TECHNICAL REQUIREMENTS
Exhibit C

- Design and Construction Requirements,
- Public Information and Communications,
- Project Management, and
- Operations, Maintenance, and Tolling.

Intent

VDOT and ERC have worked together to develop a document that will serve as Exhibit C of the Comprehensive Agreement and reflect the minimum Project requirements in effect during the Term of the Project.

Design Principles

The Design shall be governed by the following principles:

a. Safety for all travelling patrons will be achieved by early consideration of all reasonably foreseeable hazards and mitigating them to the extent as far as reasonably practicable.

b. Minimum operating, energy and maintenance costs, achieved by the use of long life, high reliability, energy efficient items with minimum maintenance requirements.

c. Minimize lane closure periods for maintenance and or construction. Locating as much of the tunnel plant as possible outside the tunnel bores, and designing any plant accessed via the tunnel for rapid repair or replacement.

d. Visual and aesthetic appearance, both external and internal, in particular, all mechanical and electrical systems concealed from sight as practical, landscaping and aesthetic treatments included throughout the Project area.

f. All M&E systems shall incorporate sufficient fault resilience, in the form of backup systems or redundancy, to ensure that in the event of a single fault event (including consequential faults) the tunnel is able to continue operating normally.

i. Accessibility for maintenance and ease of the element replacement.

Hierarchy of Documents

The hierarchy of documents is to provide guidance on precedence of matters that are in conflict with different standards. The below listing is considered the hierarchy of documents for the Technical Requirements in the event there are conflicts with different standards:

- Preface
- Revised January 7, 2011
- Revised March 29, 2011
- Revised August 26, 2011
- Revised October 24, 2011
A. Tunnel
   1. Comprehensive Agreement
   2. These Technical Requirements
   3. Deleted
   4. VDOT Standards
   5. AASHTO Standards
   6. ASTM Standards
   7. NRC
   8. ASHRAE
   9. ASME

B. Non Tunnel
   1. These Technical Requirements
   2. Special provision copied notes
   3. Special provisions
   4. Standards and specifications listed in Section 3.5.2
   5. Reference documents listed in Section 3.5.2
   6. Standard Drawings (calculated dimensions, unless obviously incorrect, will govern over scaled dimensions)

C. Buildings
   2. The Virginia Uniform Statewide Building Code
The Technical Requirements

Comprehensive Agreement Exhibit C

Section 1

Design and Construction Requirements
TECHNICAL REQUIREMENTS
Exhibit C

1 Design and Construction Requirements

1.1 General Statement of Scope

A. The Project shall be designed and constructed pursuant to the design criteria and specifications set forth in the Technical Requirements.

B. All Work shall comply with Good Industry Practice, Federal (including but not limited to the Federal design standards set forth in 23 CFR 625), State, municipal, and jurisdictional agency requirements, including those listed in Section 3.5.2, unless otherwise expressly stated in the Agreement.

C. Where the Work to be performed does not meet minimum American Association of State Highway and Transportation Officials (AASHTO) standards and specifications, the Concessionaire shall submit a design exception, pursuant to Virginia Department of Transportation’s (VDOT) Instructional and Informational Memorandum on design exceptions, (using LD-440 format). The design exceptions approved by VDOT and FHWA as of the Agreement are set forth in Attachment 1G of the Technical Requirements.

D. Where the Work to be performed meets or exceeds minimum AASHTO design criteria, but does not meet VDOT’s minimum standards and specifications, the Concessionaire shall submit a design waiver (using LD-448 format).

E. The Concessionaire shall be solely responsible for acquiring design exceptions and design waivers. VDOT’s concurrence to a Concessionaire request design exception does not guarantee Federal Highway Administration (FHWA) concurrence. Previously submitted design exceptions and design waivers are subject to reevaluation if additional information becomes available that was not known at the time of initial submittal or conditions change that were used in the analysis of the original design exception or design waiver and, in either case, such additional information or changed conditions materially affect the premise on which the original design exception or design waiver at issue was based.

F. The Concessionaire shall ensure that the condition of existing buildings, structures, roadways, sidewalks, paths, trails, lighting and signal equipment, or other property that is to remain is not affected by the performance of the Work. The Concessionaire shall perform appropriate property pre-condition surveys and associated monitoring, and shall repair any damage determined to be directly caused by the Work.

G. Permanent structures shall be as defined in Section 1.14.2.A.
H. The parapet and barrier walls on bridges must conform to Section 410 of the 2007 VDOT Road and Bridge Specifications. Concrete barrier may be precast in the tunnel from start of boat section to start of boat section. If concrete precast barrier walls are used within the tunnel limits, they shall be continuous and be installed such as to maintain zero (0) deflection.

I. The Concessionaire shall ensure that areas impacted by the Work are subject to continual and un-interrupted removal of rubbish, scrap material, and debris. Work sites shall have a neat, safe and orderly appearance at all times. Within 30 days after Final Completion, or other such timeframe as may be agreed to by both parties, the Concessionaire shall remove its construction equipment, materials and debris from the Project Right of Way and other property adjacent to the Project.

J. When removal of mailboxes and newspaper boxes is made necessary by construction operations, the Concessionaire shall place them in temporary locations so that access to the boxes will not be impaired. Prior to Final Acceptance of each Project Asset, boxes shall be placed in their permanent locations as agreed with VDOT, upgraded to current criteria, and left in as good condition as when found.

K. The Concessionaire shall preserve property and improvements along the boundary lines of and adjacent to the Work unless the removal or destruction is absolutely required and consistent with the Construction Documentation. The Concessionaire shall use suitable precautions to prevent damage to such property. For property damage the Concessionaire is responsible under the Agreement, the Concessionaire shall restore property to a condition similar or equal to that existing before such damage was done by repairing, rebuilding, or restoring, as may be directed by VDOT, or making settlement with the property owner.

L. Limited access control will be determined in accordance with Federal and State requirements as set forth in the Standard Documents in Section 3.5.2 for all new ramp locations and any modifications to existing ramp locations. Where the Work cannot meet the Federal or State requirements, a design exception must be submitted in accordance with Section 1.1.E above.

1.2 Inspection of Work

1.2.1 Inspection of Work

A. The Concessionaire is responsible for quality control and quality assurance in accordance with VDOT’s Minimum Requirements for Quality Assurance & Quality Control on Design-Build & Public-Private Transportation Act Projects – August 2008. All stages, materials, and details of the Work are subject to independent inspection by VDOT. VDOT shall be allowed access to all parts of
the Work on and offsite and shall be furnished such information and assistance by
the Concessionaire in accordance with the Agreement. VDOT shall have ready
access to machines and plant equipment used in processing or placing materials in
accordance with the Agreement.

B. The Concessionaire shall keep VDOT informed of planned operations in
accordance with the requirements of the Agreement and notify VDOT 48 hours
prior to any construction involving critical inspection points as identified in the
quality control plan.

C. If materials are used or work is performed without following the relevant Quality
Management System Plan (QMSP), VDOT may require the Concessionaire to
remove and replace the work or material, at no additional cost to the Project.

D. If an inspection reveals that Work has not been properly performed, the
Concessionaire shall immediately inform VDOT of its schedule for correcting
such Work and the time when an inspection of the corrected Work can be made.

E. Geotechnical Construction Engineer – The Concessionaire shall employ a
gеotechnical construction engineer who shall be responsible for providing written
certification to the Quality Assurance (QA) manager that all geotechnical related
work and materials are in conformance with the Technical Requirements and the
Approved for Construction (AFC) documentation. During construction, the
gеotechnical construction engineer and/or his/her qualified inspector shall inspect
the adequacy of the geological subgrades conditions for support of shallow
foundations prior to placement of reinforcing steel and footing concrete. The
gеotechnical construction engineer or representative shall be present during
installation of all deep foundations to confirm the work has been done in
accordance with the Technical Requirements, prior to installation of tunnel
segments, U-Walls and all other non-tunnel structures or foundations. For
pavements, embankments and approach abutments, the geotechnical construction
engineer and/or his or her qualified inspector shall determine suitability of the
subgrade for pavement, embankment and approach abutments support in
accordance with the Technical Requirements, prior to placement of the pavement
aggregate base course material and embankment fill or construction of the
approach abutment. Any modifications in the design as a result of these
inspections must first be approved in writing by the geotechnical design engineer
(described further in Section 1.4). The geotechnical construction engineer must
be a licensed Professional Engineer in the State and have at least 10 years of
gеotechnical engineering construction management experience with similar size
and type of projects. Concessionaire shall submit at least three projects with
points of contact to verify experience.

F. Marine Work Inspection Access
The Concessionaire shall provide a powered water transport vehicle to allow VDOT personnel access to all marine work. The water vehicle and operator shall be provided at the time of furnishing the Project Office and shall be available until Final Acceptance of the Project Asset that includes all marine work.

It is intended that this vehicle be the same as used and owned/leased by the Concessionaire for normal Project marine construction operations. The Concessionaire will provide contact information to VDOT for scheduling inspection trips. Safe boarding and de-boarding locations will be provided on the Project site adjacent to the Work.

### 1.3 Environmental

#### 1.3.1 Environmental Documentation

A. The Concessionaire shall comply with and ensure that the environmental commitments and all conditions of Governmental Approvals made in the National Environmental Policy Act (NEPA) documentation referenced in Table 1.3.1A are implemented during final design and/or construction as appropriate. The Concessionaire will provide documentation to VDOT as each environmental commitment and/or condition of a Governmental Approval is implemented.

<table>
<thead>
<tr>
<th>Downtown Tunnel National Fire Protection Association (NFPA) work</th>
<th>Programmatic Categorical Exclusion (5/13/09)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midtown Tunnel NFPA work</td>
<td>Programmatic Categorical Exclusion (5/13/09)</td>
</tr>
<tr>
<td>Rt. 58/Midtown Tunnel (Piners Point)</td>
<td>Final Environmental Impact Statement (FEIS) (11/8/96) and Record of Decision (3/17/97)</td>
</tr>
<tr>
<td>Rt. 58/Midtown Tunnel (Piners Point)</td>
<td>Record of Decision (7/9/07)</td>
</tr>
<tr>
<td>Martin Luther King Freeway Extension</td>
<td>Environmental Assessment/Finding of No Significant Impact (2/26/09)</td>
</tr>
<tr>
<td>Brambleton Interchange Intelligent Transportation System (ITS)</td>
<td>Programmatic Categorical Exclusion (5/22/09)</td>
</tr>
</tbody>
</table>

B. If the Concessionaire becomes aware of new information or identifies previously unknown impacts that may have a bearing on environmental impacts or the
Concessionaire proposes changes to the Project scope and/or footprint, the Concessionaire shall initiate consultation immediately with VDOT to determine the need to reevaluate the NEPA documentation or prepare a supplemental Environmental Impact Statement (EIS). Consultation with VDOT will also be initiated by the Concessionaire prior to requesting major approvals from the Federal Highway Administration. VDOT shall be responsible for reevaluating the NEPA documentation, preparing any supplemental EISs and coordinating with FHWA. The Concessionaire shall provide VDOT with engineering and technical information in support of any NEPA reevaluation at the time the change or new information is presented to VDOT.

C. Prior to right of way authorization for total and partial takes, the Concessionaire shall provide VDOT with a completed PM-130 form and right of way plans (reviewed as per Section 3.6 Right of Way). VDOT shall perform the right of way reevaluation review to determine the right of way to be acquired is consistent with the NEPA documentation. If VDOT / FHWA determine the plans are not consistent with the NEPA documentation, the Concessionaire shall revise the plans until they are consistent, or provide VDOT with engineering and technical information to support VDOT’s preparation of a reevaluation of the NEPA documentation for FHWA approval. VDOT shall provide copies of all right of way reevaluation reviews to the FHWA.

D. Prior to issuance of the AFC Documents, the Concessionaire shall provide VDOT with a completed PM-130 form and plans. VDOT will perform the Environmental Certification review and Plans, Specifications, and Estimates (PS&E) reevaluation review and determine if plans are consistent with the NEPA documentation and all environmental commitments. If VDOT / FHWA determine the plans are not consistent with the NEPA documentation, the Concessionaire shall revise the plans until they are consistent, or provide VDOT with engineering and technical information to support VDOT’s preparation of a reevaluation of the NEPA documentation for FHWA approval. VDOT will provide copies of all Environmental Certification reviews and PS&E reevaluation reviews to the FHWA.

E. The Concessionaire is responsible for compliance with Applicable Law for potential staging and disposal areas outside the Project limits. The Concessionaire shall also be responsible for obtaining a property owner agreement for potential areas outside the existing State right of way. Any such potential locations within the existing State Right of Way shall require the Concessionaire to obtain a Land Use Permit from VDOT.

1.3.2 Water Quality Permits
A. The Concessionaire shall be responsible for any determinations, delineations, coordination, applications, mitigation, avoidance measures, acquisitions, and administration of required State and Federal water quality permits and permit modifications required for construction of the Project. The Concessionaire shall be responsible for compliance with pre-construction, construction-related, and post-construction permit conditions. Any compensation required to address impacts to streams and wetlands which arises from a failure on the part of the Concessionaire to comply with all relevant permits to its Work shall be the responsibility of the Concessionaire. In addition to the foregoing, fines or delays which arise from the negligent acts or omissions of the Concessionaire in relation to its responsibilities over the water quality permit or other regulatory violations by Concessionaire in the performance of its Work shall be the responsibility of the Concessionaire.

B. The Concessionaire shall be listed as the “permittee” in all cases. These permits, and any permit modifications, shall be obtained by the Concessionaire, copies provided to VDOT, and verified by the VDOT project manager prior to the issuance of a Notice to Proceed for the applicable Construction Segment.

1.3.3 Hazardous Materials Investigation

Section 1.3.3 shall be read in conjunction with the Comprehensive Agreement, and both shall set forth the Concessionaire’s responsibilities for the management of Hazardous Substances.

A. Studies performed by VDOT have identified potential Hazardous Substances within the O&M Boundaries. These studies are available to the Concessionaire upon request. At a minimum, the Concessionaire shall perform a Phase I Environmental Site Assessment for the HERC/Boiler Cleaning and Specialty Corp and the Murro Chemical sites in accordance with the American Society for Testing Materials (ASTM) Method E-1527-05. The Concessionaire shall cause further studies and evaluations to be performed and submit a summary of findings to VDOT.

B. The Construction Hazardous Materials Management Plan shall include:

1. Copies of any environmental site assessments undertaken; and

2. Detailed recommendations for further study or site evaluation, where such studies or evaluations are considered necessary to determine impacts to the Project from identified or suspected contamination.

For any property proposed for acquisition and determined to have environmental impairments from Hazardous Substances, the Concessionaire shall include, within
the Construction Hazardous Materials Management Plan, the appropriate plan for containment, management, mitigation, and/or remediation of any Hazardous Substances impacted by the Project. The plan shall be submitted to VDOT for review and comment.

C. Following the acquisition and vacation of properties or prior to tunnel renovation activities, the Concessionaire shall perform asbestos inspections and if necessary, shall perform asbestos abatement in accordance with VDOT’s asbestos inspection procedures and asbestos abatement specifications. The Concessionaire shall perform abatement of asbestos-containing materials and asbestos project monitoring in accordance with all Applicable Law, as well as the applicable Standard Documents in Section 3.5.2.

D. The Construction Hazardous Materials Management Plan shall include a Spill Prevention, Control, and Countermeasure (SPCC) plan as required by regulation, which shall have been reviewed by VDOT prior to the initiation of oil storage activities.

E. The Concessionaire shall retain copies of all property studies, documents prepared for containment, management, mitigation and/or remediation, asbestos-related records and any other construction–related Hazardous Substances records in the Construction Hazardous Materials Management Plan and updates. The final updated plan shall be submitted to VDOT following completion of construction activities.

1.3.4 Environmental Monitoring

A. The Concessionaire shall be responsible for daily monitoring of compliance with all applicable Environmental Laws. Should any non-compliant item(s) be identified by the Concessionaire, immediate and continuous corrective action shall be taken by the Concessionaire to bring the item(s) back into compliance. Notification of this circumstance shall be provided immediately by the Concessionaire to VDOT.

B. VDOT reserves the right to perform quality assurance monitoring of the Project to determine whether the Concessionaire is in compliance with environmental commitments to Governmental Authorities.

1.3.5 Environmental Stipulations

The Concessionaire shall be responsible to make an affidavit which stipulates that any facility used in the performance of the Agreement is not listed on the Environmental Protection Agency’s (EPA) List of Violating Facilities pursuant to 40 C.F.R. 15.20 (unless the Concessionaire confirms that the Project is exempt under the Clean Air Act as

1.3.6 Erosion and Siltation

A. The Concessionaire shall comply with VDOT’s Erosion and Sediment Control (ESC) Standards and Specifications (including IIM-LD 11.26).

B. The Concessionaire shall exercise temporary and permanent measures, throughout the Term, to control erosion and prevent or minimize siltation of rivers, streams, lakes, and impoundments. ESC measures will be installed in accordance with applicable Standard Documents in Section 3.5.2.

C. ESC measures shall be applied to erodible material exposed by any activity associated with construction, including local material sources, stockpiles, disposal areas, and haul roads. Temporary measures shall be coordinated with the Work to ensure effective and continuous erosion and siltation control. Permanent erosion control measures and drainage facilities shall be installed and operational as the Work progresses before temporary measures are removed.

D. The Concessionaire shall have, within the limits of the Project during all land disturbing activities, an employee certified by VDOT in ESC who shall inspect erosion and siltation control devices and measures for proper installation and deficiencies immediately after each rainfall, at least daily during prolonged rainfall, and weekly when no rainfall event occurs. Deficiencies shall be corrected immediately. Such employee shall also be certified through the Department of Conservation and Recreation Inspection Certification Program.

E. Failure on the part of the Concessionaire to maintain appropriate erosion and siltation control devices in a functioning condition may result in VDOT notifying the Concessionaire in writing of specific deficiencies. The Concessionaire shall correct or take appropriate actions to correct the specified deficiencies within 24-hours after receipt of such notification.

1.3.7 Air Pollution

A. The Concessionaire shall comply with the provisions of the Agreement and the State Air Pollution Control Law and Rules of the State Air Pollution Control Board, including notifications required therein.

B. Burning shall be performed in accordance with all applicable local Laws and ordinances and under the constant surveillance of watchpersons. Care shall be taken so that the burning of materials does not destroy or damage property or
cause excessive air pollution. The Concessionaire shall not burn rubber tires, asphalt, used crankcase oil, or other materials that produce dense smoke. Burning shall not be initiated when atmospheric conditions are such that smoke will create a hazard to the motoring public or airport operations. Provisions shall be made for flagging vehicular traffic if visibility is obstructed or impaired by smoke. At no time shall a fire be left unattended.

C. Asphalt mixing plants shall be designed, equipped, and operated so that the amount and quality of air pollutants emitted will conform to the Rules of the State Air Pollution Control Board. Emission standards for asbestos incorporated in the EPAs National Emission Standards for Hazardous Air Pollutants apply to the demolition or renovation of any institutional, commercial, or industrial building, structure, facility, installation, or portion thereof that contains friable asbestos.

1.3.8 Noise Mitigation

A. Noise Walls

1. The Concessionaire shall provide permanent noise mitigation in compliance with the Virginia State Noise Abatement Policy and Norfolk and Portsmouth requirements as applicable.

2. The final noise mitigation design will utilize the design year traffic volumes defined in the final design traffic report and associated noise levels.

3. The Concessionaire shall present all feasible and reasonable noise walls as “noise walls under consideration” on design plans at the public hearing(s).

4. Upon completion of the final design noise analysis, the Concessionaire shall schedule a meeting with the Joint FHWA/VDOT Noise Abatement Committee (NAC). The findings will be presented to the NAC for final determination of which barriers will be constructed. The Concessionaire shall prepare and mail letters “certified return receipt” to impacted citizens for barriers that are being carried through construction. VDOT shall prepare a concurrence letter outlining the results of the NAC meeting for VDOT’s Chief Engineer and FHWA. Upon completion of the public survey, VDOT shall prepare a second concurrence letter documenting the results if necessary.

