oak	(if no underdrains)
Shrubs		
Aronia arbutifolia	Red Chokeberry	
Hamamelis virginiana	Witchhazel	
Hypericum densiflorum	Dense St. John's Wort	
Ilex decidua	Possum Haw	
Kalmia latifolia	Mountain Laurel	
Lindera benzoin	Spicebush	
Rhus glabra	Smooth Sumac	
Vaccinium corymbosum	Highbush Blueberry	
Viburnum acerifolium	Maple-leaved Arrowwood	
Viburnum dentatum	Southern Arrowwood	
Herbaceous		
Aquilegia canadensis	Eastern Columbine	
Asclepias incarnate	Swamp Milkweed	
Asclepias tuberosa	Butterflyweed	
Aster divaricatus	White Wood Aster	
Aster ericoides	Heath Aster	
Aster novi-belgii	New York Aster	
Baptisia australis	Blue False Indigo	
Eupatorium fistulosum	Joe-Pye Weed	
Eupatorium rugosum	White Snakeroot	
Heliopsis helianthoides	Oxeye Sunflower	
Hepatica americana	Round-lobed Hepatica	
Heuchera Americana	Alumroot	
Liastris graminifolia	Grass-Leaf Blazingstar	
Monarda fistolusa	Wild Bergomot	
Penstemon digitalis	Beardtongue	
Physostegia virginiana	Obedient plant	
Polygonatum biflorum	Solomon's Seal	
Rudbeckia fulgida	Early Coneflower	
Rudbeckia hirta	Black-eyed Susan	
Rudbeckia laciniata	Tall Coneflower	
Rudbeckia triloba	Three-lobed Coneflower	
Saxiifraga virginiensis	Early Saxifrage	
Silene stellata	Starry Companion	
Solidago caesia	Blue-stemmed Goldenrod	
Solidago rigida	Rigid Goldenrod	
Solidago speciosa	Showy Goldenrod	

Code 378 Embankments

Botanical Name	Common Name
SHA Permanent Seed Mix	
SHA Special Purpose Mix	
Andropogon virginicus	Broomsedge
Bouteloua curtipendula	Sideoats Grama
Dichanthelium clandestinum	Deertongue
Elymus Canadensis	Canada Wild Rye
Elymus virginicus L.	Virginia Wildrye
Eragrostis curvula	Weeping Lovegrass
Panicum virgatum	Switchgrass
Schizachyrium scoparium	Little Bluestem
Sorghastrum nutans	Indiangrass
Tripsacum dactyloides	Eastern Gama Grass

4.1.11.3 Additional Requirements for SWM Areas

SWM Visual Quality Monitor

The Administration will provide a SWM Visual Quality Monitor (SWM VQ Monitor) to review and provide written comment to SWM facility design plans, in addition to and to oversee grading, planting, outfall structure pigmentation and safety features. Visual and environmental quality and safety shall be accommodated in the final SWM facility designs. This shall be accomplished with input of the Design-Builder's Landscape Architect.

The Design-Builder shall coordinate visual quality review for SWM facilities with the Administration. This review shall consist of a meeting to discuss the SWM facilities as they relate to visual and environmental quality and safety.

Consultation and written comments offered by the Administration shall be incorporated into the SWM facility design. The Administration's written comments shall be satisfactorily addressed and resolved before finalizing the SWM facility plans.

Woody Plant Restrictions and Buffer Zones

Planting of woody species, including live fascines, shall be in accordance with Pond Code 378 requirements at SWM embankments and SWM outfall structures. No woody material shall be planted on the SWM embankment (roadway and non-roadway), within 15 feet of the toe of SWM embankment fill or within 25 feet of the SWM outfall structure.

A 15-foot buffer zone within Administration right-of-way shall be provided at the toe of SWM embankments (roadway and non-roadway) that shall be maintained free of woody vegetation.

Planting Height Restrictions at SWM Embankments

SWM embankments and buffer zones shall be planted with warm season grasses and/or turf grass that can be maintained to a height of 10 inches.

Soil Amendments (Fertilizer, Lime, Compost)
Soil amendments shall be applied as required according to soil testing to achieve healthy growth of plants and seed areas to ensure establishment. This includes turf establishment and plant pit amendments.

Areas targeted for warm season grass and native meadow establishment should not be amended with fertilization and other amendments.

Bioretention Soil Mix (BSM)
BSM is a blended mixture of sand, mulch and planting soil that is used at the filter medium in bioretention facilities, surface sand filters and dry swales. BSM shall be a homogeneous mix, free of stones, stumps, roots or other similar objects larger than 2 in. and shall be free from any parts of Bermuda grass, Quackgrass, Johnsongrass, Mugwort, Nutsedge, Poison Ivy, Canadian Thistle, Tearthumb, Phragmites or other noxious weeds as specified in COMAR 15.08.01.05

Care shall be taken when placing BSM and planting and watering within BSM to ensure that excessive compaction is avoided.

BSM shall consist of the following textural grading analysis:

ITEM	CRITERIA	TEST METHOD
Sand (2.0 – 0.050 mm)	65 – 80%	1)
Silt (0.050 – 0.002 mm)	0 – 15%	2)
Clay (less than 0.002 mm)	1 – 5%	T88
Organic Matter	15 – 25%	T194

BSM shall also be sampled in conformance with MSMT 356 and meet the following criteria:

ITEM	CRITERIA	TEST METHOD
pH	5.5 – 7.5	D4972
Magnesium	Minimum 35 ppm	*
Phosphorus (Phosphate – P_2O_5)	Minimum 75 ppm	*
Potassium (K_2O)	Minimum 85 ppm	*
Soluble Salts	Not to exceed 500 ppm	*

* University of Delaware, College of Agriculture and Natural Resources, Soil Testing Program Test Method

SWM Seed Mix

The seed mix used at frequently fluctuating zone, surface sand filter and dry swale facilities shall be according to the following percentages. The rate of application is listed under Minimum Planting Requirements above.

Botanical Name	Common Name	Percent of Mix
Andropogon gerardii	Big Bluestem	50%
Bromus inermis	Smooth Brome	25%
Panicum virgatum	Switchgrass	25%

Seeding Seasons for SWM Seed Mix are listed in the following table.

REGIONS	SPRING AND FALL(Month/Day)	SUMMER (Month/Day)	LATE FALL (Month/Day)
1.	3/1 to 5/15 and 8/1 to 10/20	5/16 to 7/31	10/21 to 11/20
2.	3/3 to 5/1 and 8/1 to 10/31	5/2 to 7/31	11/1 to 11/30
1 and 2	No Additives	Plus Additive A	Plus Additive B
	Plus Additive C for seeding: Slopes 4:1 and steeper		
3) 3. ADDITIVES A = Lovegrass or Foxtail Millet B = Temporary Seed Mix C = Sericea Lespedeza			

NOTE: The Design-Builder shall supply substitute seed for Lovegrass, Foxtail Millet, and Sericea Lespedeza when seeding within 4 miles of a State airport.

Regions. The Project is divided into regions by counties as follows:
Region 1 Montgomery County.
Region 2 rince Georges County

SWM Structure Color

Cleanouts and vents shall be black in color. Riprap stone used for aprons, channel lining, check dams, and outfall stabilization shall be brown or gray in color; no white riprap shall be used on the Project. All Concrete outfall structures that are visible from the roadway or adjacent property shall be stained with the same light brown or light grey color (Federal Standard 595B colors:30277, 30145, or 30219).

SWM Facility Safety

The Administration discourages the use of fencing at SWM facilities wherever possible while ensuring safety. Safe design can be incorporated in many ways such as selection of appropriate facility types, flat side slopes, benches, planting, and proper design of the riser structure. Deterrent

features such as fencing shall only be used after an attempt to design safety features has shown that fencing is warranted.

Facilities designed with permanent water levels, including forwbays, of greater that 2 feet require design and construction of the following safety features:

1) NO TRESPASSING " signs shall be placed so as to be visible from all adjacent properties. At a minimum, one sign shall be placed for each facility at the access point, with additional signs added as necessary to ensure that potential trespassers from adjacent properties are alerted.

2) Side slopes shall be 4:1 or flatter. This includes both the upstream and downstream sides of stand-alone SWM embankments and roadway SWM embankments. Cut slopes with reforestation can be steeper than 4:1 with Administration approval.

3) Benches shall be placed around the perimeter of permanent pools that are 2 ft. or greater in depth. The benches shall be a minimum 15 ft. wide and centered at the permanent pool elevation with a grade of 12:1 or flatter.

Hydraulic Structures

Safety shall be considered in the design and placement of hydraulic structures including risers, weirs, headwalls and end walls. Structure design shall provide the safety features listed below in order to ensure that the facilities are safe without the use of railings.

1) Control Riser & Weir Structures shall include a minimum 4ft.-2in. dimension or greater on two consecutive sides adjacent to the manhole cover shall be provided at the top of riser structures that are 30 in. or greater in height to allow maneuvering of the manhole cover from the frame. (See Figure 3.1.13.E.)

2) Riser and weir structure height shall be less than 48 inches to ground surface, even if the ground surface is submerged. If the structure is placed on a bench, there shall be a minimum of 5 feet from the structure to edge of permanent water surface.

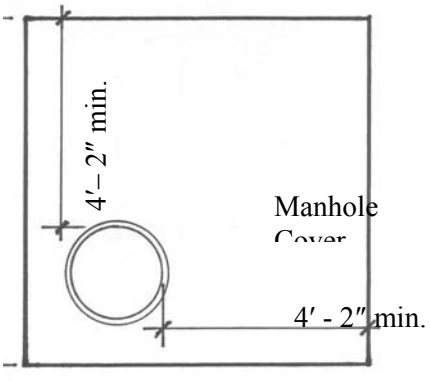

Figure 3.1.13.E-Plan at Riser Structure

3) Railings shall be provided at headwalls or end walls that are 48 inches or greater in height from top of wall to the ground surface. Fencing shall be 42 inches in height

and black or brown coated chain link with a top rail. Refer to Figure 4.1.11.F below.