5. All noise walls should be named as presented within the Noise Abatement Design Report (NADR).
Final Design Documentation shall not be submitted for VDOT’s review until after the NAC has met and provided its recommendation to the Chief Engineer and to FHWA for review and concurrence has been received. All noise walls recommended for construction and concurred with by the Chief Engineer and FHWA are included in the scope of the Construction Project and shall be constructed by the Concessionaire. This includes barriers with conditions, as long as those conditions have been met.

Prior to submitting a noise wall plan for VDOT’s review, the Concessionaire shall have the noise consultant that completed the NADR review the plan set and certify that the proposed design meets the noise abatement requirements. This certification shall be included in the plan set when it is submitted to VDOT for review.

If deviations in the horizontal or vertical alignment of a noise wall are proposed following concurrence from the Chief Engineer or FHWA, then the Concessionaire shall be responsible to ensure that additional documentation is provided with the plan set when the set is submitted to VDOT for review. This shall include a plan and profile view of the roadway with the alignments of the NAC–recommended noise wall and the proposed design. The Concessionaire shall include with the plan set a justification of the deviation. The revised NADR chapter for the noise wall for which modification is requested will be submitted with this additional information.

The VDOT Noise Abatement Section Manager’s written comments of the noise wall deviation will be required before VDOT continues its review of AFC Documents.

A key plan shall be clearly labeled to show the location of the ground-mounted combo wall (noise wall on retaining wall) and bridge-mounted noise barriers.

Plan view shall provide the alignment of the noise wall with the roadway plan view.

Profiles of the noise wall alignment shall include the noise attenuation line and the existing and proposed elevation. If combo walls or bridge-mounted barriers are present along the alignment, the pattern of the line will be different so that all lines can be distinguished.

Ground mounted noise walls shall be precast concrete with a sound absorptive finish on the roadway side. Structure mounted noise walls shall
be lightweight material with a sound absorptive finish on the roadway side.

14. The height of the noise walls shall meet but not exceed the elevation of the noise attenuation line depicted on the plans except that the height may be exceeded as may be minimally necessary to “step” panels due to changes in grade at wall locations.

15. The finish and color of the noise walls (both roadway and landowner sides) shall be determined by VDOT and the Concessionaire.

16. Noise wall posts shall be consistent with the Concessionaire’s aesthetics plan.

17. The Concessionaire shall be responsible for performing subsurface investigations to locate existing utilities so as to avoid utility conflicts with the noise wall construction.

18. Stations of the roadway and noise wall shall be included on both the plan and profile views.

19. Noise walls should be designed with as little easement or right of way behind them as is required for maintenance behind the walls. Access may be provided by access doors for personnel. Gaps may be provided in the walls with a 3:1 ratio of barrier overlap.

20. Noise walls shall have a minimum setback from the back of the barrier of at least one foot. The area between the barrier and wall will be filled to prevent debris from collecting in the area.

21. Noise wall design shall be coordinated with first responders to ensure acceptable access to fire hydrants and other emergency equipment.

22. General notes shall be included on construction plans that state the following:

a. “Noise walls shall be designed and constructed in compliance with this Section 1.3.8.A of the Technical Requirements and Section 519 of the Road and Bridge Specifications.”

b. “Noise walls shall be designed and constructed in accordance with the roadway cross-sections in the AFC plans.”
c. “Noise walls shall be designed and constructed in accordance with the soil parameters included in the Final Geotechnical Report.”

d. “Access doors size and location shall be agreed upon between VDOT, First Responders and Concessionaire prior to fabrication.”

B. Construction Noise

1. The Concessionaire’s operations shall be performed so that exterior noise levels meet local noise ordinances.

2. The Concessionaire shall be responsible for obtaining local noise ordinance variances prior to scheduling of night time operations pursuant to Section 3.11 (Third Parties and Permitting).

3. Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment. When feasible, the Concessionaire shall establish haul routes that direct Project construction and support vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.

4. These requirements are not applicable if the noise produced by sources other than the Concessionaire’s operation at the point of reception is greater than the noise from the Concessionaire's operation at the same point.

1.3.9 Historic Properties

A. Project effects on historic and archaeological properties listed on or eligible for listing on the National Register of Historic Places (jointly referred to as “historic properties”) for the Midtown Tunnel, Downtown Tunnel and Martin Luther King Freeway Extension portions of the overall Project were addressed in accordance with Section 106 of the National Historic Preservation Act (16 U.S.C. 470f). The Concessionaire shall reference for detailed information the Environmental Assessment (EA), Revised EA/Finding of No Significant Impact (FONSI), Section 4f Evaluation, and various technical reports containing detailed information on historic properties for Martin Luther King Freeway Extension.

<table>
<thead>
<tr>
<th>Project</th>
<th>Effects on Historic Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midtown Tunnel (Revised Record of Decision (ROD))</td>
<td>Adverse Effect (mitigated during previous construction)</td>
</tr>
<tr>
<td>Midtown Tunnel NFPA</td>
<td>No Effect</td>
</tr>
<tr>
<td>Downtown Tunnel NFPA</td>
<td>No Effect</td>
</tr>
<tr>
<td>Martin Luther King Freeway</td>
<td>Adverse Effect/Programmatic Agreement</td>
</tr>
</tbody>
</table>

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Revised January 7, 2011
Revised March 29, 2011
Revised August 26, 2011
Revised October 24, 2011
B. VDOT shall conduct Section 106 technical studies and consultation to support any NEPA reevaluations necessary for this Project or any of its components. The Concessionaire shall be responsible for all work necessary to conclude Section 106 and carrying out any associated commitments for Project modifications not requiring NEPA reevaluation and in accordance with this Section 1.3.9.K. The Concessionaire shall provide VDOT copies of all technical reports and correspondence among the Concessionaire, the Virginia State Historic Preservation Office (VA SHPO), and other consulting parties, prepared pursuant to this requirement.

C. For all portions of the Project except the New MLK Extension, the Concessionaire shall be responsible for all activities involving the discovery of historic properties during construction. The Concessionaire shall immediately notify VDOT and halt all construction work involving construction or subsurface disturbance in the area of the resource and in surrounding areas where additional subsurface remains or cultural resources can reasonably be expected to occur. The Concessionaire shall be responsible for carrying out any technical studies and/or consultation in accordance with 36 CFR 800.13(b). The Concessionaire shall provide VDOT copies of all technical reports and correspondence among the Concessionaire, the VA SHPO, and other consulting parties prepared pursuant to this requirement.

D. A Programmatic Agreement (PA; pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act) was executed on December 12, 2008 for the New MLK Extension. This PA includes specific stipulations covering the treatment of known historic properties; future identification, assessment of effects, and treatment of historic properties located within drainage, stormwater management, and wetland mitigation areas; treatment of gravesites; and treatment of previously unidentified archaeological sites discovered during Project construction. The PA is included as Attachment 3B to this Section 1.3. The obligations of VDOT and the Concessionaire to fulfill the requirements of the PA are set forth below. The Concessionaire shall provide supporting documentation to VDOT evidencing fulfillment of its obligations at the appropriate phase of Project development for each.

E. VDOT shall fulfill the requirements of Stipulation I (Treatment of the Cottage Place Neighborhood Historic District) and Stipulation III.C (Historical Highway Marker for Mount Calvary Cemetery Complex) of the PA.

F. The Concessionaire shall fulfill the requirements of Stipulation II of the PA (Treatment of Calvary Baptist Church) including: (1) performing an inspection of the Calvary Baptist Church prior to construction; (2) performing seismic
monitoring at the church to document vibration levels before and during construction; (3) performing an inspection of the property after construction has been completed; (4) payment of claims for damage to the church will be in accordance with the PA; (5) completion of any resulting repairs to the church. The manner in which the Concessionaire shall fulfill these obligations in the manner described below:

1. The Concessionaire shall perform inspections of the Calvary Baptist Church and document its physical condition prior to the commencement of any construction activity, within 48 hours of any period in which peak particle velocity within the Calvary Baptist Church as measured by a seismograph exceeds 1.25 inches per second or the equivalent vibration frequency level (as shown in Figure 1 at 4VAC25-40-880.C), and within 60 days after construction has been completed. These inspections shall be performed by a licensed structural engineer and a licensed historic architect. The historic architect shall meet the Secretary of the Interior’s Professional Qualification Standards in historic architecture (48 FR 44738-44739).

The Concessionaire shall provide a copy of a draft pre-construction inspection report to VDOT and Calvary Baptist Church a minimum of 45 days prior to initiation of construction for review and comment. The Concessionaire shall provide a final copy of the pre-construction inspection report to VDOT, Calvary Baptist Church, and the VA SHPO prior to the commencement of any construction activity. The Concessionaire shall provide a copy of a draft post-construction inspection report to VDOT and Calvary Baptist Church for review and comment within 90 days after construction has been completed. The Concessionaire shall provide the final copy of the post-construction inspection report to VDOT, Calvary Baptist Church, and the VA SHPO within 135 days after construction has been completed.

2. The Concessionaire shall conduct seismic monitoring of Calvary Baptist Church to document vibration levels before and during construction. Prior to commencing construction the Concessionaire shall submit a plan for the seismic monitoring program to VDOT for review and comment. The seismic monitoring program shall allow the Concessionaire to fulfill the requirements of Section 1.3.9.F.3. The Concessionaire shall provide VDOT a report on the results of the seismic monitoring program within 60 days of completion of construction.

3. Within 48 hours of any period in which peak particle velocity within Calvary Baptist Church as measured by a seismograph exceeds 1.25 inches per second or the equivalent vibration frequency level (as shown in
Figure 1 at 4VAC25-40-880.C), the Concessionaire shall notify VDOT and inspect the church for changes in its condition. Within 48 hours of the inspection, the Concessionaire shall review the results of the inspection with VDOT and Calvary Baptist Church, and VDOT and the Concessionaire shall jointly determine if any actions to modify or mitigate the impact of the Concessionaire’s construction activities are necessary.

4. The Concessionaire shall be responsible for damages to Calvary Baptist Church resulting from Project construction activities. VDOT must approve any decision by the Concessionaire to refuse a claim for damages submitted by Calvary Baptist Church. If repairs are made to Calvary Baptist Church to resolve a claim for damages, the Concessionaire shall ensure that any resulting repairs to historic materials, design, and/or workmanship are completed in a manner consistent with The Secretary of the Interior’s Standards for the Treatment of Historic Properties. The Concessionaire shall provide VDOT, the VA SHPO, and Calvary Baptist Church with a copy of the proposed scope of work and/or repair plans for review and comment. If no comments are received from these parties within 30 days of receipt of the scope of work and/or repair plans, the Concessionaire may proceed to implement the proposed scope of work and/or repair plans. The Concessionaire shall notify VDOT, the VA SHPO, and Calvary Baptist Church of the completion of any such repairs within 30 days following completion.

G. The Concessionaire shall design the Project to avoid the boundaries of the Potter’s Field site (44PM0062) and the Mount Calvary Cemetery Complex by shifting the southern portion of the Interstate 264 interchange to the west (as per Stipulation III A of PA). The Concessionaire shall not allow any Project-related ground-disturbing activities, including vehicle traffic and storage or staging of construction materials, to occur within the boundaries of these two historic properties. The Concessionaire shall not design the Project to span the Potter’s Field site.

H. The Concessionaire shall provide VDOT, the VA SHPO, the City of Portsmouth, and the African-American Historical Society of Portsmouth the opportunity to review and comment on the preliminary and final plans for those portions of the Project in the vicinity of the Potter’s Field site (44PM0062) and the Mount Calvary Cemetery Complex. The Concessionaire shall take into consideration any comments received from VDOT, the VA SHPO, the City of Portsmouth, and the African-American Historical Society of Portsmouth within 30 calendar days of receipt of Project plans in ensuring that the Project avoids all disturbance to the Potter’s Field site (44PM0062) and the Mount Calvary Cemetery Complex.
I. Prior to the commencement of any construction activity the Concessionaire shall erect a temporary chain link fence around the western boundary of the Potter’s Field site (44PM0062) and the adjacent portion of the Mount Calvary Cemetery Complex in accordance with the VDOT Road and Bridge Specifications (2007), Section 242.02 (as per Stipulation II B of PA). The Concessionaire shall erect a temporary safety fence along the northern boundary of the Mount Calvary Cemetery Complex where it is adjacent to Interstate 264 in accordance with the VDOT Road and Bridge Specifications (2007), Section 242.02(a) (12). The location of these boundaries shall be provided by VDOT.

J. The Concessionaire shall maintain these fences for the duration of Project construction. No vehicles, no construction activities, and no storage or staging of construction materials shall be allowed within the perimeter of the fences. Upon completion of construction of the Project, the Concessionaire shall remove these fences and dispose of them off the Project site.

K. The Concessionaire shall assume all the obligations assigned to VDOT in Stipulation IV of the PA. This stipulation, in brief, requires the identification and treatment of affected historic properties within the Areas of Potential Effects (as defined at 36 CFR §800.16(d)) for any drainage, stormwater management, and wetland mitigation areas determined during final design of the Project and located outside of the Area of Potential Effects for Alternative E – Option 4 as described in the report titled Cultural Resource Survey: Archaeological and Architectural Surveys, Route 58, Martin Luther King Freeway Extension Project, City of Portsmouth, Virginia (prepared for VDOT by McCormick Taylor, November 2007) and depicted in this report in Figures 1A and 1B. The Concessionaire shall provide VDOT copies of all technical reports and correspondence among the Concessionaire, the VA SHPO, and other consulting parties prepared pursuant to the requirements of this stipulation.

L. The Concessionaire shall assume all obligations assigned to VDOT in Stipulation VII of the PA (Human Remains). Additionally, the Concessionaire shall immediately notify VDOT if human remains and associated funerary objects are encountered by the Concessionaire or its agents during design or construction of the Project.

M. If a previously unidentified archaeological site is discovered during ground disturbing activities associated with construction of the Project, the Concessionaire shall immediately notify VDOT and halt all construction work involving subsurface disturbance in the area of the resource and in surrounding areas where additional subsurface remains can reasonably be expected to occur. The Concessionaire shall then fulfill the obligations assigned to VDOT in Stipulation VIII of the PA (Post-Review Discoveries of Archaeological Properties).
The Concessionaire shall ensure that all work it performs to fulfill the PA obligations assigned to it under the Agreement meets the requirements of Stipulations V (Professional Qualifications) and VI (Preparation and Review of Documents) of the PA.

VDOT shall retain all rights and obligations assigned to it as a signatory party to the PA under Stipulations IX (Dispute Resolution), X (Amendments and Termination), and XI (Duration). The Concessionaire shall work cooperatively with VDOT in meeting VDOT’s obligations under these three stipulations.

1.4 Geotechnical

1.4.1 Geotechnical Design

A. Geotechnical Design Engineer – This individual shall be responsible for ensuring that geotechnical investigations, analysis and recommendations that are necessary for the design and construction of the Project are performed in accordance with the Technical Requirements. The geotechnical design engineer shall coordinate with the design manager to ensure that relevant geotechnical design and construction considerations have been properly considered in the design and included in the work plans, specifications, copied notes, and constructability reviews for the Project. This individual shall have a minimum 10 years of geotechnical engineering experience and expertise working in the region and/or in areas of similar geologic settings with similar project features for this Project. The geotechnical design engineer shall be a licensed Professional Engineer in the Commonwealth of Virginia.

B. The Concessionaire shall collect appropriate data for geotechnical evaluation of proposed and existing tunnels and non-tunnel structures, dredging and dewatering design and operations, permanent and temporary shoring, embankments, soil cuts, culverts, bridge and retaining wall structures, noise walls, stormwater management facilities, minor structures including drainage pipes, pavement structures and any other earth-supported structures or elements of highway and tunnel design and construction. The Concessionaire shall be responsible for obtaining any Governmental Approvals required for any borings needed in performance of the Concessionaire’s geotechnical investigation for this Project. The Concessionaire shall complete laboratory tests in accordance with pertinent ASTM or AASHTO standards and analyze the data to provide design and construction requirements. Soils and materials tests shall be performed by a laboratory, accredited by the AASHTO Accreditation Programs (AASHTO Materials Reference Laboratory (AMRL) and Cement and Concrete Reference Laboratory (CCRL)), for each test it conducts for the Project. Due to the complexity of the Project, multiple individual design reports and design
memoranda submissions developed for individual work will be acceptable in lieu of a full Geotechnical Design Report (GDR) encompassing the entire Project. If desired, the Concessionaire shall submit individual reports and memoranda in advance of final design packages for related future work to VDOT for review and comment. VDOT shall not be responsible for confirming Concessionaire’s geotechnical assumptions in VDOT’s review or comments. The geotechnical report shall, at a minimum, include a description of the Project or individual work entailed including anticipated loads, a description of the subsurface conditions, summary of field and laboratory test results, options evaluated with a summary justifying the recommendations, and calculations supporting the evaluations and recommendations.

C. All boreholes left open while unattended by the drill crews shall be clearly marked and barricaded or otherwise secured to avoid possible injury or damage to the public. All boreholes shall be adequately backfilled to avoid settlement. Borings in contaminated areas, paved areas such as pavements or sidewalks, or other areas likely to be traversed by the public shall be backfilled with grout.

D. The Concessionaire shall provide VDOT records of all subsurface explorations and describe the soils encountered and their depth limits, in accordance with the requirements outlined in Chapter 3 of VDOT’s Manual of Instructions for Materials Division, Section 700.04(c) of the 2007 Road and Bridge Specifications, and the current AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications, Customary U.S. Units, fourth Edition 2007 and VDOT modifications. The geotechnical investigations for the tunnel shall be performed to meet the minimum requirements set forth in the Standard Documents in Section 3.5.2. The geotechnical investigation plan(s) shall be developed in compliance with the requirements included by the Hampton Roads District Materials Engineer. The Concessionaire shall provide electronic copies of all subsurface explorations in accordance with the boring log template available on the website address included in Chapter 3 of VDOT’s Manual of Instructions for Materials Division. The electronic files shall be provided by a certified Professional Geologist or a suitably qualified registered Professional Engineer in the Commonwealth of Virginia, in gINT® software. Upon request, VDOT will provide its gINT and ACCESS file structures for the Geotechnical Database Management System.

E. The Concessionaire shall incorporate reliability assessments in conjunction with standard analysis methods for slope stability analyses. An acceptable method for evaluation of reliability is given by Duncan, J.M. (April 2000) Factors of Safety and Reliability in Geotechnical Engineering, Journal of Geotechnical and Geoenvironmental Engineering, American Society of Civil Engineers (ASCE), Discussions and Closure August 2001. A suitable design will provide a probability of success equal to or greater than 99%. The Concessionaire may
TECHNICAL REQUIREMENTS
Exhibit C

propose to identify specific, non-critical features, and alternative methods for evaluating variability of subsurface conditions, reliability and minimum factors of safety, prior to submission of its design calculations and drawings.

F. The Concessionaire shall provide VDOT geotechnical design and construction memoranda and/or reports that summarize pertinent subsurface investigations, tests, and geotechnical engineering evaluations and analysis. The submittals shall be made at least 21 days in advance of the submittal of any final AFC documents that are dependent upon the geotechnical evaluation and design recommendations included in these geotechnical memorandums and/or reports. Technical specifications for construction methods that are not adequately addressed in the Standard Documents in Section 3.5.2 shall be provided by the Concessionaire as part of the final AFC Documents. Prior to submittal of any AFC Documents the Concessionaire’s geotechnical design engineer shall review the AFC Documents to assure that they have appropriately incorporated the geotechnical components. Evidence of this review shall be submitted with the final AFC Documents. The quality control-quality assurance documents shall document how each specific geotechnical recommendation or requirement is addressed in the AFC Documents, and shall reference the drawings that incorporate the pertinent results. All geotechnical work shall be completed to satisfy the Performance Requirement as set forth in Section 4.4.1.

G. The Concessionaire shall minimize differential settlements of the approach to the tunnel and bridges for new construction and when applicable provide construction recommendations to address soil-structure interaction to accommodate the unique construction methods applied to this Project. All geotechnical work shall be completed to satisfy baseline and post-construction contract Performance Requirements as set forth in Section 1.4.3.

H. The Concessionaire shall design and construct pavements, subgrades, and embankments to meet the following criteria:

1. Long term settlements will not be a detriment to achieve and maintain the post-construction Performance Requirements for overall ride quality and localized roughness of the pavements nor exceed the grade tolerances of pavement sections of approach slabs, bridge decks, and tie-ins to the Project;

2. Settlement will not impede positive drainage of the pavement surface especially within the travel lanes at all times nor subject the roadway to flooding; and,

3. Settlement will not result in damage to adjacent or underlying structures, including utilities.
I. The Concessionaire shall apply the Additional Substructure and Foundation Criteria (Section 1.4.3) when analyzing settlement and foundations (bridges, retaining walls and other structures). In summary, Section 1.4.3 outlines two options for managing settlement of structures: (i) limit total settlement to $\frac{1}{2}$" and subsequently limit the need for a refined analysis of the superstructure and substructure; or (ii) allow the Concessionaire to design the structure for its estimates of elastic, consolidation, and secondary settlement (total settlement) and subsequently communicate the total and differential settlement in a the general note to the Design Documentation. In either case, a general note shall be placed on the Design Documentation which communicates the amount of settlement evaluated and accommodated by the structure. Specific general note language, along with notes to the designer, is set forth in Section 1.4.3. In either case the total vertical and/or differential settlements of the proposed structures shall not exceed the Performance Requirement included in Section 1.4.3 for pavements and of the bridge decking. In addition, angular distortion between adjacent bridge foundations greater than 0.008 radians in simple span and 0.004 radians in continuous span structures is not permitted unless first reviewed by VDOT.

1.4.2 Slope Design

Cut and fill slopes shall be no steeper than 2H: 1V, unless supported by an engineering analysis based on site-specific field investigation and/or site-specific laboratory strength testing. Slopes steeper than 2H: 1V must be reviewed by VDOT. All cut and fill slopes shall be designed to be stable for the interim construction stages, for the end-of-construction condition, and for design-life conditions.

The following factors of safety are to be used with limit equilibrium methods of analysis to identify factors of safety for representative sections of all soil cut and soil embankment fill slope areas higher than 10 feet, and/or where slopes are supporting on, or are supported by, retaining structures. The factors of safety listed in Table 1.4 are valid for subsurface investigations performed in accordance with Chapter III of VDOT’s Materials Division’s Manual of Instructions or for site-specific investigation plans reviewed by VDOT’s Hampton Roads District Materials Engineer. Approval of site-specific investigation plans with reduced boring frequency may require higher factors of safety.
### Table 1.4
Minimum Factors of Safety for Soil Cut/Fill Slopes

<table>
<thead>
<tr>
<th>Soil Slope analysis parameters based on:</th>
<th>Factor of Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involves Structure or Critical Slope¹</td>
<td></td>
</tr>
<tr>
<td>Critical Slope</td>
<td>1.5</td>
</tr>
<tr>
<td>Non-Critical Slope</td>
<td>1.3</td>
</tr>
<tr>
<td>In-situ or lab. tests and measurements²,³</td>
<td></td>
</tr>
<tr>
<td>No site specific tests</td>
<td>N/A¹</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
</tr>
</tbody>
</table>

1. A critical slope is defined as any slope that is greater than 25’ in height, affects or supports a structure, or whose failure would result in significant cost for repair, or damage to, private property.
2. Site specific in-situ tests include both groundwater measurements and standard penetration testing (SPT) but may also include cone penetration testing (CPT) or dilatometer testing (DMT).
3. Parameters for critical slopes involving structures must be based on specific laboratory testing.
4. Problem soils (very soft and/or loose soils or heavily over-consolidated soils), shall be analyzed using shear strength parameters determined from appropriate laboratory strength tests.
5. Minimum requirements for soil types consistent with the parameters used in slope analyses shall be specified on the Design/Construction Documents.

#### 1.4.3 Settlement of Structures

**A.** The Concessionaire shall design foundations (bridges, retaining walls, pipes and other structures) such that the maximum post-construction foundation settlement shall be in accordance with the following requirements:

**B.** Plans shall incorporate one of the following General Notes.

The foundations for this structure have been designed to limit differential and total settlement to ½”. The total settlement (STOT) is defined as the arithmetic sum as follows: STOT = Elastic Settlement + Consolidation Settlement + Secondary Settlement. The superstructure and substructure elements above the footings have not been specifically analyzed or designed to accommodate total or differential settlement.

**OR**

This structure has been analyzed and designed to accommodate settlement as noted below:
Total Settlement of (___)” has been accommodated. The total settlement (STOT) is defined as the arithmetic sum as follows: STOT (___)” = Elastic Settlement (___)” + Consolidation Settlement (___)” + Secondary Settlement (___)”.

In addition, Differential Settlement of (___)” between adjacent substructure units and (___)” within a single unit has been accommodated.

In order to facilitate the selection of the specific values for the General Note, the following Notes to Designer are provided:

The following restrictions are placed on Settlements:

1. For beam and slab bridges conforming to superstructure types a, e, f, g, k, i as defined in Table 4.6.2.2.2 of the AASHTO LRFD Bridge Design Specifications, fourth Edition, 2007 with 2008 Interims: when total settlement and differential settlement are limited to ½” no additional analysis is required.

2. During construction and after all settlements have occurred the bridge structure (consisting of the superstructure, substructure and associated elements in the load path) must meet all structural capacity requirements for all loading combinations requiring such analysis. In addition, the structure must meet all structural capacity requirements for all load combinations for the listed differential settlement.

3. The bearings and substructure shall be designed to accommodate increases or decreases in loads due to total or differential settlement shown on the plans (Ref AASHTO 3.4.1; 3.12.6).

4. Creep and/or shrinkage may only be used to offset settlement effects when it occurs CONCURRENTLY with settlement, and the designer is responsible for determining time rate of settlement and creep. [For instance, if all settlement is elastic (instantaneous), creep cannot be used to offset loads imposed].

5. Joint rotations and Bearing rotations due to settlement shall be considered in addition to all tolerances for rotations due to live load effects or for constructability.

6. In no case shall anticipated settlements (or rotations due to settlement) cause the structure to encroach on horizontal, vertical or navigation clearance envelopes.

7. Settlements which change super elevation shall not reduce super elevation below the minimum specified by AASHTO for the roadway design speed.
and roadway type, nor shall they negatively impact the performance of the deck or approach paving.

8. Settlements which change profile grade shall not:
   a. Increase spread of drainage beyond limits specified in AASHTO.
   b. Change performance or maintainability of utilities.
   c. Introduce a low spot on the bridge.
   d. Negatively impact rideability provisions.

9. Coordinate predicted/expected settlement of the approach embankments and bridge structure to comply with contract rideability requirements.

10. The structure must be capable of carrying an additional future wearing surface equal to the magnitude of the total anticipated settlement placed uniformly from curb to curb and abutment to abutment. All parapets and railings shall accommodate the additional layer of surfacing with no modification or reduction in crash test level after construction.

11. Jacking and shimming shall not be allowed to correct differential settlement except as noted in the original design plans.

12. Settlements shall be treated as a load condition with $\gamma SE = 1.0$ for all AASHTO indicated groups.

When differential settlement at a single substructure unit is anticipated, both the superstructure and substructure shall be analyzed by accounting for the differential deflection. For continuous footings, settlement may be considered to be linear along the long axis of the footing. For isolated footings, in addition to the linear distribution of settlement, adjacent footings shall be analyzed for a linear proportion of the differential settlement at each footing (for a 3 column pier with 2 equal spaces, 50%, for a 4 column pier with 3 equal spaces, 33% of the total pier differential shall be used at each column).
Examples of Possible Settlement patterns to clarify differential settlement proportioning as it is intended to be considered as part of settlement analysis. (Patterns are selected for illustrative purposes, the pattern selection is not all inclusive, designer is responsible for determining Critical Pattern)
1.5 Materials

1.5.1 Rights for and Use of Materials Found on Project

The Concessionaire may use in the Project any materials found in the excavation that comply with the Standard Documents in Section 3.5.2 and otherwise comply with Good Industry Practice. The Concessionaire shall replace at its own expense with other acceptable material the excavation material removed and used that is needed for use in embankments, backfills, approaches, or otherwise. The Concessionaire shall not excavate or remove any material from within the construction limits that is not within the grading limits, as indicated by the slope and grade lines.

1.5.2 Samples, Tests, and Cited Specifications

The responsibility for quality control, quality assurance, and ensuring compliance with applicable specifications and testing requirements lies with the Concessionaire. The Concessionaire’s QMSP shall outline the procedures for quality assurance, quality control, and compliance with the Technical Requirements. VDOT, at its discretion, may conduct testing and audits.

1.5.3 Material Delivery

The Concessionaire shall advise VDOT at least two weeks prior to the delivery of any material from a commercial source which could adversely impact roadway and/or river traffic if not properly scheduled/coordinated. Other material deliveries shall be noted topics in Project site meeting agendas. Upon delivery of any such material to the Project, the Concessionaire shall confirm that the material meet the requirements of the Technical Requirements and, if so, shall provide VDOT with one copy of all invoices (prices are not required).

1.5.4 Plant Inspections

If the Concessionaire elects to use materials from a plant that is part of VDOT’s materials QA program wherein VDOT inspects materials at the source, the following conditions shall be met:

A. VDOT shall have the cooperation and assistance of the Concessionaire and producer of the materials.

B. VDOT shall have full access to parts of the plant that concern the manufacture or production of the materials being furnished.

C. The Concessionaire shall provide sufficient notice to VDOT of its intent and shall be responsible for obtaining copies of VDOT’s plant inspection reports.
1.5.5 Storing Materials

A. Materials shall be stored in a manner so as to ensure the preservation of their quality and fitness for the Work. When considered necessary by the Concessionaire’s Quality Assurance Manager or VDOT, materials shall be stored in weatherproof buildings on wooden platforms or other hard, clean surfaces that will keep the material off the ground. Materials shall be covered when directed by VDOT. Stored material shall be located so as to facilitate its prompt inspection. Portions of the Project right of way may be used for storage of material and equipment and for plant operations. However, equipment and materials shall not be stored within the clear zone of the travel lanes open to traffic.

B. Additional required storage space shall be provided by the Concessionaire. Private property shall not be used for storage purposes without the written permission of the owner. Copies of the written permission shall be furnished to VDOT. Upon completion of the use of the property, the Concessionaire shall furnish to VDOT a release signed by the property owner indicating that the property has been satisfactorily restored.

C. Chemicals, fuels, lubricants, bitumens, paints, raw sewage, and other harmful materials as determined by the Concessionaire’s Quality Assurance Manager or VDOT shall not be stored within any floodplain unless no other location is available and only then shall the materials be stored in a secondary containment structure(s) with an impervious liner. Also, any storage of these materials in proximity to natural or man-made drainage conveyances or otherwise where the materials could potentially reach a waterway if released under adverse weather conditions, must be stored in bermed or diked area or inside a container capable of preventing a release. Double-walled storage tanks shall meet the berm/dike containment requirement except for storage within flood plains. Any spills, leaks, or releases of such materials shall be addressed in accordance with the Agreement. Accumulated rain water may also be pumped out of the impoundment area into approved dewatering devices.

1.5.6 Handling Materials

Materials shall be handled in a manner that will preserve their quality and fitness for the work. Aggregates shall be transported from storage to the work in vehicles constructed to prevent loss or segregation of materials.

1.5.7 Unacceptable Materials

Materials that do not conform to the Technical Requirements shall be considered
unacceptable. Such materials, whether in place or not, will be rejected and shall be
removed from the site of the Work. If it is not practical for the Concessionaire to remove
rejected material immediately, the Concessionaire will mark the material for
identification. Rejected material whose defects have been corrected shall not be used
until approval has been given by Elizabeth River Crossings LLC (ERC) Quality
Assurance/Quality Control (QA/QC) with VDOT concurrence.

1.5.8 Materials Furnished by VDOT

A. The Concessionaire shall furnish all materials required to complete the Work
except those specified to be furnished by VDOT.

B. Material furnished by VDOT will be delivered or made available to the
Concessionaire at the points specified in the Agreement.

C. After receipt of the materials, the Concessionaire shall be responsible for material
delivered to it, including shortages, deficiencies, and damages that occur after
delivery, and any demurrage charges except for existing assets, and subject to
reasonable inspection by engineer.

1.5.9 Local Material Sources (Pits and Quarries)

A. Local material sources, other than active commercial sand and gravel and quarry
operations, opened by the Concessionaire or its subcontractors shall be concealed
from view from the completed roadway and any existing public roadway. Concealment
shall be accomplished by selectively locating the pit or quarry and
spoil pile, providing environmentally compatible screening between the pit or
quarry site and the roadway, or using the site for another purpose after removal of
the material, or restoration equivalent to the original use (such as farm land,
pasture, turf, etc.).

B. Should the Concessionaire wish to source construction materials from (non-
commercial) new pits or quarries the Concessionaire shall furnish VDOT a
statement signed by the property owner in which the property owner agrees to the
use of their property as a source of material for the Project. Upon completion of
the use of the property as a material source, the Concessionaire shall furnish
VDOT a release signed by the property owner indicating that the property has
been satisfactorily restored. This requirement will be waived for commercial
sources, sources owned by the Concessionaire, and sources furnished by VDOT.

C. Local material pits and quarries that are not operated under a local or State permit
shall not be opened or reopened without authorization by VDOT. The
Concessionaire shall prepare a site plan, including the following:

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Revised January 7, 2011
Revised March 29, 2011
Revised August 26, 2011
Revised October 24, 2011
1. The location and approximate boundaries of the excavation;

2. Procedures to minimize erosion and siltation;

3. Provision of environmentally compatible screening;

4. Restoration;

5. Cover vegetation;

6. Other use of the pit or quarry after removal of material, including the spoil pile;

7. The drainage pattern on and away from the area of land affected, including the directional flow of water and a certification with appropriate calculations that verify all receiving channels are in compliance with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations;

8. Location of haul roads and stabilized construction entrances if construction equipment will enter a paved roadway;

9. Constructed or natural waterways used for discharge;

10. A sequence and schedule to achieve the plan and;

11. The total drainage area for temporary sediment traps and basins shall be shown. Sediment traps are required if the runoff from a watershed area of less than three acres flows across a disturbed area. Sediment basins are required if the runoff from a watershed area of three acres or more flows across a disturbed area. The Concessionaire shall certify that the sediment trap or basin design is in compliance with Good Industry Practice and the Standard Documents in Section 3.5.2. Once a sediment trap or basin is constructed, the dam and all outfall areas shall be immediately stabilized.

D. The Concessionaire’s design and restoration shall be in accordance with Good Industry Practice.

1.5.10 Disposal Areas

A. The Concessionaire shall obtain the necessary rights to property to be used as an approved disposal area. An approved disposal area is defined as that which is owned privately, not operated under a local or State permit.
B. Prior to utilizing a disposal area for non-dredge material, the Concessionaire shall submit a site plan. The plan shall show:

1. The location and approximate boundaries of the disposal area;
2. Procedures to minimize erosion and siltation;
3. Provision of environmentally compatible screening;
4. Restoration;
5. Cover vegetation;
6. Other use of the disposal site;
7. The drainage pattern on and away from the area of land affected, including the directional flow of water and a certification with appropriate calculations that verify all receiving channels are in compliance with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations;
8. Location of haul roads and stabilized construction entrances if construction equipment will enter a paved roadway;
9. Constructed or natural waterways used for discharge;
10. A sequence and schedule to achieve the plan and;
11. The total drainage area for temporary sediment traps and basins shall be shown. Sediment traps are required if the runoff from a watershed area of less than three acres flows across a disturbed area. Sediment basins are required if the runoff from a watershed area of three acres or more flows across a disturbed area. The Concessionaire shall certify that the sediment trap or basin design is in compliance with Good Industry Practice and Standard Documents in Section 3.5.2. Once a sediment trap or basin is constructed, the dam and all outfall areas shall be immediately stabilized.

C. Disposal areas shall be cleared but need not be grubbed. The clearing work shall not damage grass, shrubs, or vegetation outside the limits of the area and haul roads thereto. After the material has been deposited, the area shall be shaped to produce a stable slope long term and to minimize erosion and siltation of nearby streams and landscaped in accordance with the plan for such work. The Concessionaire’s design and restoration shall conform to the requirements of the Agreement, including Good Industry Practice.
D. The Concessionaire shall furnish VDOT a statement signed by the property owner in which the owner agrees to the use of their property for the deposit of material from the Project. Upon completion of the use of the property as an approved disposal area, the Concessionaire shall furnish VDOT a release signed by the property owner indicating that the property has been satisfactorily restored. This requirement will be waived for commercial sources, sources owned by the Concessionaire, and sources furnished by VDOT.

1.6 Drainage

1.6.1 Drainage Design

A. The drainage design shall include but not be limited to enclosed storm sewer systems, curb inlets, stormwater management systems for water quality, stormwater pump stations, manholes, junction boxes, culverts, headwalls, channels, ditches, bridge drainage assemblies and structures that remove and transport runoff or convey stream flows.

B. The Concessionaire shall design and install new drainage facilities and will be permitted to use existing drainage systems, in accordance with Standard Documents in Section 3.5.2.

C. The Concessionaire will assemble and review all available data, studies, and development plans impacting the Project corridor for use in preparing the drainage design. The Concessionaire shall perform a hydrologic analysis within the limits of the Project and extend the analysis to include all offsite areas that will drain through or impact the Project.

D. All existing drainage facilities within the Project right of way that are impacted by the Concessionaire’s activities and that the Concessionaire intends to leave in place shall be evaluated and verified to have adequate hydraulic capacity for ultimate land use conditions. The Concessionaire shall verify the structural adequacy of the existing drainage facilities which the Concessionaire intends to leave in place for continued use which will be subjected to additional embankment, and/or live loading.

E. The Concessionaire shall provide new stormwater management facilities and remove or improve any existing stormwater management facilities in accordance with applicable Standard Documents in Section 3.5.2.

F. The Concessionaire shall design and construct all permanent and temporary erosion and sediment control measures in accordance with applicable Standard Documents in Section 3.5.2.
G. The Concessionaire shall use, as a minimum, 15” pipe for the drainage systems within the roadway, except within the limits of the tunnel. The minimum size for culverts in the interstate system shall be 24-inches.

H. No inlet structure or portion thereof shall be located in the roadway surface of the travel way.

I. Prior to the commencement of the construction Work, the Concessionaire shall determine all existing drainage facilities the Concessionaire intends to utilize and leave in place for continued use (pursuant to Section 1.6.1.D). Within the Project Right of Way, the Concessionaire shall perform such activities as may be necessary to cause such facilities to be completely clean and free of debris and silt prior to commencement of construction Work on or near such existing drainage facilities. The Concessionaire shall be responsible for cleaning any debris or silt accumulation caused by performance of the construction Work.

J. As part of the Work and in accordance with Good Industry Practice, the Concessionaire may tie in or connect new drainage assets it is designing and constructing to existing drainage assets present along the I-264 Corridor as of the Agreement Date. If there is an existing drainage asset the Concessionaire desires to tie in or connect to, but is prevented from doing so because of physical damage to such existing drainage asset not caused by or attributable to the Concessionaire’s activities, the Concessionaire shall repair the existing drainage asset so it can perform the proposed tie-in or connection. Any such repair work shall be completed in accordance with the Standard Documents in Section 3.5.2. Compensation for such repairs shall be in accordance with the requirements set out in the Agreement. The foregoing provision shall not apply if the hydraulic or structural loading of any existing drainage asset is verified to be inadequate, as determined pursuant to Section 1.6.1.D, as a result of the Concessionaire proposed tie-in or connection. In that case, the Concessionaire shall, at its sole cost and expense, replace and/or repair the existing drainage asset at the proposed tie-in or connection (in accordance with the Standard Documents in Section 3.5.2 in order to accommodate the proposed tie-in or connection.

K. All existing culverts, storm sewer, and drainage appurtenances to be abandoned shall be removed or filled and plugged with flowable fill.