Figure 4.1.1.F–Chain Link Railing at Outfall Structure

Stabilized Maintenance Access

A stabilized maintenance access from a public right-of-way to all SWM facilities shall be provided and shall conform to the following:

1) A 12 ft. wide maintenance access shall be provided to the facility bottom, forebay bottom, in flow and outflow structures. The maintenance access shall consist of stabilized soil constructed with a 6 inch depth cellular confinement system filled with open graded aggregate, topped with 4 inches of topsoil and seeded and mulched.

2) Turnarounds shall be provided at the top and bottom of the access that allow large maintenance vehicles to turn completely around where possible. Room shall be provided at the entrance for a maintenance truck with trailer to pull completely off the roadway without blocking the maintenance access.

3) The preferred maximum slope at maintenance access shall not exceed 8:1 (12%). The Administration may approve slopes as steep as 6.6:1 (15%) when conditions warrant.

4) The surface of the maintenance access road shall be a minimum of 1 ft. above any permanent water surface.

5) The entrance shall not be blocked with traffic barrier, parking or other permanent obstructions. A depressed curb and/or concrete apron shall be required at locations designated by the Administration.

6) A 12 ft. wide double gate shall be provided where fencing is used at the stabilized maintenance access. A method to secure the gate in the closed position and an exterior grade padlock and with 2 keys shall be provided to the Administration for each gate.

SWM Planting Plan Requirements

The locations and depths of liners shall be shown clearly on planting plans. Woody trees and shrubs shall not be planted over liners.

A note shall be added to the plans when planting over liners that care shall be taken not to puncture them. No augers of any kind shall be used when digging plant pits over liners.

The planting zones (submerged aquatic, emergent & floating aquatic, frequently fluctuating) shall be shown on the plan and clearly labeled. The contour line and elevation label for the permanent water elevation and the 10 year storm elevation shall be shown and labeled.

Contour Grading and Mowability at SWM Facilities

Contour grading at SWM facilities shall incorporate curvilinear shapes with minimal straight lines and sharp angles. Landforms shall be graded into the facility shape to increase the flow path and provide visual interest. Landforms shall be natural in design and blend well with the SWM facility and surrounding landscape.

Grade steepness shall be dictated by safety (see above) and mowability. Areas that require routine mowing shall be 4:1 or flatter. Routine mowing is required at the following areas:

1) Maintenance Access
2) SWM embankment (both upstream and downsteam faces
3) 15 foot clear zone at embankment toe
4) Around outfall structure
5) Emergency spillway
6) Bottom and side slopes of dry swales and surface sand filters
7) Filter strips at grass channels, infiltration basins, infiltration trenches, dry swales and bioretention

Grading and planting design shall incorporate areas requiring mowing into the design and layout. Access shall be provided to all mowing areas from the maintenance access. Dimensions and turning requirements of standard mowing equipment shall also be accommodated in the design.

SWM As-Built Certification for Plant and Turf Survivability

In addition to requirements identified in the Drainage Performance Specification, the SWM as-built certification includes submission of documentation and verification of minimum survival rates for plants at SWM facilities and turf within conveyances to the facilities.

Inspections of planting installations and survival and final turf establishment shall be performed by either a licensed Landscape Architect in the State of Maryland or an Administration approved Environmental Specialist. The inspector shall have experience in stormwater management planting design and construction.

4.1.12 Plant and Turf Establishment Certification Package

The Design-Builder shall submit a plant and turf establishment certification package that consist of field photos, completed turf inspection checklists, completed planting checklists and the contract planting plans and details with green-line revisions. If survivability percentages are not achieved, notation shall be made on the plans and report designating the plants or areas that are dead or exhibit patchy growth. A description of efforts taken to bring the plantings or turf up to the required

survivability shall be included in the report. A schedule for implementing the remediation efforts and documentation of completion of the remediation efforts shall be included.

The plant and turf establishment certification process shall be completed and approved as a condition of Acceptance for Maintenance.

Stages for Plant and Turf Establishment Inspections.
At the two year care and replacement inspection, the plant and turf establishment inspection shall also be conducted and documented. Turf establishment inspection shall be conducted according to the Administration's standards. Plants shall be inspected for species, size, quantity, health and location. Plants that measure smaller than the installed size shall be considered dead and replaced. Plant and turf establishment inspections shall be conducted in accordance with the Administration's standards.

The following planting and turf shall be inspected and documented:

1) Ponds and Wetlands

2) SWM embankment (including roadway embankment if applicable) and clear zone 15 feet beyond toe of embankment cleared of woody vegetation and established with turf or native grasses: During second growing (plant establishment phase inspection) season to verify a vegetation survival rate at submerged benches and wetlands of 50 %.

3) Infiltration Trenches: Turf establishment with 95% coverage inspected in conveyances, filter strips and other features draining to the trench that are within the Administration right-of-way and within the project site. Off-site areas shall be visually observed and the location of off-site eroded or bare areas included in the report and photographed.

4) Infiltration Basins: Woody plant clear zones listed for Ponds above. Plant, turf or native meadow establishment inspected at basin bottom and side slopes. Establishment of turf with 95% coverage on all conveyances draining to the facility within the Administration right-of-way and within the project site. Off-site areas shall be visually observed and the location of off-site eroded or bare areas included in the report and photographed.

5) Filtering Systems: Establishment of turf on weir, bottom and sides of facility, and all conveyances draining to the facility. At Bioretention Facilities, to verify a plant survival rate of at least 90 %. The mulch bed shall be inspected and replenished to constructed depth and condition.

6) Open Channel Systems: For Dry Swales, inspect establishment of turf on weir, bottom, side slopes and conveyances draining to the facility. For Wet Swales, inspect establishment of turf on weirs, sides and all conveyances draining to the facility. Inspect planting at bottom of facility for 50 % survival rate.

4.1.13 Sound Barrier/Retaining Wall Treatment (Landscape RFP Plan Symbol "WA")

The Design-Builder shall prepare Landscape Plans for the Planting adjacent to the noise barriers; which includes only the side facing the roadway corridor. The planting shall be integrated with the Landscape Concept Plan chosen for the roadway corridor and compatible with adjacent plantings, land uses and surroundings. The Design-Builder shall employ this plant association within the restricted root zones adjacent to the tops and toes of all walls, whether cast-in-place, or mechanically-stabilized earth (M.S.E.)

areas throughout the entire Project area. Plant selections shall be appropriate for the field conditions of the planting site. Shade trees and evergreens shall not be planted closer than 15' from the noise barrier/retaining wall face. Vines shall be planted along the walls at 4 feet on center. Plant species, minimum acceptable sizes, and minimum spacing are listed below:

PLANT MATERIAL: Sound Barrier/Retaining Wall Treatment – "WA"

Botanical Name	Common Name	Maximum Spacing	Minimum Size
Flowering Trees			
Crataegus viridis	Winter King Hawthorn	20' OC	2" Cal. B&B
Magnolia virginiana	Sweetbay Magnolia	20' OC	6' Ht. B&B
Evergreen Trees			
Ilex opaca	American Holly	20' OC	5' Ht. B&B
Pinus strobus	White Pine	20' OC	6' Ht. B&B
Shade Trees			
Quercus palustris	Pin Oak	40' OC	2" Cal. B&B
Acer rubrum	Red Maple	40' OC	2" Cal. B&B
Shrubs			
Juniperus virginiana	Eastern Red Cedar	15' OC	6' Ht. B&B
Myrica pennsylvanica	Northern Bayberry	10' OC	3' Ht. Cont.
Ilex glabra	Inkberry	8' OC	3' Ht. Cont.
Cormus sericea	Red-Osier Dogwood	8' OC	3' Ht. Cont.
Viburnum prunifolium	Blackhaw Viburnum	4' OC	3' Ht. Cont.
Viburnum dentatum	Arrowood Viburnum	4' OC	3' Ht. Cont.
Vines			
Parthenocissus quinquefolia	Virginia Creeper	4' OC	1 Gal. Cont.
Partheonocissus tricuspidata'	Boston Ivy	4' OC	1 Gal. Cont.

4.2 LANDSCAPE REQUIREMENTS

4.2.1 Invasive Species Control

The Design-Builder shall be responsible for the eradication and removal of invasive plant species within the Project right-of-way, easements, limits of disturbance and/or parcels acquired by the Administration. This shall apply to all plant material listed on the MD/DNR List of Invasive Exotic Plants throughout the entire right-of-way existent prior to construction. The Design-Builder shall prepare and submit an invasive species eradication and removal plan to the Administration prior to the commencement of eradication or removal work for consultation and written comment. Invasive species control shall be implemented by a person licensed for application of invasive species control requirements.

4.2.2 Contour Grading

The Design-Builder shall perform contour grading throughout the limits of the Contract. 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 the Contract's 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.

4.2.3 Right of Way Fence

The ICC passes through an area with a large wildlife population. Therefore, it is imperative to prohibit animals from entering the ICC roadway. To prevent access of wildlife and pedestrians to the roadway, the ICC shall be continuously fenced. Chain link right-of-way fence shall be constructed to direct deer and other animals to crossings at culverts or beneath bridges along the ICC. Chain link fence shall be constructed such that ditch crossings are minimized to the greatest extent possible. Positive drainage and prohibiting access to the roadway shall be required where right-of-way fence crosses a ditch. Right-of-way fence shall be constructed such that the need for gates to the community side of the fence is minimized. Right-of-way fence shall be black vinyl black coated chain link and constructed within 2 feet inside the Project right-of-way line, unless otherwise specified, and in accordance with Section 607 – Chain Link Fence of the MDSHA Standard Specifications for Construction and Materials. Alignment of right-of-way fence shall be adjusted to minimize clearing of and damage to existing trees.