L. See Section 1.14.3.D for bridge deck drainage requirements.

M. For all permanent structures, the bridges, hydrology, hydraulics, and scour requirements shall be in accordance with the Standard Documents in Section 3.5.2, including but not limited to AASHTO Load and Resistance Factor Design Bridge Design Specifications (the more stringent requirements shall govern).
N. During the construction of the Project, the Concessionaire shall provide for positive drainage of all roadway facilities open to construction traffic. Construction activities shall not redirect or add drainage run-off to a private property.

O. Shore protection for structures shall be designed in accordance with the Standard Documents in Section 3.5.2.

P. Adequate outfall, Minimum Standard 19 (MS-19) assessments shall be performed at all outfall locations in accordance with the Standard Documents in Section 3.5.2. Any existing outfall intended to be used by the Concessionaire, but found to be inadequate shall be improved or proven adequate in accordance with the Standard Documents in Section 3.5.2 or the flow shall be attenuated to such a degree as necessary to enable the outfall to become adequate. All necessary improvements to inadequate existing outfalls shall be at the cost of the Concessionaire, and shall be subject to VDOT review and comment prior to commencement of construction activities.

Q. Stormwater pump stations shall be designed in accordance with the Standard Documents in Section 3.5.2.

R. At locations where the vertical alignment of the roadway creates a sag condition in either a depressed roadway section, tunnel, or roadway section utilizing concrete barriers, and ponded water on the roadway can only be removed through the drainage system, a 50-year storm frequency and the actual time of concentration should be used as the design criteria for the drop inlets, pipe system, and stormwater pump stations.

1.6.2Stormwater Pollution Prevention Plan, Virginia Stormwater Management Program General Permit for the Discharge of Stormwater from Construction Activities, Stormwater Management and Erosion and Sediment Control Plan

A. Concessionaire Stormwater Pollution Prevention Plan. The Concessionaire shall develop and provide for VDOT’s review and comment a conceptual Stormwater Pollution Prevention Plan (SWPPP) prior to applying for the Virginia Stormwater Management Program (VSMP) and prior to any land disturbing activities. A SWPPP identifies potential sources of pollutants which may reasonably be expected to affect the stormwater discharges from the construction site and any off site support areas and describes and ensures implementation practices which will be used to reduce pollutants in such discharges. The SWPPP is comprised of, but not limited to, the Erosion and Sediment Control (ESC) Plan, the Stormwater Management Plan (SWMP), and related specifications and standards contained with the Agreement and shall be required for all land-disturbing activities that
disturb 10,000 square feet or greater, or 2,500 square feet or greater in Tidewater, Virginia. Land-disturbing activities that disturb 1 acre or greater, or 2,500 square feet or greater in an area designated as a Chesapeake Bay Preservation Area, require coverage under the Department of Conservation and Recreation’s VSMP General Permit for Stormwater Discharges from Construction Activities (VSMP Construction Permit). Where applicable, VDOT will apply for and retain coverage under the VSMP Construction Permit for those land disturbing activities for which it has control. The required contents of a SWPPP for those land disturbance activities requiring coverage under the VSMP Construction Permit are found in Section II D of the General Permit section of the VSMP Regulations (4VAC50-60-1170). While a SWPPP is an important component of the VSMP Construction Permit, it is only one of the many requirements that must be addressed in order to be in full compliance with the conditions of the permit. The Concessionaire shall be responsible for reading, understanding, and complying with all the terms, conditions and requirements of the permit and the SWPPP, including the following:

1. Project Implementation Responsibilities. The Concessionaire shall be responsible for the installation, maintenance, inspection, and, on a daily basis, ensuring the functionality of all erosion and sediment control measures and all other stormwater and pollutant runoff control measures identified within or referenced within the SWPPP, plans, specifications, permits, and elsewhere in the Agreement, including these Technical Requirements. The Concessionaire shall take all reasonable steps to prevent or minimize any stormwater or non-stormwater discharge that will have a reasonable likelihood of adversely affecting human health or public and/or private properties.

2. Certification Requirements. In addition to satisfying the personnel certification requirements contained herein, the Concessionaire shall certify its activities by completing, signing, and submitting Form C-45 VDOT SWPPP Contractor and Subcontractor Certification Statement to VDOT at least seven days prior to commencing any Project related land-disturbing activities, both on-site and off-site.

3. SWPPP Requirements for Support Facilities. The Concessionaire shall develop ESC Plan(s) and SWPPP(s) for submission and acceptance by VDOT prior to usage of any on-site or off-site support facilities, including borrow and disposal areas, construction and waste material storage areas, equipment and vehicle storage and fueling areas, storage areas for fertilizers or chemicals, sanitary waste facilities, and any other areas that may generate a stormwater or non-stormwater discharge related to performance of the Work. Such plans shall document the location and description of potential pollutant sources from these areas and shall
include a description of the controls to reduce, prevent and control pollutants from these sources including spill prevention and response. The Concessionaire shall submit such plans and documentation as specified herein to VDOT and, upon review and comment, they shall immediately become a component of the SWPPP and VSMP Construction Permit (where applicable) and shall be subject to all conditions and requirements of the VSMP Construction Permit (where applicable) and the Agreement, including these Technical Requirements.

4. Reporting Procedures

   a. Inspection Requirements. The Concessionaire shall be responsible for conducting inspections in accordance with the requirements herein. The Concessionaire shall document such inspections by completion of Form C-107 (a) and (b), Construction Runoff Control Inspection Form and Continuation Sheet, in strict accordance with the directions contained within the form.

   b. Unauthorized Discharge Requirements. The Concessionaire shall not discharge into State waters sewage, industrial wastes, other wastes or any noxious or deleterious substances nor shall otherwise alter the physical, chemical, or biological properties of such waters that render such waters detrimental for or to domestic use, industrial consumption, recreational or other public uses.

   c. Notification of non-compliant discharges. The Concessionaire shall immediately notify VDOT upon the discovery of or potential of any unauthorized, unusual, extraordinary, or non-compliant discharge from the land disturbing activity. Where immediate notification is not possible, such notification shall be not later than 24 hours after said discovery.

   d. Detailed report requirements for non-compliant discharges. The Concessionaire shall submit to VDOT within five days of the discovery of any actual or potential non-compliant discharge a written report describing details of the discharge to include its volume, location, cause, and any apparent or potential effects on private and/or public properties and State waters or endangerment to public health, as well as steps being taken to eliminate the discharge. A completed Form C-107 (a) and (b) shall be included in such reports.
B. Changes, Deficiencies and Revisions.

1. Changes and Deficiencies. The Concessionaire shall report to VDOT when any planned physical alterations or additions are made to the land disturbing activity or deficiencies in the Project plans or the Agreement, including these Technical Requirements are discovered that could significantly change the nature or increase the quantity of the pollutants discharged from the land disturbing activity to surface waters.

2. Revisions to the SWPPP. Where site conditions or construction sequencing or scheduling necessitates revisions or modifications to the ESC plan or other any other component of the SWPPP for the land disturbing activity, such revisions or modifications and shall be documented by the Concessionaire on a designated plan set (Record Set). Such plans shall be kept on the Project site at all times and shall be available for review upon request.

C. The Concessionaire shall prepare a post-construction SWMP for the entire Project. Plans shall be prepared in accordance with the Standard Documents in Section 3.5.2 and submitted to VDOT for its review and comment. The ESC Plan and SWMP shall be kept current over the operating period.

1.7 Roadway Design

1.7.1 General Requirements

Concessionaire will prepare the final geometric design of the roadway elements in accordance with Good Industry Practice. Functional classifications for roadways and specific design criteria on the Project are to be developed per Section 1.7 and the Standard Documents in Section 3.5.2.

A. The design speed for the New MLK Extension and other roadway segments shall meet or exceed the values shown in the Design Criteria for the MLK Freeway Extension provided as Attachment 1C.

B. The I-264 ramp shoulders shall meet the widths shown in the Design Criteria for the MLK Freeway Extension (Attachment 1C). Shoulder width pavement shall be adequate for safe operations and other shoulder functions such as support of the pavement edge. Existing shoulders and medians on I-264 will not be upgraded or altered except as required to accommodate ramp tie-ins.

C. In areas of asphalt pavement widening, the Concessionaire shall overlay the entire surface area of new pavement and one lane width of existing pavement to a point at least 100 feet before and after the limits of widening.
1.7.2 Roadway Design Criteria

Roadway Design Criteria for the MLK Freeway Extension is provided in Attachment 1C. Roadway Design Criteria for the Midtown Tunnel is provided in Attachment 1D.

1.8 Pavement

1.8.1 General

A. The Concessionaire shall develop pavement sections for residential and commercial roadways in accordance with VDOT’s Pavement Design Guide for Subdivision and Secondary Roads in Virginia. The Concessionaire shall develop pavement sections for primary roads in accordance with the Manual of Instructions for Materials Division (Chapter VI of Pavement Evaluation and Design).

B. Pavements shall be designed to meet the Performance Requirements included in the Standard Documents in Section 3.5.2 and 4.4 Performance Requirements in the Technical Requirements.

C. All roadways shall be designed to ensure positive drainage on the pavement surface and within the pavement structure, including connecting to existing or any new sub drainage systems.

D. Any pavement reconstruction on arterials or local streets or other roadways adjacent to and crossing the Project that are affected by the construction activities of the Project shall match the existing pavement type. An information sheet of existing as planned pavement sections within the Project corridor is included in Section 1.8.2. Reconstructed pavement sections shall be designed in accordance with the standards referenced in this section. The Concessionaire shall design tie-in work to avoid differential settlement (bump at the tie-in) between the existing and new surface in accordance with the Performance Requirements.

E. The Concessionaire’s plans, typical sections, profiles and cross-sections shall include the appropriate elements identified as a result of the drainage analysis/design and the pavement design. This shall include, but is not limited to, underdrains, stormwater inlets and pipes, and pavement sections reflecting the elements identified in the Concessionaire’s final pavement design.

F. The area surrounding pavements shall be graded to direct surface water away from paved areas. Any utility excavations or excavations for storm drains within
pavement areas shall be backfilled with compacted structural fill in accordance with applicable sections of the *Road and Bridge Specifications*.

G. The Concessionaire shall submit to VDOT for its review, 21 days before the submittal of associated final Design Documentation, a pavement design report that documents the assumptions, considerations, and decisions contributing to the Concessionaire’s proposed pavement design, including the following:

1. Pavement design details by location, including structural layer materials, general specifications, and thicknesses;
2. Relevant pavement evaluation data (structural and functional) and condition information on adjacent roads;
3. Relevant geotechnical data and drainage requirements to verify the pavement design(s);
4. Design criteria used in determining the pavement design(s), including annual average daily traffic, percentage heavy vehicles, cumulative traffic loading, pavement material strength factors, and pavement design life; and
5. Design calculations documenting the pavement design(s) in accordance with the specified design methodology.

1.8.2 Existing Pavement Design Sections

Project No.: 0058-965-108, PE101
(UPC #76642)
MLK and MLK Connector

Below are various mainline, shoulder, ramp and loop pavement sections with references to the original construction plans under which they were built. These sections do not include any possible mill and/or overlay data (Note: Harbor Drive was milled and overlaid in 2008). The information provided below is to serve as a reference and possible aid to the Concessionaire in determining the Project’s pavement design and shall not be a guarantee of present day conditions.

Reference PN: 0264-124-071, C501
I-264 from Victory Blvd. to Des Moines Ave.
(No traffic data indicated on plan sheets)
Mainline

Surface: I-30 @ 80lbs./yd² (1.5”)
Intermediate: H-2 @ 140lbs./yd² (2.0”)
Base: H-3 (1) 7.50”
Prime Coat: @ 0.40 gals/yd²
Sub-base “A”: Material Grading I…6.00:”
Sub-base “B”: Cement Treated CBR-20 @ 8%...6.00”

Paved Shoulder

Seal: @ 0.25 gal/yd² Type AE-2 with #78 Stone
        @ 25 lbs./yd²
Base: H-3(1) @ 325 lbs./yd²
Prime Coat: @ 0.40 gal/yd²
Cement Treated Sub-base: (Select Type II, Min. CBR-20)
        @ 8%... 6.00”

Reference PN: 0264-124-071, C502
I-264 from Des Moines Ave to Washington Street (Tunnel Entrance)

From: Des Moines Ave. To: Effingham Street
From: Effingham Street To: Washington Street

<table>
<thead>
<tr>
<th></th>
<th>From Des Moines Ave.</th>
<th>From Effingham Street</th>
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<tbody>
<tr>
<td>ADT (1962)</td>
<td>18,760</td>
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<td>ADT (1984)</td>
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<tr>
<td>DHV</td>
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<td>5,610</td>
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<td>D (%)</td>
<td>36 / 64</td>
<td>36 / 64</td>
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<tr>
<td>T (%)</td>
<td>7.5</td>
<td>7.5</td>
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<tr>
<td>V(MHP)</td>
<td>60</td>
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Mainline and paved shoulder typicals are the same as indicated for PN: 0264-124-071, C501 except “Sub-base A” is identified as “Sub-base Material Modified”

Ramps and Loops

Surface: I-3 @ 80 lb. /yd² (1.5”)
Intermediate: H-2 @ 140 lbs./yd² (2”)
Base: H-3(1)…7.50”
Prime Coat: @ 0.40 gals/yd²
Sub-base “A”: Material Grading I…6.00”
Sub-base “B”: Cement Treated, Select Type II,
TECHNICAL REQUIREMENTS
Exhibit C

Min. CBR-20 @ 8% by volume…6.00”

Reference  PN: 0264-122-104, C501
I-264 from Des Moines Ave to West Portal (EB) Tunnel

<table>
<thead>
<tr>
<th>From: Des Moines Ave.</th>
<th>From: Effingham Street</th>
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<tr>
<td>To: Effingham Street</td>
<td>To: Crawford Street</td>
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<tr>
<td>ADT (200)</td>
<td>75,800</td>
<td>58,600</td>
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<tr>
<td>DHV</td>
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<td>D (%)</td>
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<td>T (%)</td>
<td>4</td>
<td>4</td>
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<tr>
<td>V(MHP)</td>
<td>60</td>
<td>50</td>
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The Project is a later trench widening of existing I-264, and referenced the existing pavement section as follows:

Existing Surface courses: 3.50”±
Existing Base Course: 7.50”±
Existing Sub-base Material: 6.00”± (unidentified)
Existing Cement Treated Sub-base: 6.00”± (unidentified)

**Mainline Widening**

Surface: 165 lbs./yd.² (1.50”) Type S-5 AC
Base: 8.00” Type B-3 AC
Sub-base: 7.50” of aggregate base material Type II, Size No. 21-A or 22.
Cure Coat: CSS-1h or RC-250 @ 020 gal/yd.²
Cement Stabilized: Select Type II, Min. CBR-20 @ 7% by volume (6.00”)

**Ramps and Loops**

Seal Coat: CRS-2 or CMS-22h @ 0.30 gal/yd.²
Surface: 165 lbs./yd.² (1.50”) Type S-5 AC
Base: 3.00” Type B-3 AC
Sub-base: Minimum 10.00” and variable of aggregate base material Type II, Size No. 21-A or 22

**Paved Shoulders (Ramps, Loops, and Mainline)**

Seal Coat: CRS-2 or CMS -22h @ 0.30 gal/yd.²
Base: 3.00” Type B-3 AC

Section 1  Design and Construction Requirements - 39 -
Revised January 7, 2011
Revised March 29, 2011
Revised August 26, 2011
Revised October 24, 2011
TECHNICAL REQUIREMENTS
Exhibit C

Sub-base: Minimum 10.00” and variable of aggregate base material Type II, Size No. 21-A or 22.

Reference: Second Elizabeth River Tunnel and Approaches Contract #4 Elizabeth River Tunnel Commission

Existing MLK Pavement Section

(No traffic data provided in plans.)

Surface: 2.00” of Type I-3 AC placed in two (2) lifts.
Base: 7.00” of Type H-3(2) AC placed in three (3) lifts.
Sub-base: 12.00” minimum of Select Borrow

Note: Same design was utilized for ramps and Harbor Drive. However, UD-1 underdrains may have been installed on Harbor Drive beneath the CG.

MLK Paved Shoulder

6.00” of “soil aggregate” with prime/seal treatment CI-“A” on Select Borrow with option to install UD-1’s beneath shoulder at mainline EP (no indication that underdrains were installed).

When reviewing these sections, please note the following:

<table>
<thead>
<tr>
<th>1.)</th>
<th>Asphalt Concrete Types</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>S-5</td>
<td>Surface course AC</td>
<td></td>
</tr>
<tr>
<td>I-3</td>
<td>Used as both surface and intermediate AC</td>
<td></td>
</tr>
<tr>
<td>H-2</td>
<td>Used as both intermediate and base AC</td>
<td></td>
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<tr>
<td>H-3</td>
<td>Base Course AC</td>
<td></td>
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<tr>
<td>B-3</td>
<td>Base Course AC</td>
<td></td>
</tr>
<tr>
<td>BM-3</td>
<td>Base Course AC</td>
<td></td>
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</tbody>
</table>

2.) “Sub-base Material Grading 1” = Aggregate 21-A or 22

3.) At the time these sections were in use
   • Shoulders and riding surfaces were commonly “sealed”
   • Sub-base aggregates were commonly “primed”

1.9 Traffic Engineering

The Concessionaire shall be responsible for the design and construction of the Project signing, pavement markings, roadway and sign lighting, and traffic signals.
1.9.1 Pavement Markings and Markers

A. The Concessionaire shall provide and maintain pavement markings and reflective pavement markers as provided by this Section and meeting the Standard Documents in Section 3.5.2.

B. All limited access facilities shall have Type B, Class VI pavement markings and snow plowable raised pavement markers installed.

C. Contrast pavement markings shall be installed on all white lines installed on hydraulic cement concrete surfaces.

D. All pavement markings that shall be installed on roadways that will be maintained by other agencies shall meet the requirements of that agency.

E. Type D, Class III Temporary Pavement Markings shall be used for all temporary pavement markings on this Project. Temporary pavement markings and markers are not to be placed on the final surface course.

1.9.2 Signing

A. The Concessionaire shall design, fabricate, install and maintain all new guide, supplemental, route marker, regulatory and warning signs required for this Project as provided for by this Section and meeting the Standard Documents listed in Section 3.5.2. The Concessionaire shall also modify all existing signs requiring message modification.

B. The Concessionaire shall prepare a Signing Roll Plan (Roll Plan) and present the plan for review and comment by VDOT. 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 Roll Plan shall also display signing, both existing (to remain) and proposed, 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 Concessionaire shall also provide for modification or removal of any signage outside of the limits of the Project that is no longer appropriate or pertinent. The Roll Plan shall also include the locations of all proposed and existing Dynamic Message Signs (DMS). The Roll 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 Roll Plan. Submittal of the Roll Plan to VDOT may occur during final design.
The Concessionaire shall be responsible for planning, coordination and obtaining Governmental Approvals, if required.

All mainline and interchange guide signs shall be installed overhead, either on overhead or cantilever structures.

The Concessionaire shall not relocate existing overhead or cantilever sign structures without VDOT’s concurrence.

The Concessionaire shall be responsible for planning, coordination and obtaining Governmental Approvals, if required.

All mainline and interchange guide signs shall be installed overhead, either on overhead or cantilever structures.

The Concessionaire shall not relocate existing overhead or cantilever sign structures without VDOT’s concurrence.

The limits of directional signage for the Project for which the Concessionaire is responsible are set forth in the O&M Boundaries.

The Concessionaire shall be responsible for coordination with VDOT or the pertinent local agencies or jurisdictions in order to install directional signage, including, without limitation, obtaining all applicable Governmental Approval.

The Concessionaire shall provide the necessary guide, warning and regulatory signs for the Project.

The Concessionaire shall maintain all existing signs during construction, unless they are to be removed permanently or have been replaced as required by the Project. For any existing signs that require relocation due to construction, the Concessionaire shall present pertinent details – such as sign designs, mounting details, locations etc. – for VDOT’s review and comment, prior to relocation.

With review and comment from VDOT, the Concessionaire shall modify or remove existing signs and structures that are rendered inaccurate, ineffective, confusing or unnecessary.

The Concessionaire shall identify all existing signage impacted by the Project, including signs and associated sign structures that are outside the physical limits of roadway construction. For modifications (including adding, deleting or modifying sign panels which are of greater face area and weight to those currently on the structure) to any existing overhead/cantilever sign structure affected by the Project, the Concessionaire shall provide comprehensive structural analysis for VDOT’s review and written comment prior to the commencement of design. To assist with the structural analysis, VDOT will provide (if available) existing inspection reports, structural information, shop drawings, and foundation calculations to the Concessionaire for each existing sign structure identified by the Concessionaire. Where recent inspection records and original design plans are available, and the proposed sign panel layout does not impose higher loads on the...
existing structures, VDOT agrees that the Concessionaire may elect to reuse the existing structure without providing a complete structural analysis. All sign and structure modifications shall be in accordance with the Standard Documents listed in Section 3.5.2 and the VDOT Chief Engineer’s memorandum dated July 24, 2008 (Attachment 3C).

VDOT will review the structural analysis provided by the Concessionaire for each sign structure to determine whether or not the existing structure and/or sign can be modified as proposed. If it is determined by engineering analysis, reviewed by VDOT that modification to the existing sign structure and/or signs are not structurally acceptable, the Concessionaire shall provide new signs and structures, in accordance with Standard Documents listed in Section 3.5.2, to replace the existing sign structures and signs.

M. Signs shall incorporate high intensity reflective sheeting material, in accordance with ASTM D4956 Type IX and X and FHWA-HRT-08-026.

N. Post Interchange Distance Signs shall be installed on the Project in accordance with the Standard Documents.

O. The Concessionaire shall place milepost and intermediate markers at 0.2 mile intervals on the right side of the roadway facing traffic for new controlled-access roadways and interchange ramps.

P. The milepost and intermediate markers shall be designed according to the Manual on Uniform Traffic Control Devices (MUTCD) Standard 2E-54, Enhanced Reference Location Signs.

Q. In situations where integrated directional signs exist the Concessionaire shall coordinate with VDOT and their vendor concerning the Integrated Directional Sign Program (IDSP).

R. For signing along the Mainline, except within the tunnel, all guide signs, DMS, and supplemental guide signs shall be installed such that 800 foot spacing is maintained between signs. In areas where the 800 foot spacing cannot be maintained the Concessionaire shall obtain a design waiver/exception from VDOT to reduce the spacing.

1.9.3 Traffic Signals

A. The Concessionaire shall design, supply and construct all necessary temporary and permanent traffic signals and related infrastructure for the Project as provided by this Section and meeting the Standard Documents in Section 3.5.2.
B. The Concessionaire shall design the Project to include new and modifications to existing and proposed traffic signal installations meeting the design requirements of the maintaining agency.

C. The Concessionaire shall provide communications between all new permanent signals for the Project and the maintaining agency’s traffic signal system. The communications medium shall be compatible with the maintaining agency’s communication system or plan and approved by the agency.

D. The Concessionaire shall maintain or provide communications between all existing and temporary signals within the Project throughout construction.

E. New traffic signals on the Project shall be integrated with existing traffic signals using the following approach:

1. The Concessionaire shall design, program, adjust controller timings, test, and commission the new signalized intersections for coordinated operations matching the maintaining agency’s existing coordination plans.

2. VDOT or the maintaining agency will test and commission the local signalized intersection for network operations with existing traffic signal system and will re-time network signals, as needed, to accommodate network demand.

F. The Concessionaire shall keep the existing signalized intersections within the rights of way functional during the construction of the Project. If signals must be shut down, the Concessionaire shall provide temporary signals or appropriate traffic controls. VDOT will not permit any temporary signal shut down without written justification.

G. For each phase defined in the maintenance of traffic (MOT) Plan and traffic control plans (TCP), the Concessionaire shall develop signal timing plans for the Project and roadways designated as detours and submit the plans to VDOT. The Concessionaire shall implement, test, and adjust signal timings to prevailing conditions. The Concessionaire shall develop signal timing plans for all peak and non-peak periods which may require more than eight plans.

H. The Concessionaire shall install and be responsible for all aspects of temporary and permanent traffic signal installation to include but not be limited to design, obtaining permits, installation, rehabilitation of disturbed areas, and acquiring power and communication connections.

I. Conductor/communication cables shall be placed in buried conduit, embedded conduit, and bridge-mounted conduit.
J. The Concessionaire shall not open trench any existing pavement for the installation of conduit, except in areas that will be overlaid or rebuilt. For overlays over trench areas, the new pavement section shall match the existing pavement section.

1.10 Fences and Barriers

A. The Concessionaire shall be responsible for securing the Work and providing all temporary fencing necessary to ensure the safety of the work force and members of the public.

B. The Concessionaire shall perform a safety risk analysis to determine whether fencing should be used to separate the noise wall erection work zones from adjacent properties and, if such analysis shows that fencing is required, the Concessionaire shall provide temporary six-foot-high (minimum) chain link security fencing at any such locations.

C. Glare screens or extended height barriers will be installed on all concrete median barriers.

D. Except for temporary fencing, all chain link fabric, posts, rails and other associated hardware for fences, including these items on permanent structures, shall be black vinyl-coated and the details for fences shall be in accordance with the Standard Documents in Section 3.5.2.

1.11 Aesthetics

1.11.1 Agency Coordination

A. City of Portsmouth

1. City of Portsmouth design references:

   a. Uptown D2 District Form Based Code

   b. City of Portsmouth Master Transportation Plan

2. Six (6) segments (A-H) of the Project corridor within its boundaries are to receive aesthetic treatments. These are:

   a. Segment A: from the Midtown Tunnel to London Boulevard (major gateway)
i. Concessionaire shall discuss location and installation of gateway features, such as primary monument-style gateway and way finding signage

b. Segment B: from London Boulevard to High Street (urban area adjacent to a historic residential neighborhood)

i. Light fixtures should be lower in height and consist of Dominion-style lighting.

ii. Concrete sidewalks can be used. All sidewalk widths shall be 5 feet.

iii. On west side of MLK freeway extension, Concessionaire shall consider connecting MacArthur Avenue to Queen Street to re-establish and maintain residential block pattern in lieu of a cul-de-sac.

iv. Deleted

v. Deleted

vi. If MSE wall construction is used to elevate grade from London Boulevard, the MSE wall needs to run fully to High Street and create a vertical face abutment. Sloped sides from High Street to abutment are undesirable. Examples of styles and color of MSE walls follow this section in 1.11.3.

c. Segment C: High Street Bridge (gateway from Historic Downtown area to fast-growing Midtown area)

i. Provide cohesive vision to frame the right of way, reflect the appearance of the city.

ii. It is desirable for the High Street Bridge to exhibit a gateway visual effect. Considerations for arching facia features should be given.

d. Segment D: from High Street to Turnpike Road (mixed use and future Transit Oriented Design hub)

i. Light fixtures should be lower in height and consist of Dominion-style lighting.
ii. On west side of MLK freeway extension, the Concessionaire shall consider connecting King Street to County Street to re-establish and maintain block pattern and urban grid in lieu of a cul-de-sac.

iii. On east side of MLK freeway extension, the Concessionaire shall consider connecting King Street to County Street to re-establish and maintain block pattern and urban grid in lieu of a cul-de-sac.

iv. Concessionaire shall minimize distance between through lane and off-ramps.

e. Segment E: Bridge over Turnpike Road (urban area)

i. Light fixtures should be lower in height and consist of Dominion-style lighting.

ii. Bridge structure will follow the same type set by preceding structure from High Street.

f. Segment F: from Turnpike Road to Interstate 264 (major gateway)

i. The Concessionaire shall discuss location and installation (at the City’s cost) of gateway features, such as primary monument-style gateway and way finding signage.

ii. Lighting should be maximized underneath the MLK where appropriate. High pressure sodium (HPS) fixtures should be considered.

iii. Light fixtures should be lower in height in the vicinity of Dale Homes, the residential units on South Street, and along the south side of Interstate 264. Lights should consist of Dominion-style lighting.

iv. Ramp termination treatment will be consistent with the overall theme of the adjacent bridge structure, i.e. concrete barriers, embedded steel with guardrail attached, warning signage and landscaping enhancements. Ramp termination treatment will be shown on the Design Development and Detailed Design Plans and submitted for VDOT review and comment.
TECHNICAL REQUIREMENTS
Exhibit C

Section 1
Design and Construction Requirements

1. Seeding, shrubs (& shrub beds) will be designed by a registered Landscaping Architect (LA) licensed to practice landscape architecture in the Commonwealth of Virginia. All shrubs and/or floral arrangements genus types will be compatible and be able to thrive in the environment of the Hampton Roads area.

2. All Stormwater Detention Basins scheduled for inclusion on this Project are to be:
   a. Considered for implementation within the Right of Way
   b. Surrounded by Black Vinyl coated chain link fence with a landscaped perimeter with the exception of Pond 14
   c. Tree planting and genus shall be in accordance with the street tree list following this section in 1.11.4.

3. Concept sketches are shown in Attachment 1E and listed below.
   a. High Street Gateway – May 25, 2011 (2 pages)
   b. Turnpike Road Area – June 3, 2011
   c. Illustrative Elevations – May 25, 2011
   d. Enlargements – July 12, 2011
   e. Site Furnishings – May 25, 2011

B. City of Norfolk

1. City of Norfolk Design references
   a. City of Norfolk Design Standards
   b. Ghent Design Guidelines
   c. City of Norfolk Design Review Committee (advisory only)

2. General aesthetic design requirements:
   a. Provide cohesive vision to frame the right-of-way, reflect the appearance of the city.
b. Match materials and construction of existing sidewalks/trails for extensions of same per city design standards and guidelines.

c. Enhanced front façade/landscape integration for any vertical walls (noise walls or MSE walls).

d. Provide an area for installation of a “Welcome to Norfolk” sign exiting the Norfolk portal (eastbound traffic). This area should be located in the median.

3. Concept sketches are shown in Attachment 1F and listed below.


1.11.2 Deleted

1.11.3 Deleted

1.11.4 Tree List

A. Street Tree List

(Large Canopy Trees – mature height above 70 feet)

<table>
<thead>
<tr>
<th>Tree Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer rubrum</td>
<td>Red Maple</td>
</tr>
<tr>
<td>Betula nigra</td>
<td>River Birch</td>
</tr>
<tr>
<td>Celtis occidentalis</td>
<td>Common Hackberry</td>
</tr>
<tr>
<td>Cercidiphyllum japonicum</td>
<td>Katsura Tree</td>
</tr>
<tr>
<td>Fraxinus Americana ‘Autumn Purple’</td>
<td>White Ash</td>
</tr>
<tr>
<td>Fraxinus excelsior</td>
<td>Blue Ash</td>
</tr>
<tr>
<td>Fraxinus pennsylvanica ‘Marshall’s Seedless’</td>
<td>Green Ash</td>
</tr>
<tr>
<td>Ginkgo biloba</td>
<td>Ginkgo (male only)</td>
</tr>
<tr>
<td>Gleditsia triacanthos var. inermis</td>
<td>Thornless honey locust</td>
</tr>
<tr>
<td>Liquidambar styracifolia</td>
<td>Sweetgum</td>
</tr>
<tr>
<td>Platanus acerifolia ‘Bloodgood’</td>
<td>London Plane tree</td>
</tr>
<tr>
<td>Platanus occidentalis</td>
<td>Sycamore</td>
</tr>
<tr>
<td>Quercus acutissima</td>
<td>Sawtooth Oak</td>
</tr>
<tr>
<td>Quercus coccinea</td>
<td>Scarlet Oak</td>
</tr>
<tr>
<td>Quercus falcata</td>
<td>Southern Red Oak</td>
</tr>
<tr>
<td>Quercus muhlenbergii</td>
<td>Chinquapin Oak</td>
</tr>
<tr>
<td>Quercus palustris</td>
<td>Pin Oak</td>
</tr>
<tr>
<td>Quercus phellos</td>
<td>Willow Oak</td>
</tr>
</tbody>
</table>
### B. Public Space Trees

In addition to the above trees, the following trees may be placed within Dooryards, Squares or Civic Greens.

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer palmatum cultivars</td>
<td>Japanese Maple</td>
</tr>
<tr>
<td>Cerus canadensis</td>
<td>Redbud</td>
</tr>
<tr>
<td>Cornus florida cultivars</td>
<td>Dogwood</td>
</tr>
<tr>
<td>Cornus kousa</td>
<td>Kousa Dogwood</td>
</tr>
<tr>
<td>Lagerstroemia indica</td>
<td>Crepe Myrtle</td>
</tr>
<tr>
<td>Magnolia spp.</td>
<td>Magnolia</td>
</tr>
<tr>
<td>Malus spp. (improved varieties)</td>
<td>Crabapple</td>
</tr>
<tr>
<td>Prunus spp.</td>
<td>Flowering Cherry and Plum</td>
</tr>
<tr>
<td>Taxodium distichum</td>
<td>Bald Cypress</td>
</tr>
<tr>
<td>Acer nigrum</td>
<td>Black Maple</td>
</tr>
<tr>
<td>Carya illinoinensis</td>
<td>Pecan</td>
</tr>
<tr>
<td>Carya laciniosa</td>
<td>Shellbark Hickory</td>
</tr>
<tr>
<td>Carya ovata</td>
<td>Shagbark Hickory</td>
</tr>
<tr>
<td>Ilex vomitoria</td>
<td>Yaupon Holly</td>
</tr>
<tr>
<td>Juglans nigra</td>
<td>Black Walnut</td>
</tr>
<tr>
<td>Liriodendron tulipifera</td>
<td>Tulip Poplar</td>
</tr>
<tr>
<td>Pistacia chinensis</td>
<td>Chinese Pistache</td>
</tr>
<tr>
<td>Taxodium ascendens</td>
<td>Pond Cypress</td>
</tr>
<tr>
<td>Zelkova serrata</td>
<td>Japanese Zelkova</td>
</tr>
</tbody>
</table>

### 1.12 Lighting

**A.** The Concessionaire shall preserve all existing lighting assets along I-264; Rte. 58, Rte. 337, in the Existing Midtown Tunnel and Existing Downtown Tunnels, at both tunnel portal entrances on the Norfolk and Portsmouth tunnel approaches and at Brambleton Avenue and Hampton Boulevard interchange, throughout the construction of the Project in order to avoid a diminution of the existing lighting conditions for a period of more than 14 days. The Concessionaire may accomplish
this by staging its construction operations to ensure the repair or replacement of existing lighting assets impacted by the Work is completed within 14 days of such assets being taken out of service or otherwise impacted so as to cause a diminution of the existing lighting conditions. If the necessary repair or replacement of an existing lighting asset cannot be completed within the 14 day period, the Concessionaire shall provide, prior to the expiration of the 14 day period, temporary lighting equipment until the completion of the repair or replacement Work.

B. High mast lighting shall not be allowed within one quarter mile radius of residential areas.

C. Deleted

D. The Concessionaire shall provide lighting within the Project Right of Way, and on approaches as required and design the Project to include new, modifications to, or improvements of, the roadway and tunnel and tunnel facility lighting systems impacted by the Project to the extent noted below.

1. New or modified lighting shall be provided at the entry and exit connections to the New MLK Extension and the New Midtown Tunnel and approaches from the Norfolk and Portsmouth landside.

2. New lighting shall be provided for the New Midtown Tunnel facilities. New or modified lighting at the Existing Midtown Tunnel will be provided within five (5) years after Final Acceptance of the Existing Midtown Tunnel.

3. Under-bridge lighting shall be provided as necessary for new MLK Extension and I-264 Interchange, London Boulevard, and High Street and MLK Extension bridge structures where the structures form an overpass or underpass on the Project.


5. At the ramp intersections with arterial streets as required by the local maintaining agency.

6. The Concessionaire, at its sole cost and expense, shall provide any and all lighting required as mitigation for any design exception, or design waiver.

E. The Concessionaire shall design lighting in accordance with the Standard Documents in Section 3.5.2.
1. Lighting is required where independent grade separated bicycle or pedestrian crossings are impacted or constructed.

1.13 Bicycle and Pedestrian Facilities

A. The Concessionaire shall design and construct the Project to allow for the existing pedestrian and bicycle facilities of the Elizabeth River Trail in Norfolk to cross the Project right of way within the project limits. The Concessionaire shall also design and construct the Project to accommodate the required space needed for planned pedestrian and bicycle facilities within the Project limits as defined by City of Portsmouth’s Master Plan (finalized January 2010).

B. All new facilities and modifications to existing facilities will be designed in accordance with the Standard Documents in Section 3.5.2.

C. The Elizabeth River Trail is built on an old railroad right of way which traverses the portal of the Existing Midtown Tunnel and shall be continued across the New Midtown Tunnel Portal. The Concessionaire shall coordinate with VDOT’s District Bicycle Pedestrian Coordinator and local jurisdictions on the design of the existing or planned facility.

D. All pedestrian signal displays shall be countdown signals. Pedestrian pushbuttons shall be a minimum of 5.0 cm (2 in) across in one dimension and shall contrast visually with their housing or mounting. All pushbuttons must be compliant with American with Disabilities Act Accessibility Guidelines and in accordance with the Standard Documents in Section 3.5.2.

E. Pavement designs for sidewalks and paths shall include a minimum four inch layer of Aggregate Base Material Type 1, Size 21 B, or comply with site and subsurface conditions, whichever is greater.

F. Bicycle and pedestrian signing shall be installed per the MUTCD. The Concessionaire shall provide replacement bike markings only where existing markings are provided.

G. All existing pedestrian and bicycle facilities shall be maintained throughout construction until permanent facilities can be fully opened, unless otherwise approved by VDOT. Facilities, such as Elizabeth River Trail, may be detoured during construction. Any temporary pedestrian or bicycle facility closure request shall be submitted in writing to VDOT for approval. The pedestrian bridge over I-264 can be closed for 9 months to facilitate replacement, provided the detour route is maintained and adequate detour signage is installed, maintained throughout the closure period.
H. The Concessionaire shall design and provide drainage, if needed, for any new independent pedestrian or shared use path bridge. Drainage scupper grates on the bridge should preferably be located within the 2’ shoulder of the path.

1.14 Structures and Bridges

1.14.1 Deleted

1.14.2 Definitions

A. Permanent Structures

1. Permanent structures include but are not limited to bridges, retaining walls, sound walls, bridge class culverts, sign structures, lighting structures, support maintenance buildings and system equipment structures, toll gantries, control rooms, ventilation facilities, crash houses, and technical shelters.

2. A "bridge class culvert" is defined as follows:

   a. A culvert having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening; or other culverts that may be defined as a bridge class culvert in accordance with National Bridge Inspection Standards, the Code of Federal Regulations (23 CFR 650.3), and/or

   b. As defined in the current edition of IIM-S&B-27.6. – Safety Inspections.

1.14.3 Design

A. Design Standards

1. All new bridges and bridge replacements shall be designed in accordance with AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications fourth edition, current interims and VDOT Modifications. All new and existing culverts and retaining walls, including modifications, shall be designed to AASHTO Standard Specifications for the Design of Highway Bridges or AASHTO LRFD and VDOT modifications, as determined by the Concessionaire. All other structures shall be designed to the appropriate Standard Documents in Section 3.5.2.
All railings (e.g., cast-in-place concrete median barriers, parapets, and barrier walls) on bridges and structures shall be designed as follows:

a. For structures designed in accordance with AASHTO LRFD, the railings shall be designed to AASHTO LRFD;

b. For structures, including modifications to existing structures and bridges, designed in accordance with AASHTO Standard Specifications for Highway Bridges, the railings shall also be designed to satisfy all the requirements set forth in National Cooperative Highway Research Program Report No. 350; and

c. All railings shall be in accordance with VDOT’s standards details in Vol-V-Part 3 of the Manual of the Structure and Bridge Division unless VDOT has granted a design waiver or design exception (as applicable).