East of the CSXT/MARC line, right-of-way fence shall have a minimum exposed height of 8 feet above grade and shall be buried a minimum 1 foot below grade to obstruct wildlife from burrowing under the fence. Construction methods utilized to bury the fence shall minimize to the greatest extent possible impacts to the critical root zone of trees beyond the limit of disturbance. The critical root zones of specimen trees shall not be impacted. The interchanges at the Metro Access Road and MD 97 shall be fenced with the same chain link fence to prevent wildlife from entering the interchanges.

West of the CSXT/MARC line, right-of-way fence shall have a minimum exposed height of 6’ above grade, but is not required to be buried.

Right of way fence shall not be required where noise barrier is constructed 25 feet or less horizontally from the Project right of way line.

Right of way fence shall be located on the roadway side of storm water management ponds to the greatest extent possible to allow wildlife access to ponds, except within the interchanges note above.

Chain link fence shall be installed on the outside of the posts or the furthest from the roadway.

Right-of-way terminal posts shall be securely attached to noise barriers, headwalls, retaining walls, bridges and other structures to prevent wildlife and pedestrians form access to the roadway.

Existing right of way fencing within the Project limits shall be removed and replaced with the appropriate fence as specified in this section.

4.2.4 Shared Use Separation Fence

Chain link fence shall be constructed to separate the Shared Use Path, also referred to as the Bike Trail or Path, from the ICC mainline roadway and ramps. Shared Use Path Separation Fence shall be 3.5 feet in height and shall have knuckled selvage at the top and bottom of the fence. A tension wire shall be run continuously between terminal posts near the top and bottom of the fabric and attached to the chain link with hog ring fasteners at 18 inch intervals. Shared Use Path Separation Fence shall be black vinyl coated with fencing material installed on the Share-Use Path side of posts.

4.2.5 Wildlife Fence and Escape Requirements

Wildlife fence shall be required to prohibit small mammals, amphibians and reptiles from entering the Project roadway and intended to direct wildlife to culvert crossings and beneath bridges along the Project. Wildlife fence shall to the greatest extent possible be constructed to avoid ditch crossings.

Wildlife fence shall be 16 to 20 gauge black coated vinyl welded wire mesh with 0.25" x 0.25" openings installed with a minimum of 3 feet exposure above grade and buried a minimum of 6 inches below grade. Wildlife Fence shall be securely attached to the bottom of Right of Way Fencing constructed adjacent to forested areas. and applied along forested areas, streams and adjacent to stormwater management ponds. Wildlife Fence shall be installed on the side furthest from the roadway and shall have a 2 inch 90 degree lip at the top to obstruct small animals from scaling the Wildlife Fence. Limits of existing forest and streams are shown in the Final Environmental Impact Statement.

The Design Builder may propose other designs to prohibit small mammal, amphibian and reptiles from entering the mainline roadway and ramps.

Earthen escape ramps shall be provided as escape points for wildlife trapped within the fences right-of-way areas. Earthen ramps locations shall be proposed by the Design-Builder and coordinated with the Administration. One-way gates will not be allowed.

4.2.6 Access Gates

Access Gates shall be provided for maintenance access . Access gates shall be 12 foot wide double gates (each leaf 6 feet wide) and shall match the height and material of adjacent fencing . An exterior grade padlock with 2 keys shall be provided for each gate. Gates shall not be blocked with guardrail, parking or any permanent obstructions. Right-of-way fencing shall have access gates located no further than 1,000 feet apart.

Access gate locations shall be coordinated with the Administration and utility owners.

4.2.7 SWM Fence

SWM fencing shall be constructed and consist of black vinyl coated chain link fencing. Chain link fencing shall be provided according to the Administration's Pond Fencing Guidelines with a height of 3.5 feet and be placed so as to be visually unobtrusive. Fencing shall be required and constructed at SWM facilities when safety features can not be incorporated into the design and construction.

When chain link fencing is used at stormwater management facilities a top rail shall run continuously between terminal posts at the top of the chain link. Chain link shall be tied to the top rail at 2 foott 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 18 inch intervals. A 12 foot wide double gate shall be constructed at each SWM facility requiring fencing.

SWM Fence Requirements

Figure 3.1.13.F. – Black Vinyl Coated Chain Link Fence with Top Rail

4.2.8 Signs

Interpretive or way finder signs shall be located at pedestrian and bicycle facilities in accordance with requirements of local jurisdictions.

5.0 SUBMITTALS

5.1 FINAL ROADSIDE PLANTING PLAN

Final landscape planting plan shall include all plant types, sizes and locations for the Project. The plans shall include all proposed wetland and stream restoration plantings and shall be submitted at a scale of 1 inch equals 50 feet.

5.2 NUTRIENT MANAGEMENT PLAN/REPORT

The Design-Builder shall comply with the Maryland Nutrient Management Law and requlations.

Prior to performing turf establishment and sodding, the Design-Builder shall sample and test soils for limestone, sulfer, compost and fertilizer needs in accordance with the procedures identified in the Administration's MSMT 356 'Sampling and Testing Soil for Nutrient Management Plan".

The procedures described in the above MSMT 356 shall be used in determining if stockpiles are suitable for use as furnished topsoil. Information on the rootmat and topsoil are included in the geotechnical boring logs contained in Part 7-Engineering Data.

The Design-Builder shall use the soil test results and obtain the services of a Maryland certified Nutrient Management Consultant to develop a Nutrient Management Plan, including nitrogen, phosphorus, potassium and limestone input levels for the Project. A directory of certified Nutrient Management Consultants may be found by contacting the Nutrient Management Program at 410-841-5959.

The Design-Builder shall submit and soil test results and the Nutrient Management Plan to the Administration for consultation and written comments.

5.3 SOILS REPORTS

The Design-Builder submit all soil testing reports to the Administration. Soil testing shall be performed for texture, particle size gradation, pH and organic content. The soil report shall be completed and submitted in advance of the Nutrient Management Plan and coordinated with its requirements.

6.0 WARRANTIES

The Design-Builder shall provide warranty and maintain all landscape plantings for two years after Acceptance for Maintenance of plantings and landscape Work. Acceptance Maintenance for plantings and landscape Work will be achieved 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 two 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 or as directed by the Administration.

This 2-year plant material warranty shall apply to all landscaping, reforestation, wetland, stormwater management and reforestation plantings required in the Project.

PS 305 – TRAFFIC PERFORMANCE SPECIFICATION

1.0 GENERAL

The Design-Builder shall be responsible for the traffic analysis and the design and construction of the Project signing, pavement markings, roadway and sign lighting, and traffic signals and traffic lighting.

Signing consists of interchange guide signing for both the ICC mainline and cross-streets approaching the ICC (including I-270, I-370, MD 355, Shady Grove Road, and MD 97), supplemental signs along mainline, toll signing, regulatory and warning signs; all to be coordinated with Intelligent Transportation System (ITS) devices and Electronic Toll Collection (ETC) equipment. Sign lighting for all overhead and cantilever structures shall be provided. Signing is also required along the bike trail which is proposed from Needwood Lane to Emory Lane.

Partial interchange decision point lighting shall be provided by the Design-Builder at each interchange. Partial Interchange Lighting (PIL) consists of luminaires located in the general areas where entrance and exit ramps connect with the through traffic lanes of a freeway (i.e. lighting between the entry gore and the end of the acceleration ramp or exit gore and the beginning of the deceleration ramp). The Design-Builder shall be responsible for design and construction of sign structures and light poles, including foundations, conduit systems, circuitry, power supplies, lighting cabinets, and coordination with the power company to obtain power feed for traffic signals and lighting devices. The Design-Builder shall also provide lighting along the entire length of the Shared Use Path/Bike Trail.

Pavement Markings shall be provided along the mainline ICC, ramps, and cross-streets.

The Design-Builder shall provide Traffic Signals at each intersection as necessary including foundations, traffic signal poles, signal heads, conduit system, circuitry, detection devices, associated signal equipment, and intersection lighting and signing. The Work shall include coordinating utility connections with the proper utility company and coordinating the signal cable connections with Montgomery County to complete the traffic signal installation and connecting each proposed signalized intersection to Montgomery County's interconnect system. The Design-Builder shall also coordinate with Montgomery County to maintain and relocate existing traffic signal system and interconnect system infrastructure, as required.

2.0 STANDARDS AND REFERENCES

2.1 STANDARDS

Traffic analysis, design and construction shall be in accordance with this performance specification and

the relevant requirements of the following Standards, unless otherwise stipulated in this specification. Standards specifically cited in the body of this specification establish requirements that shall have precedence over all others. Should the requirements in any Standard below conflict with those in another, the Standard listed with the higher priority 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

Use the most current adopted version of each listed standard as of the publication date of this RFP.

All traffic analysis shall be in accordance with the relevant requirements of the Standards listed by priority in Table 1

Table 1
Standards for Traffic Analysis

Priority	*Author or Agency*	*Title*	*Document Provided*
1	FHWA	Manual on Uniform Traffic Control Devices (MUTCD)	NO
2	TRB	Highway Capacity Manual	NO
3	ITE	Traffic Engineering Handbook	NO
4	ITE	Manual of Transportation Engineering Studies	NO
5	MSHA	Office of Traffic and Safety's Capacity/Queuing Analysis Procedures for Intersections	YES

All traffic design and construction for signing, pavement markings, and traffic signals shall be in accordance with the relevant requirements of the Standards listed by priority in Table 2.

Table 2
Standards for Traffic Design Criteria
(Signing, Pavement, Markings & Traffic Signals)

Priority	Author or Agency	Title	Document Provided
1	MSHA	Standard Specifications for Construction and Materials, for items identified as Standard in Attachment A of Part 3-Resign Requirements	NO
2	MSHA	Maryland Supplement to MUTCD	NO
3	FHWA	Manual on Uniform Traffic Control Devices (MUTCD)	NO
4	IES	RP-8-00, American National Standards for Roadway Lighting	NO
5	AASHTO	Roadside Design Guide	NO

Table 2
Standards for Traffic Design Criteria
(Signing, Pavement, Markings & Traffic Signals)

Priority	Author or Agency	Title	Document Provided
6	MSHA	Standard Office of Traffic and Safety Shelf Typicals	YES
7	MSHA	Book of Standards for Highway and Incidental Structures for items identified as Standard in Appendix B of Part 3-Design Requirements	NO
8	MSHA	Maryland State Highway Standard Sign Book	NO
9	MdTA	Standard Sign Book	NO
10	MdTA	Guidelines for Traffic Control Devices on Managed Lanes/Managed Facilities	YES
11	FHWA	Standard Highway Signs Book	NO
12	AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*	NO
13	MSHA	Administration, Section VIII, of the "Specifications for Consulting Engineer's Services, Volume II	NO
14	NFPA	National Electric Code	NO
15	IEEE	National Electric Safety Code	NO
16	MSHA	Office of Traffic and Safety's Traffic Engineering Design Division's Traffic Control Devices Manual	YES
17	MSHA	Maryland State Highway Line Striping Material Selection Policy	YES
18	AASHTO	Highway Safety Design and Operations Guide	NO
19	MSHA	Accessibility Guidelines for Pedestrian Facilities along State Highways	YES
20	ADA	Americans with Disabilities Act Accessibility Guidelines	NO
21	MSHA	Accessible Pedestrian Signals – Design Guidelines	YES
22	NCHRP	Report 350. Recommended Procedures for the Safety Performance Evaluation of Highway Features	NO

* Note: For traffic signal structures the Design-Builder shall utilize the 3rd edition. For Sign Structures the Design-Builder shall utilize the 4th edition.

All traffic design and construction for roadway and sign lighting shall be in accordance with the relevant requirements of the Standards listed in Table 3

Table 3
Standards for Roadway and Sign Lighting

Priority	Author or Agency	Title	Document Provided
1	MSHA	Standard Specifications for Construction and Materials for items identified as Standard in Appendix A of Part 3-Design Requirements	NO
2	NFPA	National Electric Code	NO
3	IEEE	National Electric Safety Code	NO
4	NFPA	502-Standard for Road Tunnels, Bridges and Other Limited Access Highways	NO
5	MSHA	Maryland Supplement to the MUTCD	NO
6	FHWA	Manual on Uniform Traffic Control Devices (MUTCD)	NO
7	IES	RP-8-00, American National Standard for Roadway Lighting	NO
8	IES	DG-5-94, Recommended Lighting for Walkways and Class 1 Bikeways	NO
9	IES	RP-22-96, American National Standard for Tunnel Lighting	NO
10	AASHTO	Roadway Lighting Design Guide	NO
11	AASHTO	Roadside Design Guide	NO
12	MSHA	Book of Standards for Highway and Incidental Structures for items identified as Standard in Attachment B of Part 3-Resign Requirements	NO
13	AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 3rd Edition	NO
14	MSHA	Office of Traffic and Safety's Traffic Engineering Design Division's Traffic Control Devices Manual	YES
15	AASHTO	Highway Safety Design and Operations Guide	NO
16	MSHA	Accessibility Policy and Guidelines for Pedestrian Facilities along State Highways	YES
17	ADA	Americans with Disabilities Act Accessibility Guidelines	NO
18	AASHTO	Guide for the Planning, Design and Operation of Pedestrian Facilities	NO
19	AASHTO	Guide for the Development of Bicycle Facilities	NO
20	NCHRP	Report 350. Recommended Procedures for the Safety Performance Evaluation of Highway Features,	NO

2.2 REFERENCES

Use the references listed in Table 4 as supplementary guidelines for traffic analysis. These publications

have no established order of precedence.

Table 4
References for Traffic Analysis

Author or Agency	Title	Document Provided
MSHA	ICC Corridor 1 2030 LOS Wiring Diagram – Design Forecast Volumes	YES
MSHA	2010 LOS Wiring Diagram – No-Build Forecast Volumes	YES
MSHA	2010 Interim LOS at MD 97 – With Corridor 1 Forecast Volumes	YES

Use the references listed in Table 5 as supplementary guidelines for the design of signing, pavement markings, and traffic signals. These publications have no established order of precedence.

Table 5
References for Traffic Design Criteria
(Signing, Pavement Markings & Traffic Signals)

Author or Agency	Title	Document Provided
MSHA	Roundabout Design Guide Manual	YES
FHWA	FHWA Roundabouts: An Informational Guide 2000	NO
TRB	Transportation Research Board's Accessible Pedestrian Signals Synthesis and Guide to Best Practices	NO

3.0 COORDINATION WITH OTHER CONTRACTS

The Design-Builder shall coordinate the design and construction of all traffic control devices for the Project with those required for Contract B and other SHA, MdTA, Montgomery County, and local jurisdiction projects.

3.1 SIGNING REQUIRED FOR CONTRACT B

Any signing needed for adjacent Contract B which must be placed within the Project limits shall be shown on the definitive design roll plan (see section 5.2.1). All sign supports shall have sufficient capacity to accommodate the additional signs required for adjacent Contract B.

3.2 SIGNING FOR MD 97 TO EASTBOUND ICC TRAFFIC MOVEMENTS

For all signing along MD 97 that directs traffic to Eastbound ICC, the Design-Builder shall design and provide a location for the signs but will not fabricate or install the signs. If these signs are to be placed on a structure with a sign for this Project, then the installed structure shall have adequate capacity for the additional signing required when adjacent Contract B is completed.

3.3 SIGNING FOR WESTBOUND ICC AT MD 97

The Design-Builder will not design, fabricate, nor install the 1 mile and ½ mile approach signing for the MD 97 interchange along Westbound ICC. However, the Design-Builder shall be responsible for designing, fabricating, and installing all other approach signing for the MD 97 interchange along Westbound ICC that falls within the limits of work.

3.4 INTERIM SIGNING FOR EASTBOUND ICC AT MD 97

The Design-Builder shall be responsible for designing both the interim interchange guide signing (before Contract B is complete) and the final interchange guide signing (after Contract B is complete) along Eastbound ICC at MD 97. All sign supports shall have sufficient capacity to accommodate the worst case of either the interim signing or the final signing. Contract B will be responsible for removing the interim signing and fabricating and installing the final signing at the completion of Contract B.

4.0 TRAFFIC OPERATIONAL ANALYSES – PROCEDURES AND APPLICATION

4.1 APPROVED ANALYSIS TECHNIQUES AND SOFTWARE

Highway Capacity Manual and Software – Latest Version

The Highway Capacity Manual and Software (latest version) shall be used to analyze all freeway mainlines, ramp junctions (merge and diverge locations), and weaving sections. 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.

Synchro and SimTraffic – Latest Versions

For corridors with multiple intersections, the Design-Builder shall use Synchro and SimTraffic to analyze corridor 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.

CORSIM – Latest Version

For freeway and arterial operations, the Design-Builder may elect to use CORSIM to analyze operations. This shall be in addition to the Highway Capacity Manual and Software, and Synchro/SimTraffic requirements listed above. Results will be considered by the Administration in conjunction with the above when assessing design alternatives proposed by the Design-Builder.

aaSidra – Latest Version

For all roundabouts proposed by the Design-Builder, operational analyses shall be completed with aaSIDRA. The results shall demonstrate that the roundabout operation will be no worse than the corresponding intersection operations proposed in the RFP.

Critical Lane Technique

For all signalized intersections, the Design-Builder shall calculate the level of service for the proposed design and each MOT phase of operation using the Administration's Critical Lane Volume methodology, as outlined in the Office of Traffic and Safety's Capacity/Queuing Analysis Procedures for Intersections memorandum, latest version.

Queuing Analysis Technique

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, as outlined in the Administration's Procedures for Intersections memorandum, latest version.

The Design-Builder shall also analyze all ramps such that the queues do not back from the ramp terminus to the mainline ICC. The Design-Builder shall provide calculations that the sight distance will be adequate for vehicles exiting the ICC at highway speeds to see the back of the queue and decelerate to a stop condition.

Operational Assessment of Design Alternative/s

It shall be the Design-Builder's responsibility to perform traffic analyses for the interim conditions and proposed final design(s) using the tools and techniques listed in Sections 4.1.1 – 4.1.6, as appropriate.

Using the 2010 No-Build Traffic, the Design-Builder shall test all maintenance of traffic alternatives to ensure that there are no operational or safety issues created by the maintenance of traffic plans. Operations during each stage of construction shall be evaluated with the 2010 No-Build Traffic volumes using the procedures outlined in Sections 4.1.1 – 4.1.6 and the Design-Builder shall provide results of these operations to the Administration for review prior to each shift in traffic operations.

The Design-Builder shall use the 2030 Design Volumes to develop and test the final design plans. If a change is proposed to the concepts included in the RFP, the Design-Builder shall provide traffic operations as good as, or better than, the operations of the original design, and shall also provide a corridor analysis using CORSIM and Synchro, to review corridor-wide operations for the proposed change. 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.

In addition to the above, the Design-Builder shall also be responsible for reviewing the anticipated 2030 operational and design proposed speed(s) for each segment of roadway and shall provide the operational and design speed differentials between adjacent lanes (i.e. mainline versus merging ramp) in tabular form for review by the Administration.