2. All permanent support buildings and associated structures shall be designed in accordance with the Virginia Uniform Statewide Building Code. The Virginia Department of General Services’ Bureau of Capital Outlay Management (BCOM) will have jurisdiction and authority for design review and construction inspection for these installations. The Concessionaire will follow all requirements as set forth in BCOM’s Guide for Construction and Professional Services Manual.

3. If a structure or bridge is designed to AASHTO LRFD, the Concessionaire still is required to comply with VDOT’s Manuals for the Structure and Bridge Division. Should any such manual not be in accordance with AASHTO LRFD, then the Concessionaire shall implement a modified version of the requirement such that it is in compliance with AASHTO LRFD (subject to VDOT’s review and comments).

4. For mechanically stabilized reinforced earth walls, the Concessionaire also shall design and detail such walls to satisfy the requirements of Article 11.10.2.2 of AASHTO LRFD regardless of the specification used to design the walls.

B. Details and Drawings for Permanent Structures

1. All details and drawings should be in accordance with Vol-V-Part 3 of the Manual of the Structure and Bridge Division. The Concessionaire may propose deviations from VDOT’s current standards, subject to VDOT approval. Should any such details not be available, the Concessionaire
shall implement a modified version of the requirement such that it is in compliance with AASHTO LRFD.

2. Required guidelines for steel box pier caps and steel box girders shall be in accordance with the Standard Documents in Section 3.5.2.

3. Low permeability concrete shall be used for the entire structure including deep foundation units. Testing requirements may be waived by VDOT if the structure is not subject to freeze/thaw cycles.

4. On the plans, all deep foundation units shall be numbered.

5. Any repairs and/or modifications to existing bridges or structures shall be engineered and details submitted to VDOT as a plan package for review and comment.

6. Retaining walls associated with any bridge, located within a distance of 20 feet beyond the end of approach slab/sleeper pad, shall be included with the bridge plan package. Retaining walls beyond the limits set forth above shall be submitted as separate plan packages.

7. To the extent as practical, expansion joints in deck slabs shall be minimized. The use of continuous span units and jointless bridge design technologies shall be used as outlined in the VDOT Manual of the Structure and Bridge Division, Volume V-Part 2 (VDOT office practices).

C. 60% Bridge Plan Submission

1. The Concessionaire shall submit a 60% plan for each permanent structure (new bridge, bridge replacement, and bridge widening).

2. 60% plans must be submitted to VDOT prior to any final bridge design submittal, and at other appropriate times pursuant to VDOT’s concurrent engineering process. VDOT shall not review any final design submittals until the 60% plan has been submitted to VDOT. The commencement of the final design prior to the review of the 60% plan by VDOT shall be done solely at the risk of the Concessionaire.

3. Deleted

D. Final Plans (Stage II) Submission
1. The Stage II bridge submittal shall conform to plan requirements in VDOT’s Manual of the Structure and Bridge Division, Volume V-Part 2 Design Aids/Typical Details.

2. Bridge Deck Drainage
   a. The Concessionaire shall follow the requirements set forth in the Standard Documents in Section 3.5.2 except as noted below.
   b. Lateral runs of pipe shall be hidden, not embedded or recessed, and coordinated with the architectural design of the bridge. The pipes and downspouts shall facilitate ease of maintenance of the deck drainage system.
   c. All pipes shall be a minimum eight inch diameter, and have a slope to promote self-cleaning velocities, and clean-outs.
   d. Downspouts and/or drainage pipes shall not be embedded in bridge piers, abutments or other such substructure units.
   e. Steel downspouts and pipe reducers shall be ASTM A53, Schedule 40, seamless, and galvanized inside and out.
   f. In addition to the requirements mentioned here, the bridge deck drainage must meet the requirements of AASHTO LRFD.

1.14.4 Modifications to Existing Structures and Bridges
   A. If the Concessionaire modifies structural elements of any existing bridge, then the Concessionaire shall provide a design and plan set for the new work and the connections to the existing structure that is consistent with the Standard Documents, including, but not limited to, VDOT Structures and Bridge Manuals, VDOT Instructional and Informational Memorandum’s (I&IMs) and AASHTO Standards.

1.14.5 Toll Gantries
   A. The design for the structures, toll gantries, and supports for the violation enforcement, traffic management system (TMS) and tolling system roadside equipment will accommodate the following:
      1. Toll and enforcement equipment dead loads and performance requirements;
2. Natural frequency requirements; and

3. Applicable live loads.

B. The vertical deflection of the toll gantry will not exceed the equipment manufacturer’s desirable design specification.

1.14.6 Barrier Protection of Structures

A. Barrier Protection of Structures shall satisfy the requirements of AASHTO LRFD, including the requirements of Article 3.6.5 of AASHTO LRFD. This requirement shall also apply to all existing bridges and structures where lanes are added or shoulder widths are reduced or do not meet current standard.

B. The above requirement shall be extended for following situation: Columns of straddle bent piers shall always be protected by structurally independent, crashworthy ground mounted 54.0-in high barriers in accordance with Article 3.6.5.1 of the AASHTO LRFD. Barriers shall have a minimum of 1’-0” clearance from the face of the column to back face of the barrier.

1.14.7 Railroad Coordination

A. The bridge shall be designed to satisfy the requirements of the following, and where these requirements are not in agreement, the Concessionaire shall satisfy the more stringent requirement.

1. Manuals of the Structure and Bridge Division, VDOT;

2. Requirements of the owner of the railroad;

3. The American Railway Engineering and Maintenance-of-Way Association; and

4. AASHTO LRFD.

B. The Concessionaire is responsible for obtaining any required approvals from the owner of the facility.

1.14.8 Post Construction

A. Safety and Acceptance Inspection for Bridges, Tunnel Facilities, Culverts, Overhead Sign Structures, and High Mast Lighting Poles.
1. A Substantial Completion inspection is required before accepting the structure. When feasible, it is suggested that the Substantial Completion inspection be held simultaneously with the Safety Inspection,
   a. Substantial Completion inspections will be conducted, in accordance with the Comprehensive Agreement and the Standard Documents in Section 3.5.2. Representatives of the Concessionaire shall be in attendance during the inspection. As described for Safety Inspections, the Concessionaire is responsible for providing traffic control measures and access to all structure elements necessary for performing the inspection.
   b. This inspection shall be performed by VDOT.
   c. As-built drawings, record documents, and shop drawings shall be provided in accordance with the Technical Requirements.
   d. Upon completion of this inspection, a letter from VDOT will be prepared, recommending acceptance or specifying any deficiencies, including incomplete work, which must be resolved before the structure is accepted. If a structure is not accepted, the Concessionaire shall fix the deficiencies and notify VDOT by submitting a letter certifying that the deficiencies have been corrected. Depending on the severity of the deficiencies, as judged by VDOT, another inspection may be performed or acceptance may be immediately recommended.

2. A Safety Inspection is required before any bridge or tunnel is opened to traffic.
   a. This inspection serves as the initial inspection of the structure. Data about location, date completed / open to traffic, alignment, description, horizontal / vertical clearances, streams, structure element description and condition, and traffic safety features will be gathered.
   b. The Concessionaire shall ensure that all structural elements are accessible for inspection of all structures. This requirement may dictate that the Concessionaire provide:
      i. Man-lifts, barges, remote operated vehicles, bucket trucks, under-bridge inspection vehicles, boats, or other equipment necessary to inspect the structure; and
ii. Plans, personnel, and equipment to implement traffic control measures.

c. The inspection shall be performed by VDOT. As-built drawings will be provided in accordance with the Technical Requirements.

d. In most cases, the structures must be substantially complete (i.e. roadway, curbs, and slopes on the approaches and underneath the structure are already in place) before the inspection will be performed.

3. VDOT will complete the Safety Inspection and a Final Acceptance Inspection. VDOT will complete the inspection during the period specified below.

a. If only a single bridge is to be inspected, VDOT will complete the inspection within a four week period from the date of receipt of written notice from the Concessionaire. Inspection of tunnel facilities will be completed within an eight week period from the date of receipt of written notice.

b. Furthermore, if multiple bridges are to be inspected during a given one month period, the period for the completion of the inspection will be four weeks plus an additional week per bridge to be inspected.

4. Acceptance of a bridge, culvert, overhead sign structure, or high mast light pole will require a Safety Inspection and a Final Acceptance Inspection, which shall be completed by VDOT.

B. Load Ratings

1. The Concessionaire shall perform a structure load rating for the new bridges, bridge replacements, bridge widening, and all modified bridges (e.g. sound wall additions, railing replacements, etc.).

2. The analysis shall be in accordance with VDOT’s Structure and Bridge Division Instructional and Informational Memorandum (I&IM) Number S&B-27.6 (or latest revision), except that the concessionaire shall use the AASHTO’s Manual for Bridge Evaluations, first Edition (2008) and 23CFR650 Subpart C – National Bridge Inspection Standards (NBIS), Subsection 650.301.

Section 1
Design and Construction Requirements

April 30, 2010
Revised January 7, 2011
Revised March 29, 2011
Revised August 26, 2011
Revised October 24, 2011
3. The Concessionaire shall perform load ratings on bridge superstructures using the Load and Resistance Factor Rating method for NBIS rating for the AASHTO HL-93 design loading, the blanket permit vehicle (90K and 115K) and Virginia’s Legal Load vehicles as specified in the Structure and Bridge Division’s I&IM Number S&B-27.6.

4. All load ratings for structures other than steel curved girders/beams shall be performed using the As-Built drawings and BRIDGEWare VIRTIS software. The model in VIRTIS shall be grid model. Horizontally curved bridges with curved longitudinal steel members shall be evaluated using DESCUS software with rating capability. All other load ratings shall be generated by hand calculations or by use of software compatible to VDOT methods.

5. The Concessionaire shall prepare and deliver to VDOT two copies of the load rating report for each structure. Each report shall contain a completed copy of VDOT’s current load rating summary sheet (SB502) referencing the controlling structural element(s) sealed and signed by a Professional Engineer licensed in the State, rating assumptions, pertinent analysis calculations, and VIRTIS, DESCUS or other approved computer input as appropriate. In addition, a CD-ROM containing the load rating input files for VIRTIS, DESCUS, or other approved computer programs shall be delivered to VDOT with the report.

C. As Built Documentation (Refer to Section 1.20).

1.15 Tunnel Performance Requirements - Civil

1.15.1 Flood Protection

A. The Work shall maintain the existing flood protection provisions as a minimum. The Concessionaire shall coordinate the design, construction and operation of the Work in accordance with FHWA Technical Manual for the Design and Construction of Road Tunnels - Civil Elements (Publication No. FHWA-NHI-10-034, June 2010 Draft Version) and with the United States Army Corps of Engineers (USACE) and any other relevant authorities.

B. The Project road shall not, by restricting the flow of flood water, or reducing the areas currently available for flood storage, exacerbate the risk of flood of the Work or the surrounding areas.

C. The top of the tunnel protection layer shall be below the level of the existing Elizabeth River channel bed. The profile of the existing river bed shall be
confirmed by bathymetric survey prior to submission of the Design Development and Detailed Design.

D. Deleted

E. Flood protection shall be provided on the Norfolk Portal of the New Midtown Tunnel. The existing flood gate on the Norfolk portal of the existing tunnel shall continue to be maintained in an operable state. Any alternative to flood gates shall be subject to VDOT’s review and comment.

F. Flood mitigation measures shall be determined by the Concessionaire, but at a minimum shall meet Extreme High Water Level (EHWL) requirements and all State and Federal Law and the Standard Documents. Flood mitigation measures shall be submitted as part of the Design Development and Detailed Design.

G. The EHWL used in the design of flood protection measures shall be calculated by the Concessionaire and will be included in Design Development and Detailed Design. The EHWL shall be the water level with the probability of being exceeded no more than 0.002 times in one year (the 500 year flood level). The flood protection shall be designed for wave heights corresponding to the same return period.

H. The Concessionaire shall maintain flood protection features throughout the Term, taking into account the global stability of the flood protection features. The height of levees, embankments or revetments shall take into account long term settlements, and an appropriate allowance for freeboard, which will be determined by the Concessionaire.

I. The Work shall be protected from inundation by flooding at all stages of construction. In the temporary condition, once tunnel elements have been immersed, at least three bulkheads shall be left in place.

J. Drainage cut offs shall be provided at the tunnel portals to prevent surface water runoff from entering the tunnel. Drainage sumps shall be provided at the tunnel portals, and the tunnel low point. Pumps shall be provided in the sumps to remove the liquid collected.

K. The sumps shall be designed with sufficient operational redundancy to meet the drainage requirements with one of the pumps not operating.

L. Flood protection at the Portsmouth Portal of both the new and existing Midtown Tunnels shall consist solely of providing for a sufficient height for the approach retaining walls (EL 13.5 for the new tunnel and EL 13.1 for the existing tunnel).
1.15.2 Groundwater

A. No permanent dewatering provisions shall be permitted, i.e. groundwater lowering below the long term mean ground water level. The approach structures shall not be terminated below the long term mean sea, or mean groundwater level.

B. Any temporary dewatering systems shall be designed and constructed so as to secure a dry and stable excavation at all times. The excavation shall be protected from uplift, erosion and deterioration.

C. The Concessionaire shall identify any potential impact the temporary or permanent works may have on the groundwater quality, and mitigate these effects. The Work to be considered shall include but shall not be limited to:

1. The casting basin temporary dewatering and construction;
2. Temporary dewatering and construction of the approach ramp; and
3. Placement of the tunnel, backfill, reinstatement of the river bed and the long term situation after reinstatement of the river bed.

D. If groundwater quality and/or elevation is potentially affected by the Work, the Concessionaire shall establish a baseline for monitoring groundwater quality and/or elevation. The Concessionaire shall define a suitable monitoring program and shall obtain the acceptance of the relevant authorities for the monitoring program.

E. The Concessionaire shall verify assumptions in respect of any dewatering system designed to lower groundwater elevation proposed with regard to draw down or permeability of soils by carrying out pumping tests and in-situ permeability tests.

F. The effect of any dewatering on adjacent structures shall be assessed and documented by the Concessionaire. Ground movements shall not cause damage to adjacent structures.

G. The design of the permanent structure shall account for any effects caused by uplift or ground movement in the temporary condition.

H. Provisions shall be made to prevent the flow of groundwater/river water through the backfill materials along the tunnel and into the approach areas. The Concessionaire shall take into consideration any increase in hydraulic connectivity which may result from the temporary or permanent works.
I. Where practicable, any structures subject to buoyant forces should be designed to resist uplift through the weight of the structure alone. Any uplift restraint devices such as tension piles or ground anchors used to prevent instability or control unacceptable movement of the structure shall be sturdy and durable for the design life of the tunnel. The Concessionaire shall submit details with the Design Development and Detailed Design. The submission shall include details of the proposed arrangement, calculations to justify the structural and geotechnical design, details of any geotechnical investigations undertaken to verify the design assumptions, and details of the means by which durability will be assured.

1.15.3 Disaster Recovery

A. During the design life, the tunnel may be subjected to extreme actions such as flooding, sunken ship loading, fire, explosion and earthquake. Measures shall be taken in design to ensure the stability of the structure until disaster recovery measures can be implemented, and that in the long term, the tunnel remains serviceable.

B. The Concessionaire shall consult with the relevant authorities (e.g. FHWA, VDOT, USACE, Federal Emergency Management Agency (FEMA), and Department of Homeland Security (DHS)) and prepare the necessary documentation, such as a Safety Response Plan, and an Emergency Response Plan.

C. Loads shall be determined by the Concessionaire for all extreme events and be documented in the Design Development and Detailed Design.

D. The loading applied by a sunken ship resting on top or alongside the tunnel shall be accounted for in the Concessionaire’s design. The static equivalent loadings considered should be a concentrated load and uniformly distributed load, calculated with reference to the FHWA Technical Manual for the Design and Construction of Road Tunnels - Civil Elements, June 2010.

E. For the sunken and grounding ship load, the foundation design shall ensure that the maximum allowable settlement of the tunnel, taking into account the maximum joint openings, the internal traffic clearance profile and pavement requirements are not exceeded. The period prior to salvage of the vessel shall be assessed by the Concessionaire and documented in the Design Development and Detailed Design. The minimum period shall be one month unless demonstrated otherwise.

F. The tunnel shall be able to resist an incident causing accidental flooding. The foundation design shall ensure that the maximum allowable settlement of the tunnel, taking into account the maximum joint openings, the internal traffic
TECHNICAL REQUIREMENTS
Exhibit C

clearance profile and pavement requirements, is not exceeded. The period until
dewatering is to be assessed by the Concessionaire and documented in the Design
Development and Detailed Design. The minimum period shall be one month
unless demonstrated otherwise.

G. Deleted

H. The Concessionaire shall consider the risk of explosion in the tunnel based on the
types of goods that may be transported through it and shall design the tunnel for
an appropriate intensity of explosion loading. This aspect of the design shall be
documented in the Design Development and Detailed Design. The explosion load
shall be considered as a static load acting over the full area of the internal cross
section, and over an arbitrary length. The concrete structure and joint gaskets
shall not be damaged as a result of this loading.

I. The Concessionaire shall take into account seismic loadings, or demonstrate that
such loadings are not significant in the design. With reference to AASHTO
LRFD, the importance category of the tunnel is defined as Critical.
Watertightness shall not be compromised and repairs should be of a minor nature
and not require long term closure of the tunnel to implement. The Concessionaire
shall document the proposed design approach in the Design Development and
Detailed Design.

1.15.4 Tunnel Protection Layer

A. The tunnel rock protection should be below the depth of the channel maintained
by dredging, with allowance for dredging tolerance.

B. The stone protection and transition layers shall be designed by the Concessionaire
to provide protection for propeller scour. The Concessionaire shall carry out any
investigations required to determine the hydrographic design criteria. These
criteria shall be reflected by the Concessionaire in the Design Development and
Detailed Design.

C. The tunnel protection layer shall extend for the full width of the tunnel and
backfill as necessary to meet the following requirements:

1. Protect the immersed tunnel and structural backfill from scour induced by
ship’s propellers;

2. Be designed to protect the immersed tunnel from damage caused by
falling anchors, sunken or grounding ships and maintenance dredgers; and
3. Be detailed to ensure that dragging anchors break free from the layer before reaching the tunnel.

D. The Concessionaire shall maintain the required depth of tunnel protection throughout the Term. The Concessionaire shall survey the tunnel protection layer periodically as defined below and provide documentary evidence to VDOT that the depth of protection is in place.


F. The Concessionaire shall propose the frequency of surveys, based on a developing knowledge of the dominant deterioration mechanism, and submit proposals to VDOT for review and comment. Surveys should be carried out following significant events such as ship grounding, or severe storm, or current events in excess of design current.

G. The Concessionaire shall produce As-Built records including the results of a bathymetric survey carried out immediately post construction in order establish a baseline for future surveys.

1.15.5 Trial Casting

A. Trial castings shall be carried out to represent the immersed tube tunnel and the cut & cover tunnel. The trial casting shall be undertaken using the actual construction methods and equipment i.e. batch plants, pumps etc. and performed by operators and staff who shall be involved in the permanent Work production. For the cut & cover tunnel trial casting the Concessionaire, at risk, can implement the trial casting at the proposed final location. If the trial casting is deemed acceptable, then it may be incorporated into the permanent works. If the trial casting is deemed unacceptable, then the casting will be removed at the Concessionaire’s expense.

B. A trial casting of the tunnel section shall be conducted at least two months in advance of the actual tunnel production. It is recommended that a program for the trial casting (including the number of in-situ tests and the location of coring) shall be submitted to VDOT for review a minimum of 21 days before trial castings are performed.

C. The trial casting shall comprise typical structural parts of the tunnels and be sufficient to demonstrate the efficiency of the casting, cooling and curing methods. As a minimum, the trial casting shall comprise 50% of cross section including dividing wall; the length of the trial casting in the longitudinal direction is to be agreed with VDOT, but shall not exceed the designed length between the...
construction joints, for the longest segment pour envisaged. All elements of the trial casting shall be full sized and not scaled such that they are representative of the intended permanent works structure.