Using both the 2030 Design Volumes and the 2010 Interim Conditions traffic for MD 97, the Design-Builder shall test all final design alternatives to provide traffic operations as good as or better than the operations indicated on the 2030 Design Volumes and 2010 Interim Conditions LOS Wiring Diagrams. Following completion of Contract A, the MD 97 interchange will form the eastern terminus of the ICC and more traffic is expected on some movements of this interchange and along MD 97 than in the 2030 design year. Therefore, it may be necessary to provide more capacity to accommodate the 2010 interim traffic than for the 2030 final design traffic. It shall be the Design-Builder's responsibility to make sure that final design plans for this interchange accommodate not only the 2030 Design Volumes, but also the 2010 Interim Traffic Volumes. The Design-Builder shall test not only the proposed interchange operations, but also the mainline operations along MD 97 from north of the interchange ramps to the MD 28 intersection.

Signal Warrant Evaluation

All new or modified intersections shall be evaluated to determine if signalization is appropriate, based on the MUTCD. Study findings shall be presented in a report which outlines the warrants evaluated, consideration given to safety, operations, delay and available gaps in traffic resulting from adjacent signalized intersections. Recommendations shall also be included in the report and shall be attached to the SHA's Office of Traffic and Safety's Traffic Control Device Request Design Request Form, as discussed in section 4.2. All signal warrant evaluations shall be presented and reviewed at the definitive design review.

4.2 PREPARATION AND SUBMITTAL OF SHA'S OFFICE OF TRAFFIC AND SAFETY'S TRAFFIC CONTROL DEVICE REQUEST DESIGN REQUEST FORM

For the following improvements, the Design-Builder shall submit the SHA's Office of Traffic and Safety's Traffic Control Device Request Design Request Form to the Administration with accompanying traffic operational analysis reports/documentation and signal warrant analyses (see section 4.1.8):

A) New traffic signals, intersection control beacons, or hazard identification beacons;

B) Removal of existing traffic signals, intersection control beacons, or hazard identification beacons;

C) Functional change of any existing traffic signal, such as adding or changing signal phases;

D) Any type of signal preemption or priority;

E) Any existing traffic signal modification such as relocating poles, strobes, optically-programmed heads, LED heads, back plates, adding or shifting signal heads, addition of accessible pedestrian signals and countdown pedestrian signals, etc.;

F) Additional signal detectors or changes to existing detectors;

G) Signal detector repair/replacement as part of a reconstruction or resurfacing effort;

H) All highway lighting or major change to an existing lighting system;

I) All new overhead or cantilevered sign structures or modifications to existing;

J) All revisions to the legend of major guide signs;

K) Signing additions or changes on the Interstate System; and

L) Signing and pavement markings for new facilities and modifications to existing facilities.

To initiate the definitive design process, the Design-Builder shall prepare each Design Request Form in accordance with the procedures outlined in the Administration's Design Request Form Instructions and Guidelines, and shall submit the Design Request Form and supporting traffic studies and documentation to the Administration. All Design Request Forms will be submitted to the Administration for consultation and written comment, prior to the Design-Builder proceeding with the design, installation, or modification to any traffic control device.

5.0 SIGNING

5.1 DESIGN AND CONSTRUCTION REQUIREMENTS

Definitive Design Signing Roll Plan

The Design-Builder shall prepare a Definitive Design Signing Roll Plan and present the plan at a review meeting with the Administration. The roll plan shall include proposed sign locations and messages for all guide signs, toll signing, typical regulatory and warning sign applications, proposed locations for relocating existing signs, and proposed locations for new structures. The Design-Builder shall not relocate existing sign structures. The roll plan shall display signing for all mainlines, ramps and interchanges, as well as for the arterial streets, frontage roads, and any other roadways that contain signing that is affected by the Project. The Design-Builder shall also provide for modification or removal of any signage outside the limits of the Project that is no longer appropriate or pertinent. The signage shall be removed or modified regardless of whether it falls within or outside the limits of construction along the mainline and approach roads. The roll plan shall include the location of all proposed and existing Dynamic Message Signs as specified in the Intelligent Transportation System Performance Specification and RFP Plans. The roll plan shall include the locations of all proposed electronic toll

equipment as specified in the Electronic Toll Collection Performance Specification and RFP Plans. The concept plan shall include signing for the future M-83 interchange, located west of the Olde Mill Run Deck over structure. The conceptual signing along MD 97 shall also include signing for the proposed MD 28 interchange with MD 97. The Design-Builder shall also provide an interim signing plan for the MD 97 interchange and display the interaction between the interim and the final signing when adjacent Contract B is completed. The interim signing plan shall include freeway ends signing along eastbound ICC approaching MD 97. The Design-Builder shall provide signing for roadways where existing access has been modified. The signing modifications due to the access modifications shall be shown on the definitive plan. The plan shall also denote which agency is responsible for ownership and maintenance of each sign and structure (i.e. SHA, MdTA, or local jurisdiction). The definitive plan features shall include, but are not limited to, the existing and proposed roadway alignments, right-of-way, utilities, baseline of construction (including stationing), and existing topography at the tie-in points of the roadway limits of work. The proposed pavement markings shall also be shown on the proposed signing concept plan. The Design-Builder shall also provide a location on the definitive plan for MdTA's "Welcome to the MdTA" sign along the eastbound ICC at the entrance to the roadway. A detail of the sign (MdTA-1.01) is available on MdTA's website. The Design-Builder will not be responsible for furnishing and installing the sign, only to have an acceptable location along the eastbound ICC reserved for the sign.

Plan Sheet Requirements

Once the roll plan is reviewed by the Administration, 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, MUTCD sign designation (if applicable), size and location of all route marker assemblies, guide, warning, toll and regulatory signing. These plans shall also show the location, messages and sizes of all existing signs. All existing signs to be removed or relocated shall also be shown. The plans shall include the location and type of delineation devices (including pavement markings). The Design-Builder shall also include milepost signs spaced every 0.1 miles along mainline ICC utilizing the D10-1a, D10-2a, and D10-3a signs. For every whole mile, the Design-Builder shall utilize the D10-5 sign. All exits shall be numbered using reference location sign exit numbering, which means the existing numbers relate to the mile reference of mile marker, at that location. When more than one exit occurs within the same mile, the first exit shall be identified with the number and letter "A", the second exit "B" and so forth. Milepost 0.0 for the ICC is located east of the diverge for the Metro Access Road at approximately Station 110+00. The owner of each sign/structure shall be clearly noted on the plan sheets. All proposed guide signs shall be detailed on a SN-3 (Sign Fabrication) detail sheet. The plan set shall include MdTA's latest SN-1 sheet (General Notes and Proposals). The Design-Builder shall be responsible for contacting MdTA Traffic Manager to obtain the latest SN-1 sheet. The SN-4 (Ground Mount Sign Support Details) sheet shall be used for all ground mounted 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 the support spacing from left edge of sign. 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 may be included which summarizes the quantities and materials in table format being used for this Project. Every sign location shall have a line on the SN-11 sheet.

Design of Sign Locations

The Design-Builder shall design, fabricate and install all the overhead and ground mounted signs shown on the definitive plan, within 100-feet of the location shown on the definitive plan or as approved otherwise by the Administration. 800 foot spacing shall be maintained between overhead signs and traffic signals. All mainline guide signs, Dynamic Message Signs, supplemental guide signs, and any overhead structures including toll gantries shall be installed at a minimum of 800 foot intervals. Signs, including regulatory and warning signs, along the ramps shall be installed at a minimum of 200 foot intervals. The Design-Builder shall provide documentation that there is sufficient sight distance provided to allow appropriate Perception, Identification, Emotion, and Volition (PIEV) time for all signs along the ramps. The interchange signing shall include at a minimum the 1 Mile, ½ Mile, Exit Direction Guide signs, and the Exit Gore sign as well as all additional toll related signing as shown in MdTA's Managed Lane / Managed Facility Guidelines. Approaching the ICC along eastbound I-370, the Design-Builder shall provide for an additional 2 Mile advanced guide sign for the ICC. The Design-Builder shall provide street name signs at overpasses along the ICC. Street name signs shall also be provided along the trails which cross under the ICC. The signs shall be ground mounted and shall not be attached to the bridge structure. The Design-Builder shall design all details of the sign panels, as well as ground mount and overhead supports. The Design-Builder shall coordinate the proposed sign locations with all proposed landscaping, utility, hydraulic, lighting, ITS equipment, Toll equipment, and all other roadside features to assure proper clearances, lighting levels, and adequate sight distance.

Sign Design and Construction Requirements

The messages, fonts, font sizes, arrows, shields, colors, borders, and type of supports for the overhead and ground mounted signs shall be designed and constructed according to the MUTCD and following interchange classifications. The Clearview font shall be utilized for all positive contrast guide signs. Along the ICC, the MD 355 Interchange, Metro Access Road/Shady Grove Road Interchange, and the MD 97 Interchange shall be classified Freeway–Major-Category b as defined in the MUTCD section 2E.29. The text size for the 1 Mile and ½ Mile interchange exit signing along the ICC shall utilize 16" U.C. and 12" L.C. E Modified text. All exit direction signs along the ICC shall utilize 20" U.C. and 15" L.C. E Modified text. Each sign shall utilize the following destinations:

	Destination	
Interchange	Northern	Southern
MD 355	Gaithersburg	Rockville
Shady Grove Road	--	Shady Grove Road
Metro Access Road	--	Metro Symbol & "Station"

MD 97	Olney	Wheaton

All existing guide signs along I-270 and I-370 shall be the same destinations as shown on the existing signs. All advance guide signing for I-370 along I-270 shall be modified to include "TO" and the route number designated for this project, as determined by the Administration. The Design-Builder shall utilize the guide sign logo options displayed in MdTA's guidelines for Traffic Control Devices on Managed Lanes/Managed Facilities for the route number shields.

Along MD 355, the signing shall be modified to sign eastbound ICC traffic to use Shady Grove Road to access the ICC. Along Shady Grove Road, the east destination shall be "TO MD 97" and the west destination shall be "TO I-270". The MD 97 interchange shall only sign for the western destination "TO I-270". After the entire facility is completed the "TO MD 97" messages shall be removed from all signs and replaced with "TO I-95". The Design-Builder shall ensure that all guide signs that include the "TO MD 97" message can accommodate modifying the message to "TO I-95". The Design-Builder will not be responsible for modifying this message but shall provide a sign design detail showing how the sign will accommodate the modified message. Note: The Design-Builder shall use route shields to display the MD 97, I-270 and I-95 messages.

In regards to Regulatory/Warning Signs and route marker assemblies, all signs along I-270, I-370, the ICC, and associated ramps shall be Freeway size. All signs designed and installed along all other roadways shall be Standard size. The sizes of the signs shall adhere to the latest edition of the FHWA Standard Highway Signs Book, the Maryland Standard Sign Book, and the Maryland Transportation Authority Standard Sign Book.

All guide signs along eastbound ICC for the Metro Access Road shall include the "Last Exit Before Toll" messages below the sign in black legend on fluorescent yellow background.

Guide Signs indicating left or exit only movements entering or exiting freeways or expressways shall have the action message (i.e. NEXT LEFT, LEFT LANE, EXIT ONLY, etc.) in black legend on fluorescent yellow background. Fluorescent yellow background shall be used for all yellow traffic signs. When a sign contains more than one background color, the signs shall have two separate borders corresponding to each background color where the background colors meet. If the background colors utilize the same border color, then only one border is necessary where the background colors meet.

All proprietary logos (i.e. MdTA Police, etc.) will be provided by the Administration. The Design-Builder shall identify the logos required during the definitive design process. Those logos 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 between the definitive design review and the readiness for construction review.

All signs greater than 4' x 8' shall be manufactured using extruded aluminum sign material. All signs that are installed under this Project shall be ASTM Type XI sheeting and conform to D 4956, Type XI. This includes both the sheeting for the text and the sign backgrounds.

Sign Support Design and Construction

All ICC mainline and interchange guide signs, including guide signing along MD 355, Shady Grove Road, and MD 97, and toll rate signs shall be installed overhead, either on Overhead or Cantilever Structures. For each 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 cross-sections and profiles at all sign locations, and make adjustments as necessary to provide adequate sight distances, proper placement of the guide signs and adequate ground clearances. Using the sign structure cross-section, the Design-Builder shall correctly fill out the Administration's sign structure input sheet for each overhead/cantilever sign structure with associated cross section and include with the definitive design for Administration review and written comment. Comments to input sheets will be provided within fourteen calendar days and returned to the Design Builder for revisions if needed. Once comments to input sheets have been satisfactorily resolved, the Design-Builder shall develop the standard SN-8 and SN-9 sheets for the sign structures. Administration will provide current SN-8 and SN-9 sheets upon request.

Signs not installed overhead shall be ground mounted on either steel or wood posts. The Administration will provide design charts for design of steel and wood supports. The wind speed to be used in design shall be 90 mph. Sheet aluminum signs shall be mounted on wood supports or square tubular steel posts. All exit gore signs shall be placed on steel supports. Signs over 32 square feet shall be installed on steel posts, unless otherwise noted by the Administration for a particular sign. Additionally, if signs are installed at a location where steel posts are required then extruded aluminum sign material shall be used.

No signs nor 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.

Proposed sign locations shall be coordinated with all proposed landscaping, utility, hydraulic, lighting, ITS equipment, Toll equipment, traffic signals, roadway profiles, bridge approach structures, and all other roadside features to assure proper clearances and adequate sight distance.

The Design-Builder will be responsible for locating and marking all underground utilities prior to any sign installation work.

The signing for the mainline ICC shall be installed at the end of the project and within two months of opening the road to traffic.

The Design-Builder shall design, fabricate, and install all regulatory, warning, route marker assemblies, toll information, and guide signs required for this Project, including approaches outside Project limits. The Design-Builder shall modify all existing signs requiring message modification, including approaches outside Project limits.

The Design-Builder shall provide sign lighting maintenance systems for all overhead and cantilever sign structures for both existing and new within the Project limits in accordance with the lighting section of this RFP. All sign lighting shall be on dedicated circuits. The sign lighting design shall be shown on the roadway lighting plans. All overhead sign structures shall be lit.

The Administration will provide the Design-Builder with blank 'Structure Verification for Adding, Deleting or Modifying Signs on Existing Structures' sheets. Any modifications to the existing overhead sign structures, including replacement of sign panels, shall be presented to the Administration for review and written comment. Review and written comments, if necessary, will be provided within fourteen calendar days. Upon satisfactory resolution to comments, the Design-Builder shall draft the plans and/or notes using CADD for review with the Administration.

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.

For the Shared Use Path proposed from Needwood Lane to Emory Lane, the Design-Builder shall provide signing along the trail and along the cross-streets. The trail signing shall provide for the orderly and predictable movement of both pedestrian and vehicular traffic. Also, the signing shall provide proper guidance and warnings as are needed to ensure the safe and informed operations of both the pedestrian and vehicular traffic along both the trail and roadway.

Aesthetic Guidelines

The Design-Builder shall provide signs, sign supports, and structures that conform to the aesthetic guidelines as stated in the Structures Performance Specification and RFP Plans.

Design and construction of proposed aesthetic sign structures shall begin along Eastbound I-370 / ICC from east of the MD 355 interchange to the Project interface with Contract B and along Westbound I-370 /ICC from the Project interface with Contract B to the exit direction sign for MD 355. All overhead signing within Shady Grove Road/Metro Access Interchange which is north of Shady Grove Road shall be proposed aesthetic sign structures. All overhead signing along Shady Grove Road, MD 97, and the Metro Access Road (south of Shady Grove Road) shall be standard SHA four-chord galvanized structures.

For all overhead or cantilever aesthetic sign structures, the top of the sign shall be even with the centerline

of the top chord of the structure and the bottom of the sign shall be even with the centerline of the bottom chord. For any overhead or cantilever aesthetic sign structure which contains two or more signs, the signs shall be the same height. If a sign contains an exit panel, the exit panel may be higher than the centerline of the top chord of the structure.

5.2 SUBMITTALS

The Design-Builder shall submit the following items prior to the readiness for construction review.

a) Definitive Design Signing Roll Plan
b) For all proposed sign structures, the Administration's sign structure input sheet for each overhead/cantilever sign structure along with the associated cross-sections.
c) For all existing sign structures, the Administration's 'Structure Verification for Adding, Deleting or Modifying Signs on Existing Structures' sheets.

6.0 PAVEMENT MARKINGS

6.1 DESIGN AND CONSTRUCTION REQUIREMENTS

All proposed pavement markings shall be shown on definitive plans for signing and reviewed by the Administration prior to advancing the design.

All proposed pavement marking shall be shown on the same plan sheets as the signs. All single longitudinal lines shall be 5 inches wide, and all double width lines shall be 10 inches wide. The plans are to show color, size, location, and material type for markings within the limits of work. The final design marking plans shall be indicated on the signing plan with the same scale as the signing plan. The lanes shall be dimensioned based on the typical sections for the Project. Dimensions shall be included for each change in the roadway typical.

For all final pavement marking lane lines including parallel, acceleration/deceleration lanes for ramps, and intersection auxiliary lanes, the following table shall be adhered to:

Pavement Marking Abbreviations

RPMs-Plowable Raised Pavement Markers

PPPRP-Permanent Patterned Preformed Retro-Reflective Pavement Markings

Durable Markings-Includes thermoplastics, patterned profiled thermoplastics (wet tape), or

epoxy. All durable markings shall demonstrate wet retro reflective properties when tested in accordance with ASTM #E 2177-01 (retro reflectivity recovery).

Paint-Whenever paint is listed as an application, the 50/50 blend of large and standard glass beads is required.

Roadway Type	Line Striping Material		
	Center Lines	Lane Lines	Edge Lines
PORTLAND CEMENT CONCRETE (PCC) (including Bridge Decks)			
Interstate Highway / Freeway	------	Contrast PPPRP with RPM's	PPPRP**
Highway (other than Interstate/Freeway) AADT ≥ 50,000	PPPRP with RPM's	Contrast PPPRP with RPM's	PPPRP
Highway (other than Interstate/Freeway) AADT < 50,000	PPPRP with RPM's	Contrast PPPRP with RPM's	PPPRP
HOT MIX ASPHALT (HMA)			
Interstate Highway / Freeway	------	PPPRP with RPM's	PPPRP
Multi-lane or Divided Highway (other than Interstate/Freeway) AADT ≥ 50,000	PPPRP with RPM's	PPPRP with RPM's	PPPRP
Multi-lane or Divided Highway (other than Interstate/Freeway) AADT < 50,000	Durable with RPM's	Durable with RPM's	Durable
2-Lane 2-Way Roadway AADT ≥ 30,000	Durable	------	Durable
2-Lane 2-Way Roadway AADT < 30,000	Paint	------	Paint

** Note: Contrast Markings shall be utilized for the right edge (white) lines. The left edge (yellow) lines shall not utilize contrast markings.

All transverse pavement markings (i.e. 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 across roads at all signalized intersections where a traffic study has determined a need or as noted by the Administration.

All pavement markings installed on HMA surface on the ICC, I-370, and associated ramps shall be in-laid.

The Design-Builder shall mark locations all fire hydrant locations along the ICC with both blue raised pavement markers and blue post mounted delineators.