D. The trial casting shall demonstrate that the performance requirements are fulfilled simultaneously, and should be sufficient to demonstrate and validate:

1. Measures to control early age cracking (concreting sequence, curing and cooling methodology); and

2. Concreting and grouting procedures at all joints (immersion, segment and construction).

E. The trial casting structure shall be equipped with instrumentation to monitor concrete temperature against time. The temperature monitoring system and/or alternative process shall be the same as the system used for tunnel production. Each trial casting shall be evaluated (i.e. back-analyzed) to demonstrate that the evolution of measured temperatures correlates with those predicted by analysis. A report shall be submitted to VDOT for review a minimum of 21 days before execution of the corresponding permanent structure.

F. Pre-testing of concrete

1. Deleted

2. The software used for temperature and stress analysis and the design of measures to prevent early age cracking must be appropriate and proven for this application, using a well-documented computer program based on the Finite Element Method. The software shall have suitable precision to model small time steps in the early stages of concrete maturity.

3. Temperature simulations shall be based on documented values for the adiabatic heat development for the actual concrete and documented values for the conductivity of formwork and insulating materials. Simulation of stresses shall be based on documented transient (time/age dependant) material properties of the material actually used.

4. Based on stress analysis the Concessionaire shall establish limiting temperature differences for each structural element to control the hardening process of the concreting works. Unless otherwise determined by the stress analysis, the following limits are recommended:

   a. For structural elements which are restrained by neighboring elements, a maximum temperature difference between the mean

temperature of the newly cast element and the mean temperature of previously cast elements shall be defined. The difference shall not exceed 59°F;

b. For all structural elements, a maximum temperature difference between the mean temperature of the element and the temperature at the surface of the element shall be defined. The difference shall not exceed 59°F;

c. The maximum temperature of the concrete shall not exceed 149°F in the central part of the structural element.

G. Pre-testing of the injection of cast-in cooling pipes, if used, shall be performed for all types of pipes used. The length of the pipe shall, as a minimum, be of the same length as the maximum length used in production.

H. If the trial casting does not achieve the required quality, the Concessionaire shall submit details of their proposed changes to tunnel production. A further trial casting may be required to demonstrate that the revised procedures satisfy the requirements.

1.15.6 Stability

A. The Concessionaire shall establish criteria to ensure the stability of tunnel elements during floatation, transport and immersion. The principles and parameters, and standards adopted by the Concessionaire shall be documented in the Design Development and Detailed Design.

B. The calculation of stabilizing loads for the immersed tunnel and approach structures shall only take into account dead load, temporary ballast water (where used). In determining the mass of the tunnel element, only the following items shall be considered:

1. Structural concrete;
2. Structural steel;
3. Cast-in-place items and prestressing;
4. Ballast concrete;
5. Elevated walkways; and
6. Soil vertically above any ‘toes’ (projection of the base slab beyond the external walls) up to tunnel roof level.

C. Minimum and maximum densities for dead loads and hydrostatic loads for calculation of the overall stability shall be taken as 5% and 95% quartiles, respectively.

D. The self weight of structures shall be determined from the maximum density or the minimum density, whichever creates the most unfavorable effect for the construction elements under consideration.

E. The hydrostatic load shall be determined from the maximum density or the minimum density, whichever creates the most unfavorable effect for the construction elements under consideration. The effects of variations of salinity and turbidity shall be taken into account.

F. The concrete density used in the design shall be based on testing of trial mixes, and it shall be monitored by in-situ testing during construction in accordance with QA/QC procedures.

G. The weight of backfill and stone protection over the tunnel roof, and the effect of internal friction from trench backfill, shall not be taken into account. Partial factors of 1.0 shall be applied to the self weight of the structure and the uplift load of the water. For soil vertically above the toes, a partial factor of 0.9 shall be applied.

H. All other load effects which may increase the uplift during the temporary and permanent stages shall be taken into account by the Concessionaire.

I. For the temporary stage, with an immersed tunnel element resting on the bottom of the trench, the minimum factor of safety against uplift, defined as the ratio between the total factored stabilizing load and the total factored uplift load, shall be 1.025. Where ballast water is used to maintain negative buoyancy, a maximum water density of 62.4 lb/ft$^3$ shall be used. The Concessionaire shall submit details of the temporary stability at all stages of construction, which shall include equipment and sequence proposed for the ballast exchange, as part of the Preliminary and Detailed Design.

J. For the permanent stage, the minimum factor of safety against uplift for each immersed tunnel element shall be 1.06. In the case of an immersed tunnel constructed in segments, the factor of safety between two segment joints shall be at least 1.04.
K. After the immersed tunnel element has been placed on the bottom of the trench, horizontal stability in the temporary condition shall be ensured by appropriate sequencing of the placing of fill alongside the element.

L. The calculations for the cut and cover tunnels, service buildings and approach ramps shall consider a case with a high ground water level with a minimum factor of safety against uplift of 1.10, and a case with extreme high groundwater level with a minimum factor of safety against uplift of 1.03.

M. Resistance to uplift using restraint devices such as ground anchors, tension piles or the like that rely on friction shall include a factor of safety appropriate to the restraint system and ground conditions. The Concessionaire shall propose this factor of safety.

1.15.7 Tunnel Foundation

A. The design of the tunnel and the approach ramp structures shall take into account the settlement (both total and differential) of each individual element of the structures, and the interaction between the elements. The effects of settlement are to be quantified at the Design Development and Detailed Design stage and mitigated where necessary to ensure the satisfactory performance of the tunnel in relation to the following:

1. Traffic clearance envelope;
2. Pavement performance;
3. Design of joint seals;
4. Design of structural connections at joints; and
5. Design of drainage and ducting.

B. The Concessionaire shall submit a Method Statement for information to support the design, and to document the procedures, plant and equipment to be used to install the tunnel foundation.

C. The tunnel and ramp structures shall be founded on suitable material. Unsuitable material below the base of the trench should be removed and backfilled or improved as necessary. The possibility that over-dredging may be required should be considered when selecting the dredging equipment.

D. The Concessionaire shall undertake any ground improvement necessary to achieve the performance criteria. The effectiveness of any proposed ground
treatment shall be verified by a suitable program of verification testing. Any assumptions with regard to the performance of the ground improvement and how these assumptions are to be verified shall be documented with the Design Development and Detailed Design. The methods used for the testing shall be in accordance with standards and requirements to be proposed by the Concessionaire.

E. The tunnel shall be analyzed based on the expected foundation conditions. The design shall consider potential variations in the thickness of the foundation taking into account likely dredging tolerances, and where applicable, tolerances on the surface profile prior to immersion (uneven or lack of support). The assumptions adopted in the design shall be documented in Preliminary and Detailed Design.

F. The Concessionaire shall consider the risk of the loss of foundation material into the substrate, and if significant, measures shall be taken to prevent the loss.

G. If sand jetting or sand flow techniques are used for the foundation of the immersed tunnel, the analysis shall include for the transfer from temporary supports to in service supports.

H. The Concessionaire’s design shall take into account the effects of settlement or heave. Measures shall be taken by the Concessionaire to ensure that ground movement is prevented or is substantially complete before the issuance of Substantial Completion or Final Acceptance.

I. Where new construction imposes loads or stress changes on any existing buildings, embankments, pavements, structures, utilities or the ground supporting such elements, appropriate measures shall be taken by the Concessionaire to prevent differential settlement or damage.

J. Pavement sections shall be developed in accordance with VDOT’s Manual of Instructions for Materials Division (Chapter IV of Pavement Evaluation and Design) and shall meet the requirements as set forth in the Standard Documents in Section 3.5.2

K. The Concessionaire shall document expected ground movements and movements of all tunnel structures in reports submitted to VDOT as part of the Preliminary and Detailed Designs. This shall include movements that are expected to occur during construction, residual movements post construction and total movements. The analysis used to derive the estimates shall be consistent with the actual construction schedule (timing and sequence of work), and the material and methods to be used.
L. In the calculation of settlement, the Concessionaire shall take into account the interaction between the soil and structures, and shall include any proposed ground improvement.

M. Movements of the tunnel shall not compromise pavement requirements stated in Section 1.15.7.J. If estimated movements calculated at the design stage are likely to exceed limiting criteria for pavement performance during the design life, the Concessionaire shall undertake the following:

1. Design ground improvement to the tunnel foundation to limit movements;

2. Document that sufficient tolerance exists within the tunnel clearance envelop to allow the roadway alignment to be adjusted by pavement overlay to accommodate estimated total and differential movements; or

3. Submit proposals to VDOT as part of the Design Development and Detailed Design.

N. Settlement of the new and existing tunnels, and approach structures shall be monitored and reported throughout construction.

O. The procedures and provisions for monitoring the interval between surveys shall be documented in the Detailed Design. Survey shall commence no later than one month before the start of construction of the approach structures, or the immersion of the first tunnel element, whichever is earlier.

P. Monitoring of settlements should continue post construction until 90% of the total settlement has occurred. The estimate of total settlement should be based on extrapolation of measured data. The Concessionaire shall consult with VDOT for the discontinuance of monitoring.

1.15.8 Protection of Existing Tunnel

A. The objective of the design and construction of the New Midtown Tunnel with respect to the Existing Midtown Tunnel should be that the construction of the New Midtown Tunnel shall have minimal impact on the Existing Midtown Tunnel, to the extent that there will be:

1. Minimal disruption to normal operations of the Existing Midtown Tunnel;

2. Minimal increase in the level of ongoing maintenance of the Existing Midtown Tunnel;
3. Minimal repair required to any component of the Existing Midtown Tunnel structure, internal fittings and fixtures or Mechanical and Electrical (M&E) systems; and

4. Minimal new leakage in the Existing Midtown Tunnel or any adverse change to the conditions of existing leakage or seepage in the Existing Midtown Tunnel.

B. Movement criteria will be identified in the Concessionaire’s Phase 2 Work Package ID D01040303 Preliminary Instrumentation and Monitoring Plans & Recommendations (Proposed Tunnel). For events, behavior or movements not covered by the agreed movement criteria, VDOT and the Concessionaire shall also mutually agree to appropriate performance criteria.

C. Condition Inspection

1. Prior to construction the Concessionaire shall undertake a baseline structural condition inspection of the Existing Midtown Tunnel to record defects. The inspection shall be carried out in accordance with FHWA Highway and Rail Transit Tunnel Inspection Manual. Inspection of the structure shall be carried out by experienced qualified engineers who are able to identify signs of distress within the structure.

D. Baseline Survey

1. A seasonal survey shall be conducted by the Concessionaire in advance of construction operations to monitor movement of the major structural elements of the Existing Midtown Tunnel in the summer and winter to establish a baseline range of movement of the major structural elements. The scope of the seasonal survey should be sufficient to identify minor changes or movements in the major features and/or critical structural elements of the Existing Midtown Tunnel.

2. Survey points established for the baseline survey should be suitable to be used for subsequent surveys required during construction.

E. Design

1. The Concessionaire’s design shall demonstrate that ground movements associated with the construction works will have minimal impact on the existing tunnel, as required above. The design shall include analysis using advanced ground modeling techniques using finite element methods and shall take account of each stage of construction. It shall also account for the durations when ground support may be reduced due to dredging works.
and any time dependent behavior of soils (i.e. ground movements in response to changing loading patterns and intensities through the construction of the Project and in-service). A number of representative sections through the New Midtown Tunnel and Existing Midtown Tunnel shall be examined to understand the behavior along the length of the tunnel and establish the critical areas of the Work. Analysis shall include both the immersed tunnel section and the approach tunnels and ramps. Protective works, if required to control ground movements, shall be included in the modeling.

2. Should the outcome of the design analysis show that the Existing Midtown Tunnel is subject to increased stress or strain as a result of the Work, the existing structure shall be subject to a structural analysis of sufficient detail to determine if the new loading or ground movements cause overstress to any structural element, and whether the new loads are acceptable or whether preventative measures are required.

3. Assumptions on material properties, geometry, and loss of materials as a result of corrosion or deterioration in strength due to condition or defects shall be fully documented as part of the structural analysis. Where practicable the Concessionaire shall undertake sampling and testing to obtain missing data required for the analysis. Where it is not practicable to obtain missing data, assumptions shall be documented.

F. Monitoring of the Existing Midtown Tunnel

1. The Concessionaire shall install a suite of monitoring instrumentation in the Existing Midtown Tunnel to capture the following information:
   
a. Vertical settlement along the length of the tunnel at regular intervals and tunnel element by tunnel element;

b. Horizontal movement at any point along the tunnel;

c. Rotation of the tunnel structure evidenced by settlement to one side of the structure relative to the other; and

d. Distortions at the immersion joint positions such as opening and closing or rotation evidenced by differential opening or closing at the top or bottom of the structure.

2. Suitable survey equipment shall be installed on or near the temporary Support of Excavation (SOE) system to monitor ground movements in the
zone between the Existing Midtown Tunnel and the dredging works to identify lateral ground movement, settlement or slope instability.

3. Survey of the existing tunnel shall be carried out in real-time during critical construction operations, and in particular, during the bulk dredging works. Remote sensor equipment shall be installed as necessary for this purpose.

4. The Concessionaire shall establish trigger levels from their design analysis works related to the expected ground movements, such that any exceeding of the predicted movements can be immediately notified by the survey team to the nominated persons in the construction team with responsibility for implementing action response plans.

5. Action response plans shall be agreed ahead of the start of construction works and have acceptance from VDOT and any affected third parties or authorities, such as the Coast Guard, who may have to be notified or assist with any emergency response action being undertaken.

6. Personnel with the appropriate qualifications and authority to implement response plans shall be on 24 hour call during critical construction operations.

7. Survey results shall be made available without encumbrance or delay to VDOT’s supervision team. The results shall be subject to daily review of the Concessionaire and the construction supervisor during critical phases of the works.

1.15.9 Joint Design

A. All joints shall be designed to be watertight without the need for replacement and maintenance during the design life.

B. All joint materials and components shall be protected against the detrimental effects of spilled liquids and against a fire in the tunnel.

C. The details developed for the immersion joints and the movement joints shall be able to accommodate the assumptions made in design concerning the transfer horizontal and vertical shear forces, prevent lateral and vertical differential movements, and shall have the ability to accommodate whatever assumptions have been made regarding temperature, drying shrinkage, settlement, creep, and any other movements which may occur for all relevant limit states to be defined by the Concessionaire.
D. Immersion joints shall have a double barrier against leakage, obtained by the application of a Gina-type gasket and an Omega-type seal. Manufacturers’ literature in support of the Concessionaire’s proposals shall be submitted to VDOT with the Design Development and Detailed Design.

E. The design of the Gina-type gasket and Omega-type seal shall take into account the long term relaxation of the Gina-type gasket material and the construction tolerances of the supporting steel frames, along with the proposed method of tunnel installation and related tolerances.

F. The compression of the Gina-type gasket shall always be larger than the minimum compression necessary to provide the required sealing pressure as derived from test results with the actual gasket type and maximum water pressure.

G. The compression of the Gina-type gasket shall always be 0.4 inch less than the maximum compression capacity and 0.4 inch more than the minimum compression necessary to provide the required sealing pressure.

H. The Omega-type seal and its fixing shall be watertight under the maximum sea level conditions with an overall safety factor of 2.5. Following installation, and before completion of the immersion joint, the Omega-type seal shall be pressure tested for leakage to the maximum design water pressure anticipated.

I. Movement joints for water retaining structures shall have a double barrier against leakage.

J. Construction joints for water retaining structures shall have a double barrier against leakage.

K. The systems for achieving watertightness at movement and construction joints must have proven successful applications under similar conditions. Alternative systems to those described herein above may be proposed, but will be subject to VDOT review and comment. The Concessionaire shall document proposals for achieving watertightness as part of the Design Development and Detailed Design.

L. All components requiring maintenance shall be easily accessible for monitoring, inspection, maintenance and replacement. Provisions shall be made for testing and inspection of the watertightness of the immersion joints. The maintenance concept shall be documented as part of the Design Development and Detailed Design.

1.15.10 Durability
A. The durability of all materials shall be appropriate to their actual use in the construction and in the actual environment to which they are exposed. The Concessionaire shall carry out the necessary subsurface investigations and testing (in situ and laboratory) to confirm this environment.

B. The design life shall be to code except where a target life for durability or performance has been chosen, in which case the design life shall be taken as 120 years. The Concessionaire shall document how durability will be achieved in the Design Development and Detailed Design.

C. The Concessionaire shall document the loadings, load combinations and load factors to be used in the design, which shall be submitted as part of the Design Development and Detailed Design. In the absence of sufficient and reliable statistical data in relation to environmental effects (e.g. water density, water level variation), the assumptions adopted by the Concessionaire must be clearly conservative.

D. Concrete

1. The design of the concrete mixes for all buried structures shall take into account the chemical composition of the soil and groundwater.

2. The application of a waterproofing membrane, the impregnation or coating of concrete surfaces, the addition of corrosion inhibitors etc. shall not be taken as justification for a relaxation of the primary requirements for durability (cover, maximum chloride diffusivity).

3. The maximum water/binder ratio shall not exceed 0.42. The minimum water/binder ratio should be selected to limit the adverse effects of autogeneous shrinkage on early age cracking.

4. The chloride diffusivity of the concrete at a concrete age of 28 maturity days shall not exceed 1000 Coulombs. The diffusivity shall be determined by Virginia Test Method 112 and ASTM C 1202. In case of Pulverized Fly Ash (PFA) contents exceeding 20% by weight, the given requirement with regard to the diffusion coefficient shall be related to testing at 56 maturity days. With ground granulated blast furnace slag (GGBS) as cement replacement, testing at 56 maturity days may be performed in case that compliance with the required chloride diffusivity cannot be demonstrated at 28 maturity days.

E. Prestressed Concrete
1. Structures with permanent prestressing shall be based on no tensile stress in the concrete in any Serviceability Limit State combination.

2. In the case of segmental construction, temporary longitudinal prestressing of the tunnel elements shall ensure a minimum compressive stress of 44 pounds per square inch (psi) in the joints between segments.

F. Reinforcement

1. Reinforcement may be ordinary carbon steel, galvanized, epoxy coated or stainless steel.

G. Steelwork

1. All parts of partially embedded fixings for temporary works and fixings for mechanical and electrical installations which are left in the concrete shall be stainless steel, galvanized, epoxy coated or other means to inhibit corrosion. Provision shall be made to prevent electrolytic corrosion of dissimilar metals.

2. Steel end frames at immersion joints including metal attachments should be capable of maintaining structural integrity and watertightness for 120 years.

1.15.11 Watertightness

A. The tunnel and approach structures including service buildings below groundwater level shall be watertight. The following watertightness criteria shall be achieved:

<table>
<thead>
<tr>
<th>Case</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-situ and prefabricated concrete structures including immersed tube tunnel</td>
<td>A</td>
<td>Free of all visible leakage or seepage</td>
</tr>
<tr>
<td>Diaphragm walls 1) Secant piles 1)</td>
<td>B</td>
<td>Leakage shall be restricted to damp patches on the concrete face and at construction joints. Jetting of water will not be acceptable. Prior to construction of an inner lining, total inflow over a given area</td>
</tr>
</tbody>
</table>
1) Where diaphragms walls/secant piles are used, an additional inner concrete lining shall be constructed to achieve the required watertightness Category A inside the tunnel and to provide appropriate drainage paths.

2) For purposes of determining whether the Concessionaire has achieved Final Acceptance of the New Midtown Tunnel, if the New Midtown Tunnel experiences visible water leakage and/or water seepage, the requirements set forth in FHWA Technical Manual for Design and Construction of Road Tunnels – Civil Elements, June 2010 shall apply.

B. Tunnel elements may be one of the two following forms:

1. Segmental – tunnel elements are formed by a series of match-cast concrete segments with segment joints in between which allow expansion, contraction and full articulation. Reinforcement is discontinuous across segment joints. Concrete shall be watertight and segment joints shall contain double protection against leakage. Segments should be temporarily prestressed together for the floatation, transportation and immersion processes.

2. Monolithic – tunnel elements are formed from continuous concrete cast in sections but with construction joints with full continuity of reinforcement such that each element acts as a single structure with no articulation along its length. Concrete shall be watertight but may also be protected by the application of an external watertight membrane.