7.0 TRAFFIC SIGNALS

7.1 PERFORMANCE REQUIREMENTS

Using the criteria specified within Section 4.0 – Traffic Operational Analyses and Section 7.2 Traffic Signal Design Requirements:

A) The traffic signals shall be designed to provide for the efficient movement of traffic (vehicular and pedestrian) in both the year of operation (2010) and the design year (2030);

B) The Design-Builder shall develop signal timing plans that optimize traffic flows and provide signal coordination with adjacent intersections and arterial roads;

7.2 DESIGN AND CONSTRUCTION REQUIREMENTS

Definitive Design Traffic Signal Roll Plan

The Design-Builder shall prepare a definitive design in the form of a traffic signal location roll plan for Administration review that includes all existing signal equipment and interconnect, and displays all proposed signal equipment and interconnect within the Project. The plan shall also display all existing and proposed crosswalks within the Project. A temporary Maintenance of Traffic (MOT) Plan, along with associated phasing of signal construction, shall also be presented at this time.

Plan Sheet Requirements

The Design-Builder shall prepare Traffic Signal plans to address any new traffic signals or modifications that are required. The traffic signals shall be designed as per the Design Request Form for each intersection. All traffic signal plans shall be drawn in accordance with the Administration's Traffic Control Device design manual and CADD standard requirements, MUTCD, and Maryland Supplement to the MUTCD.

Existing traffic signal operation and detection shall be maintained during all phases of the roadway construction and all stages of Maintenance of Traffic.

Design and construction of all permanent traffic signal shall be mast arm type unless otherwise noted by the Administration.

Lighting shall be provided on all signal poles wherever feasible, and shall be coordinated with adjacent existing and/or proposed roadway and/or sign lighting.

Pedestrian signals and pushbuttons shall be installed at crosswalk locations as specified in the Design Request Form for each intersection. All pushbutton locations shall be in compliance with the current ADA and Accessible Pedestrian Signal (APS) standards and guidelines. The traffic signals shall have countdown pedestrian signal heads and APS pushbutton stations at all locations where signalized cross-walks are provided.

Interconnect Plans

The Design-Builder shall prepare traffic signal interconnect plans as indicted in the Design Request. Interconnect plans shall be drawn at a scale of 1"=50'. The Design-Builder shall obtain all existing interconnect information. Interconnect plans shall include controller cabinet locations, conduits, handholes, sampling stations, wiring diagram, cables, construction details and equipment list in accordance with the Administration's design and CADD requirements. All existing traffic signal interconnect shall be maintained throughout construction, which may require relocation or temporary interconnect. All existing interconnected signals and new signals shall remain interconnected under the final design. The Design-Builder shall use 50-pair communication cable where ever new communication cable is being installed.

The proposed traffic signal interconnect cables shall not utilize any conduit runs that contains toll system cables.

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 fiber optic cable impacted by construction. The Design-Builder shall coordinate with Montgomery County to facilitate the relocation of existing interconnect cables and equipment. Splices will not be permitted along existing or proposed interconnect runs. 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.

Utility Requirements

The Design-Builder shall be responsible for locating and marking all underground utilities prior to any signal installation work. The Design-Builder shall be responsible for all Work, materials, and costs associated with obtaining power and maintaining power throughout construction for all traffic signals, including coordination with the power company and obtaining power supply for all traffic signals and other electrical work 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 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 be solely responsible for all Work and costs associated with obtaining communication cable and maintaining communication cable throughout construction for all signals. Montgomery County 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. It is anticipated that it will take at least one year to obtain power supply from the utility companies.

Sight Distance Requirements

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 present sightline plans for all traffic approached to the Administration for review and written comment.

The Design-Builder shall also prepare and submit to the Administration for review and written comment sightline profiles for all overhead signs, bridges and hazard identification beacons that are on traffic signal approaches.

The Design-Builder shall prepare and present to the Administration for review and written comment separate sightline plans and profiles for each MOT phase that has different sightlines approaching a traffic signal. If sight lines do not meet the MUTCD requirements, the Design-Builder shall provide a recommendation for meeting the requirements to the Administration.

Materials

Traffic signals shall be designed and constructed in accordance with the following:

A) Using Video Detection systems for vehicle detection and sampling;

B) Using Econolite Traffic Signal Cabinets wired in accordance with Administration specifications. The Design-Builder shall be responsible for delivering the assembled signal cabinet and controller to the Montgomery County Traffic Signal Shop for testing and approval. The Design-Builder will then be responsible for delivering the cabinet and controller to the site and installing. The Montgomery County will provide final connection of all cables within the cabinet;

C) Wiring required;

D) Using Light-Emitting Diode (LED) traffic signal heads and countdown pedestrian signal heads;

E) Using Pre-emption equipment; and

F) Using APS pushbutton stations and signs.

7.3 TEMPORARY TRAFFIC SIGNALS

The Design-Builder shall provide temporary traffic signals as required by the traffic control plans and Design Request Forms. The Design-Builder shall perform all studies as necessary for placement of Temporary Traffic signals, complete the Design Request Forms, and present all information to the Administration for review and written comment.

7.4 SUBMITTALS

The Design-Builder shall submit the Definitive Design Traffic Signal Roll Plan prior to advancing design to the readiness for construction review.

The Design-Builder shall submit the traffic signal roll plan at the same time of submitting the signing roll plan.

8.0 LIGHTING

8.1 DESIGN AND CONSTRUCTION REQUIREMENTS

The Design-Builder shall not provide any additional High Mast Lighting.

The Design-Builder shall design Project and Contract B interchange lighting for MD 97 but shall only install lighting within Project limits.

For existing lighting, the maximum outage time for luminaires shall be 24 hours.

Partial Interchange Lighting

Partial interchange lighting shall be provided at new interchanges within the Project limits. Lighting within existing interchanges shall be modified to accommodate interchange improvements. All deceleration lanes shall be illuminated from the beginning of the deceleration lane (including the taper) or 500’ upstream of the painted nose (whichever is shorter) to 140’ beyond the gore nose. Light poles shall not be placed inside the gore within 100’ of the gore nose along mainline lanes. Mainline lanes downstream of the exit ramp gores shall be lit to 140’ beyond the gore nose. All acceleration lanes shall be illuminated from the gore nose to the end of the acceleration lane (including the taper) or 500’ beyond the painted nose (whichever is shorter). In locations where there exists less than ¼ mile between partial

interchange lighting systems, the Design-Builder shall continuously light that section of roadway with low-level lighting.

For the Shady Grove Road / Metro Access Road Interchange, the Design-Builder shall maintain a minimum of 0.3 fc on all ramps.

For all interchange lighting along I-370 or ICC that is east of Oakmont Avenue, the Design -Builder shall design and install lighting that consists of cobrahead luminaires mounted 40 feet above the pavement and consistent with aesthetic guidelines provided in the Structures Performance Specification and RFP Plans. Interchange lighting along MD 97 shall utilize SHA standard lighting structures.

For existing interchanges, lighting poles shall match the existing luminaire and poles (including cobrahead luminaires mounted 40 feet above pavement, Montgomery County DPW&T Cut-off flat glass style on 25 foot aluminum pole, or shoebox luminaires on 30’ poles). The high mast lighting along I-370 from I-270 to Oakmont Avenue shall be maintained. All impacted high mast lighting structures shall be replaced in kind. The Design-Builder shall be responsible to analyze existing interchange lighting to determine if light levels meet current IES RP-8 recommendations. The Design-Builder shall provide additional lighting if required.

Power supply for lighting shall be installed in separate conduits and on independently metered circuits for respective jurisdictional owners.

Existing Non-Interchange Roadway Lighting

In locations where the ICC will impact existing county roadway lighting at non-interchange locations, lighting shall be replaced by the Design-Builder. Lighting shall incorporate the same luminaire and pole type as on the rest of the roadway in order to maintain consistency. Luminaires and poles shall include, but are not limited to, the following:

A) Montgomery County DPW&T Cut-off flat glass style on 25' aluminum pole;

B) Montgomery County DPW&T Colonial Post-Top on direct buried fiberglass pole with a luminaire mounting height of 12' above finished grade spaced at 120' intervals as per Montgomery County Standards; and

C) Montgomery County DPW&T Tear Drop lighting structure.

The Design-Builder shall design and construct the lighting system consistently with operational and engineering requirements of the owning and 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 Montgomery County DPW&T to coordinate relocation of the light fixture. The Design-Builder is not responsible for agreements between the County 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 Contractor upon removal. The Design-Builder shall notify the owner of the lighting being removed at least two weeks in advance of scheduled equipment removal.

Olde Mill Run Deck Over Structure Lighting

Lighting shall be provided in conformance with the IES-RP-22 for any proposed deck over structure. A deck over structure shall be considered any contiguous enclosed roadway segment (walls and ceiling) that is 300 feet or longer. Deck over lighting shall require monitoring and controls that shall be integrated into the MdTA's existing tunnel control system. The Design-Builder shall install monitoring equipment that will report the status of the lighting (On or Off), state of lighting (if lighting levels change in response to ambient lighting conditions), and provide controls to manually select the state (set the lighting level to higher or lower intensities). The lighting system shall be a long-life lighting system. A long-life lighting system shall be a lighting system with a functional life time (<50% failure of any component including lamp and depreciation not worse than 70% at 70,000 hours) of at least 100,000 hours. Systems without electrodes such as the Sylvania Icetron, LED systems, or other long life technology shall be utilized. The CRI of any lighting system shall be 40 or above.

The lighting system, along with the traffic control systems, for any deck over shall be backed-up by a centralized back-up power system with an automatic transfer switch (ATS). The back-up power system shall have an uninterruptible power supply and shall provide a minimum of 24 hours of continuous operation at full electrical load without manual intervention, and shall be suitably secured from vandalism. If a generator is selected, the operation of the generator shall not exceed 65 dBA measured at the closest right-of way line. A remote monitoring system shall be provided for the back-up power system operations and environmental conditions within the structure enclosure that monitors the entire power system not limited to lighting, ATS status (normal or emergency power), back-up power system operation status (idle or running), remaining fuel supply (if a generator is selected), energy demand (KW and Amps), Voltage (each phase), smoke/fire/temperature alarms, security alarms, and water intrusion alarms. The back-up power system and ATS operations shall be remotely monitored and connected to the Administration's network. Paved access for maintenance and re-fueling (if necessary) of the back-up power system shall be provided from the ICC. Tunnel electrical gear shall be in close proximity of the generator. The Design-Builder shall design, coordinate all efforts, connect the remote monitoring system, provide application software, and make all network connections to the ICC fiber optic cable system. Deck over structure electrical gear shall be installed in NEMA 4X enclosures or contained within the building and in accordance with NEC and NFPA. At least 25% spare breakers (of each size, except for mains) and at least 25% more circuits (rounded to the next highest whole number) shall be furnished and installed. The electrical service gear shall be rated for at least 50% more electrical load than is installed at the time of construction. At least 50% additional conduit capacity shall be provided (stubbed-out) through concrete pads or structures supporting the electrical gear to support future addition of electrical

loads. Design of the back-up power system and supporting electrical service shall include short circuit/fault circuit studies for Administration review. The system shall also include supporting software that is automated and logs monthly back-up power system tests. The back-up power system shall not be purchased until the Administration has thoroughly reviewed the complete system, and the Design-Builder has successfully addressed all comments and is satisfied the proposed back-up power system is in full compliance with requirements.

Shared Use Path Lighting

Lighting shall be provided along the proposed Shared Use Path/Bike Trail to be constructed as part of this Project. Lighting along any existing Bike Trail impacted by this Project shall be modified. Bike Trail lighting shall be County DPW&T Colonial Post-Top on direct buried fiberglass pole with a luminaire mounting height of 12' above finished grade, spaced at 120' intervals as per Montgomery County Standards. The Design-Builder shall design and construct the lighting system to be consistent with IES standards and the operational and engineering requirements of the owning and maintaining agencies.

Underpass Lighting

The Design-Builder shall provide underpass lighting as necessary to maintain continuity of roadway lighting. The underpass lighting shall provide lighting in daytime periods if meeting criteria from the AASHTO "An Informational Guide for Roadway Lighting". The Design-Builder shall remove all existing underpass lighting at MD 355/I-370, Ramp M/I-370, and Oakmont Avenue/I-370 and replace with new fixtures designed to accommodate the I-370 bridge widenings.

Intersection Lighting

The Design-Builder shall combine intersection lighting with the traffic signal plans whenever possible. All intersection 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 of intersection lighting.

Pedestrian Culvert Crossing Lighting

The Design-Builder shall design and construct lighting in all pedestrian culverts crossing under the ICC. All lighting shall meet criteria included in IES DG-5-94 and RP-8-00.

8.2 SUBMITTALS

A lighting roll plan shall be presented at the definitive review and concurrently with the signing, signal and ITS roll plans for review and written comment by the Administration. The lighting roll plans shall include proposed locations for all lights and photometric calculations supporting the light locations. The definitive design shall also include proposed partial interchange lighting for the future M-83 interchange.

The Design-Builder shall provide spacing computations showing luminance, illuminance and veiling

luminance calculations. The calculations shall include uniformity ratios and point-by-point computations. The Design-Builder shall apply a light loss factor of 0.65 when computing photometrics. The computations shall use the lamp lumen requirements in Section 950.12.02 of the Administration's Standard Specifications for Construction and Materials.

8.3 PERFORMANCE REQUIREMENTS

All proposed lighting equipment shall be located such that it can be readily maintained by personnel of the maintaining agency. 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.

The Design-Builder shall provide voltage drop calculations for all circuits. The voltage drop for each 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.

Two conductor duct cables shall be used for all 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 conduit under all roadway surfaces. Single conductor cables shall be used any place cables are to be installed in conduit. The Design-Builder shall provide electrical manholes and connector kits to splice the conductors. No in-ground splices of electrical cables shall be permitted for any reason. No electrical manholes shall be placed in drainage ditches. The Design-Builder shall abandon existing conductors between poles that are to be removed.

Any existing lighting structure that is impacted by construction of this Project shall be disconnected and reconnected to its original power supply by the Design-Builder as part of this Project unless it is being removed. All abandoned cables shall be made safe.

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.

In areas where low level lighting is implemented, the maximum allowable vertical and horizontal illuminance at residential property lines shall be 0.01 foot-candles (fc). House side shielding shall be implemented for all low level lighting within 75 feet of a residential structure, where necessary to achieve the 0.01 fc horizontal or vertical illuminance requirement.

All electrical designs shall be coordinated with the electrical system required for the ITS and Tolling equipment. The lighting system shall utilize cabinets and conduits separate from the Electronic Toll Collection and Intelligent Transportation System equipment.

Sign Lighting

Any lighting system with a lamp life less than 70,000 hours shall be installed on a maintenance track system or other system that provides lamp replacement from the shoulder of the road without closing lanes. Signs shall be only lit from beneath the signs. Acceptable lighting shall consist of metal halide lighting, mercury vapor, or other approved conventional lighting system with a CRI>70 and lamp life>15,000 hours and a manufacturer guarantee of replacement parts availability for 10 years past the manufacture date. Any lighting system with a lamp life less than 70,000 hours shall be installed on a maintenance track system or other system that provides lamp replacement from the shoulder of the road without closing lanes. Alternatively, long-life lighting systems may be utilized if approved by the Administration. A long-life system shall be a lighting system with a functional life time (<50% failure of any component including lamp and depreciation not worse than 70% at 70,000 hours) of at least 10,000 hours. If long-life systems are approved for use, such systems may be used without requiring maintenance track systems to support shoulder access for maintenance. 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. On SHA owned and maintained structures, the design of luminaires for sign illumination shall be in accordance with OOTS standard lighting charts. On MdTA owned and maintained structures, sign lighting 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 lighting within Project limits shall be maintained throughout construction.

Plan Sheet Requirements

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, 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 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 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 and a sign lighting schedule.

8.4 CONSTRUCTION REQUIREMENTS

The Design-Builder shall place cobrahead 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, subject to review by the Administration.

Temporary Lighting

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 shown on the RFP Plans throughout construction. If required to maintain the existing lighting levels in the Project area, the Design-Builder shall install and maintain temporary lighting. 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.

Electrical Service for Lighting

The Design-Builder shall be solely responsible for all Work, materials and costs (including coordination with the power company) required to obtain power supply for all lighting and work required for this Project. The Design-Builder shall be responsible for 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 be responsible for maintaining power throughout construction for all lighting facilities. 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 feed location(s). It is anticipated that it will take at least one year to obtain power supply from the utility companies.

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.

Aesthetic Requirements

The Design-Builder shall provide lighting structures and luminaires that conform to the aesthetic guidelines identified in the Structures Performance Specification and RFP Plans.

9.0 SIGNING DATABASE

The Design-Builder shall be responsible for inventorying all signs installed on MdTA property and all other MdTA owned signs installed under this Project. The inventory shall include, but is not limited to, sign size, support type, GPS location of the sign, pictures of the sign (front, back, and sides), and retroreflectometer readings for each sign. Pictures shall be taken and recorded of the front, back and side of each sign. A sample Field sheet for both ground mounted signs and overhead/cantilever signs is

included for reference purposes. The Design-Builder shall be responsible for inputting the field inventoried information into a Microsoft Access Database. A blank database template will be supplied to the Design-Builder by the Administration. The database manual with descriptions of the database fields will be provided to the Design-Builder by Administration. The Design-Builder shall submit the completed database to the Administration for inclusion within the MAXIMO program.

The Design-Builder shall be responsible for providing all signing plan sheets in .pdf format along with all Plans and approved shop drawings in .pdf format to the Administration for inclusion in the MAXIMO program.

10.0 ADVISORY SPEEDS

The Design-Builder shall be responsible for providing a report to the Administration that documents all mainline advisory speeds and advisory ramps speeds. The report shall include an investigation of the horizontal geometrics based on AASHTO roadway design guidelines. The investigation shall define the critical stopping sight distance for each ramp and acceleration and deceleration distances. These above values shall be field verified to determine if the actual conditions provide the critical distances required. Pavement conditions of each ramp shall also be noted. Photographs for each ramp shall be taken and included in the report. The Design-Builder shall evaluate each ramp with an electronic accelerometer (CurveRite Model 1100 or approved equivalent). All electronic accelerometer measurements shall follow the manufacturer's instructions. The field testing shall not exceed the posted regulatory mainline speed limit and shall be stopped if g-force measurements exceed 0.40 g-ft/sec^2. The recommended average g-force for determining advisory speeds is 0.28 g-ft/sec^2 and should be posted in 5 MPH increments.

11.0 REGULATORY SIGNING

The Design-Builder shall be responsible for providing an engineering study to the Administration that documents all regulatory signing (i.e., speed limits, truck restrictions, etc.) installed under this Project.

12.0 ENGINEER SUPERVISION AND QUALIFICATIONS

Traffic design, including but not limited to traffic analysis (including computer traffic simulation and optimization models), design of Traffic Control Devices (including signing, traffic signals, pavement markings, and lighting), development of traffic signal timings, freeway traffic management techniques, and design for Maintenance of Traffic, shall be supervised and submitted by an engineer licensed as a Professional Engineer in the State of Maryland and a certified Professional Traffic Operations Engineer (PTOE) with a minimum of 10 years experience on projects of similar magnitude and complexity. All licensure and certification shall be completed by Notice to Proceed for this project.

Electrical and Lighting design, including but not limited to circuit design and implementation as well as photometric studies, shall be supervised and submitted by an engineer licensed as a Professional Engineer in the State of Maryland with a minimum of 10 years experience on projects of similar magnitude and complexity. All licensure and certification shall be completed by Notice to Proceed for this Project.