C. For the water-retaining parts of the tunnel and approach ramps early age cracking resulting in through-section cracks shall not be allowed. Such cracks may be caused by restraint to deformations due to combination of thermal movements, early shrinkage, creep and settlements.

D. The provision of a waterproofing membrane will not be considered as mitigation for the presence of through-section cracks in the tunnel concrete. If a membrane is proposed, the system applied to the walls and roof should be spray applied, with a suitable lap joint with the system used to protect the base. The Concessionaire shall document its suitability and long term performance by proven successful applications under similar conditions in the Design Development and Detailed Design. The successful application shall be evidenced by records from practical applications or test results.
E. The Concessionaire shall, through temperature and stress analysis, document that the planned risk of early-age cracking at the water-retaining parts of the tunnel and approach ramps shall be acceptable for the full range of ambient climatic and weather conditions that may occur during hardening. Details of the Concessionaire’s proposals in respect of watertight construction shall be well documented and submitted for VDOT review and comment at least 21 days before the trial casting.

F. All leaking cracks occurring in internal surfaces of the tunnels and approach ramps shall be sealed by the Concessionaire.

G. Shutter ties through the external walls should be avoided. If the Concessionaire proposes to use shutter ties that will penetrate external walls of watertight structures, the method and materials for reinstatement should be documented in the Design Development and Detailed Design, and the efficacy of the proposals demonstrated as part of the full scale trial cast. VDOT shall not be obligated to accept the principle of shutter ties.

1.15.12 Fire Protection

A. The fire temperature versus time curves to be applied in the structural design, including joints, shall be selected in accordance with National Fire Protection Association (NFPA) 502.

B. The design shall ensure that the structural capacity not be exceeded during or after a fire. In addition, watertightness shall be maintained, no permanent deformations shall occur, and any damage shall be repairable. Special attention shall be paid to the possibility that the strength of concrete may be lower after cooling than during the fire.

C. Tunnel fire protection shall comply with the requirements of the NFPA 502 Standard for Road Tunnels, Bridges and Other Limited Access Highways.

D. Calculations of temperature distribution on the internal surfaces of the walls and slabs during a fire shall be determined by model calculations, and the results shall be summarized in a report which shall be submitted with the Design Development and Detailed Design.

E. Fire protection material and fastenings shall be designed to withstand a uniformly distributed suction pressure of at least 63 lbs/ft² under unheated conditions. The design shall ensure that the fire protection will stay in place during a fire.

1.15.13 Drainage
A. The minimum road gradient, to ensure adequate drainage, shall be 0.5%.

B. Drainage sumps and pumping stations shall be sited at the lowest point of the tunnel sag curve (low point sump) and near the tunnel portals (ramp sumps).

C. Underground drainage systems shall be watertight within the specified design life, taking into account the construction methods to be used and relative movements across joints.

D. Except for the mid-point drainage sumps, manholes and inspection chamber access covers related to the drainage system shall be located away from the roadway. Mid-point sumps access covers shall be securely locked and located out of the wheel track zones.

E. The contents of the low point sump shall be discharged into an impounding sump at the portal, which shall meet Virginia’s water quality requirements prior to disposal off site.

F. The tunnel openings and generating systems shall be designed to provide protection against a 500 year storm event including storm surge and wind driven surge in accordance with the Standard Documents in the Basis of Design and Design Criteria.

1.15.14 Marine Fill

A. The Concessionaire’s design of the marine works and evaluations of the hydrographic conditions shall be carried out by suitably experienced specialists. The design shall be submitted to VDOT as part of the Design Development and Detailed Design.

B. The river bed level and profile after backfilling of the tunnel will be in accordance to the Project environmental permit requirements.

C. The Concessionaire shall carryout pre- and post-construction bathymetric and topographical surveys of the area affected by the Work. The zone within the river shall be resurveyed one year after completion of the Work.

D. Locking fill and structural backfill, defined as fill placed immediately adjacent to the tunnel structure and beneath the protection and filter layers, shall be placed on either side of the immersed tunnel. The locking fill and structural backfill shall be free draining granular material, with the specification and dimensions of it being determined by the Concessionaire. The structural backfill shall be protected by a transition layer placed between the back fill and the tunnel protection layer, if
required. Ordinary backfill outside of the zones described need not be free draining.

1.15.15 Design Review and Comment

A. The Design Review Process shall be as described in the Agreement.

B. Deleted

C. Deleted

D. Detailed Design should include sufficient information for VDOT to determine whether the Project requirements have been satisfied, and should include a comprehensive set of drawings to illustrate the design. The scope and coverage of the submission(s) should be agreed with VDOT in advance. The Detailed Design submission should include, but is not limited to the following reports:

1. Deleted
2. Deleted
3. Ground Movement Report (including impact on existing tunnel);
4. Deleted
5. Durability Assessment (including watertightness) Report;
6. Concrete Mix Design Report;
7. Early Age Crack Control Report;
8. Deleted
9. Deleted
10. Deleted
11. Deleted
12. Deleted
13. Outline Maintenance Strategy Report (including WLC, residual life, asset management);
14. Deleted

15. Security Plan;

16. Operations Plan (including details of Operations Buildings); and

17. Safety Response and Emergency Response Plans.

E. In relation to the submission of geotechnical design and construction memoranda and/or reports that summarize pertinent subsurface investigations, test, and geotechnical engineering evaluations and analysis, the requirements as set forth in Section 1.4.1 shall apply.

F. Deleted

G. The Concessionaire shall submit a Detailed Design to VDOT for verification that the design is in conformance with the Technical Requirements. Staged submissions can be made, but submissions must contain sufficient information for the proposals to be considered. The Detailed Design should be submitted and reviewed in advance of commencement of construction of any part of the Work described in the submission.

H. Deleted

1.15.16 Design Reference Documents

A. The following design references shall be used:


2. For the design of tunnel rock protection, actions from ship propellers shall be calculated using The Rock Manual (Document GC683, second edition), CIRIA London and Propeller Induced Scour (Doc. RR2250) by M.J. Prosser published by the BHR Group (The Fluid Engineering Centre, United Kingdom, Tel 44 (0)1234 750 422), or alternative standard(s) agreeable to VDOT.

3. For the design of tunnel rock protection, the rock size shall be selected using USACE Hydraulic Design Criteria Sheet 712-1 Stone Stability or alternative standard(s) agreeable to VDOT.

4. The penetration of a falling anchor in concrete or rock layer shall be estimated using Concrete Structures Under Impact and Impulsive
Loading, Synthesis Report, Bulletin d’Information No. 187, Comité Euro-International du Beton (CEB), 1988, or alternative standard(s) agreeable to VDOT.

1.15.17 Methods Statements

A. The Concessionaire shall produce Method Statements to support the tunnel design. The Method Statements shall be submitted to VDOT, for information, during the Detailed Design, and as part of the pre-construction planning process. Method Statements addressing the following aspects of construction are required as a minimum:

1. Concrete works;
2. Concrete placement and curing (separate MS for immersed tunnel structure, cut and cover structure, ramp structure);
3. Temporary prestressing;
4. Crack injection;
5. Marine works;
6. Dredging;
7. Maintenance dredging of tunnel trench;
8. Placing of tunnel foundation;
9. Float up and transportation of tunnel elements;
10. Immersion of tunnel elements;
11. Sourcing, suitability and placing of tunnel backfills and protection;
12. Ballast exchange; and

1.15.18 Provisions for Maintenance and Access

All components requiring maintenance shall be easily accessible for monitoring, inspection, maintenance and replacement. Provisions shall be made for testing and inspection of the water tightness of the immersion joints. If ordinary carbon steel is
used for reinforcement, readily accessible provisions for monitoring the condition of the structure shall be provided. The method of collecting, logging and processing data shall be reviewed by VDOT.

1.15.19 Existing Midtown Tunnel and Existing Downtown Tunnels Refurbishments

A. Technical Requirements for the Existing Midtown Tunnel and Existing Downtown Tunnels will be developed by the Concessionaire based on the assessment conditions reports that will be produced by the Concessionaire following detailed surveys of the Existing Midtown Tunnel and Existing Downtown Tunnels.

B. The Concessionaire shall apply the requirements of the FHWA Tunnel Management System after the rehabilitation of the Existing Midtown Tunnel and Existing Downtown Tunnels.

C. The Concessionaire shall prepare a set of Technical Requirements for the Existing Midtown Tunnel and Existing Downtown Tunnels that take into account the existing condition of the Existing Midtown Tunnel and Existing Downtown Tunnels and the necessary Rehabilitation Work that may be required to enable efficient operation of the Existing Midtown Tunnel and Existing Downtown Tunnels throughout the Term and to meet the handback requirements at the end of the Term.

D. The requirements shall recognize VDOT’s objective to upgrade all tunnels to be in compliance with NFPA 502. If there are any aspects of the Existing Midtown Tunnel or Existing Downtown Tunnels that cannot be upgraded to these standards due to physical constraints of the tunnels the Concessionaire shall clearly document these areas and agree on the appropriate Technical Requirements with VDOT. Design exceptions shall be identified in accordance with VDOT procedures to seek VDOT review and comment.

E. The Technical Requirements shall be based on the inspections and surveys undertaken and recorded by VDOT, and on further inspections, surveys and tests to be undertaken by the Concessionaire. The Concessionaire shall undertake sufficient survey, testing and inspection to enable a comprehensive set of Technical Requirements documents to be prepared.

F. The Technical Requirements shall include:

1. Design requirements for design of finishings to be installed and for the Rehabilitation Work to be undertaken.
TECHNICAL REQUIREMENTS
Exhibit C

2. Program of further survey and testing to be undertaken to verify the current condition and enable planning or remedial works and ongoing maintenance.

3. QA/QC requirements for inspection and testing during construction.

4. Classification of defects such that action can be determined and records maintained throughout the Term.

5. Preparation of traffic management plans at local and District level during the refurbishment works for review by VDOT.


7. Documentation for operation and maintenance.

G. The Concessionaire shall endeavor to achieve consistency in approach to design and construction and consistency in the quality of the works between the new Midtown Tunnel and the Existing Midtown Tunnel and Existing Downtown Tunnels.

1.16 Tunnel Performance Requirements - M & E

1.16.1 General

A. The purpose of this section is to provide an outline of the mechanical and electrical requirements that VDOT should ensure are included in the technical provisions that are being prepared by the Concessionaire for the New Midtown Tunnel between Portsmouth and Norfolk.

B. General criteria relating to the design principles, methodology and review process are described.

C. The systems proposed for inclusion in the New Midtown Tunnel are:

1. Tunnel ventilation;

2. Tunnel lighting (normal and emergency);

3. Tunnel drainage (at portals and low point);

4. Firefighting equipment (fire detection, fire hydrants, fire suppression);

5. Tunnel panels (including fire extinguishers, telephones, alarms);
6. Emergency signage (emergency exit signs, variable message signs);

7. Traffic monitoring and control systems (closed-circuit television (CCTV), lane control, over height vehicle protection);

8. Communications systems (fixed and mobile telephones, radio);

9. Supervisory Control and Data Acquisition (SCADA) system for M&E plant monitoring and control system;

10. Electrical power supplies and distribution (alternative supplies from Portsmouth and Norfolk networks); and

11. Standby power supplies (generators and uninterruptible power source (UPS)).

D. These minimum standards for the Tunnel Mechanical and Electrical Works are established for public safety and to ensure the Work meet VDOT’s requirements when the tunnel is handed back to VDOT at the end of the Term. These requirements do not relieve the Concessionaire, its designers, contractors, agents and the like from any legal, quality or other obligations relating to the design, construction and operation of the Project.

E. Review and Comments Process

1. Design Development Review (60%)

   a. The M&E Systems submission shall include sufficient additional detail of the ventilation, fire suppression and drainage systems to enable the principal dimensions of the tunnel structure to be fixed.

   b. Documentation submitted as part of this Design Development and Detailed Design Submission shall include at a minimum:

      i. An outline description of all M&E systems, with sufficient drawings to illustrate the proposed locations and arrangement of equipment.

      ii. Basis of design, including input data, the Standard Documents and performance requirements.

      iii. Details of any new options considered, with benefits.
c. The Concessionaire shall submit the Design Development and Detailed Design Plan for VDOT review and comment, at a notional level of completion of 60% (the precise % completion may be proposed by the Concessionaire). The purpose of this submission is to provide initial detail of all systems to be installed in the tunnel and show the design is coordinated between systems and the civil engineering works. The submissions shall also demonstrate compliance with the Agreement and the requirements for fire life safety and of the First Responders, and that O&M requirements have been fully considered.

d. The reports, drawings and design packages to be submitted at this stage shall be agreed with VDOT to include, but not be limited to:

i. Sufficient information to demonstrate that the proposed ventilation, fire suppression and drainage plant will be capable of satisfying the agreed design criteria.

ii. Any design assumptions and agreed departures from these Design Requirements.

iii. Records of requirements agreed with third parties, including principles for evacuation and fire fighting.


2. Detailed Design Review (90%)

a. Upon completion of detailed design, all relevant drawings and specifications, cable schedules together with all relevant supporting calculations, shall be during a 21 day VDOT review and comment return period for conformance to the Technical Requirements and the approved Design Quality Management Plan.

b. Design packages shall be submitted for review by VDOT under the following headings, or as agreed with by VDOT:

i. Tunnel Ventilation and Control System (including emergency egress/maintenance corridor ventilation, calculations and computational fluid dynamics (CFD) modeling);

ii. Tunnel Normal and Emergency Lighting and Control System (including calculations);
iii. Drainage Sumps Equipment (including pumping plant, ventilation, fire suppression, control systems and all relevant calculations);

iv. Tunnel Fire Safety Equipment (including fire detection, fire suppression, fire pumps, standpipe system and hydrants, fire cabinets, portal fire panels and all relevant calculations);

v. Emergency Escape Doors and Emergency Exit Signs;

vi. CCTV System;

vii. A Traffic Control System (including lane control signals, tunnel closure equipment, information signs, changeable message signs, over height vehicle protection and all associated control equipment);

viii. Communications Systems (including fixed and mobile telephones, radio and voice alarm);

ix. SCADA System (including data network and all associated operator interfaces);

x. High Voltage (HV) Power Systems (including incoming supplies, HV switchgear, transformers, cables and grounding);

xi. Low Voltage (LV) Distribution System (including switchgear, cabling and raceways, lightning protection and grounding);

xii. Standby Power (including standby generators, fuel storage, and cooling and exhaust systems, UPS and batteries); and

xiii. Plant and Equipment Rooms (including lighting, heating, ventilation, cooling, small power outlets, security systems, fire alarms and fixed fire extinguisher systems).

3. Refer to Section 1.16.16 of these Requirements. The methodologies for tests listed in Section 1.16.16.B.1 and 1.16.16.B.2 shall be submitted for review and comment by VDOT at least 21 days in advance of the planned dates for the tests. Full test reports in accordance with Section 1.16.16.B.3 shall be submitted for VDOT review and comment within two weeks of completion of the respective tests.

F. Consultations
1. The consultation process outlined in this section shall continue throughout the design period to ensure that all affected parties are made fully aware of the development of the design of the tunnel and its facilities and that their comments and requirements are taken into consideration in the equipping and operating of the tunnel. The primary focus of the consultations shall be on operational and safety issues as listed below:

a. All meetings shall be convened and recorded by the Concessionaire. Prior to commitment to detailed design of the principal safety related systems, the Concessionaire shall prepare a Summary Report confirming the agreement in the meetings of all Fire Life Safety Committee (FLSC) participants to the design of the tunnel and its systems and the proposed means of operation and emergency response.

b. Meetings shall be held with the City of Portsmouth and City of Norfolk Fire and Rescue Services to discuss:
   
   i. Proposed tunnel design and facilities for dealing with fires, spillages and road traffic accidents.
   
   ii. Fire Department procedures, roles and responsibilities.
   
   iii. Radio communications requirements (STARS).
   
   iv. Training requirements.

c. Meetings shall be held with the Virginia State Police to discuss:
   
   i. Proposed tunnel design and facilities for traffic management, closures, diversions and road traffic accidents.
   
   ii. OCC facilities to be provided.
   
   iii. Police emergency response, roles and responsibilities.
   
   iv. Radio communications requirements (STARS).
   
   v. Training requirements.

d. Combined First Responders Workshop to discuss:
i. Co-ordination of emergency response plans, roles and responsibilities.

ii. Co-ordination of radio communications requirements (including STARS).

iii. Requirements for rendezvous and triage areas.


v. Proposals for emergency exercises.

G. Design Principles

1. The M&E Design shall be governed by the following principles:
   a. Because of the risk of flooding from high-water events, critical power supply and control equipment shall be located above the established Project flood elevation.
   b. In accordance with VDOT Rules and Regulations Governing the Transmission of Hazardous Materials through Bridge-Tunnel Facilities, trucks carrying Hazardous Substances in Categories 1.1, 1.2 and 1.3 (explosives), 2.3 (poison gas), 4.3 (dangerous when wet) and 6.1 (PGI inhalation hazard) will be excluded from the tunnel. Materials in categories 2.1 (flammable gas), 3 (flammable), 5.1 (Oxidizer), 5.2 (organic peroxide) and 8 (corrosive) may not be carried in bulk.
   c. Bicycles, pedestrians and animals will not be allowed in the tunnel.

H. Reliability and Availability

1. All items of electrical and mechanical plant shall be designed to perform reliably in the intended application. All systems and equipment proposed for use shall have a proven track record of reliable service in a similar application and should be designed to meet performance levels in Section 4.1.1.

I. Reference Documents

1. The whole of the M&E works shall be designed to comply with the requirements and recommendations of the following standards, regulations and specifications, as relevant:
a. NFPA 70 – National Electric Code, 2008;
c. NFPA 502 – Standard for Road Tunnels, Bridges and Other Limited Access Highways, 2011;
d. Institute of Electrical and Electronics Engineers (IEEE) National Electrical Safety Code (NESC), 2008;
e. FHWA Technical Manual for Design and Construction of Road Tunnels, June 2010;
g. FHWA Highway and Rail Transit Tunnel Maintenance and Rehabilitation Manual, 2005 Edition; and

J. Protection Against Environmental Conditions

1. All parts of the tunnel electrical and mechanical installations, including fasteners and support systems, shall be suitable for use under all reasonably foreseeable conditions in the environment in which they are installed.

2. Conditions to be considered shall include, but shall not necessarily be limited to, the following, as appropriate:

   a. Ambient temperature;
   b. Humidity;
   c. Immersion in water;
d. Accumulations of ice or snow;

e. Tunnel washing;

f. Vibration; and

g. Electromagnetic interference.

3. All parts of the tunnel electrical and mechanical installations, including fasteners and support systems, shall be adequately protected against corrosion before, during and after installation for the duration of their design life. Materials, paint systems and protective finishes shall be appropriate to the operating environment and shall be designed to inhibit the spread of corrosion should the protective layer be damaged. Suitable measures shall be taken to avoid direct contact between dissimilar metals exposed to the atmosphere.

4. Equipment installed within the tunnel shall be designed to minimize the accumulation of dust and moisture on exposed surfaces, and, unless stated otherwise, shall have an ingress protection rating equivalent to IP65 as defined in ANSI/International Electrotechnical Commission (IEC) 60529.

5. All protective finishes shall be capable of repair on site to an equivalent level of durability and corrosion protection equivalent to the original finish, in accordance with the manufacturers’ recommendations, following mechanical or other damage.

K. Compatibility

1. The M&E design shall take into account the need for coordination and compatibility between systems, so that no item of equipment will interfere with the correct operation of another.

2. The design shall consider the impact of reasonably foreseeable external influences, such as weather conditions, the passage of traffic and the use of portable and mobile radio equipment, and ensure that no such influences have an adverse effect on operation of the tunnel electrical and mechanical equipment.

L. Tunnel Supervision

1. The Concessionaire shall provide an OCC equipped to provide centralized control and monitoring of the Downtown/Midtown Tunnel systems.
2. In this context the term OCC means the control room and associated equipment rooms, which may be within the existing OCC building or in a new building. Consideration shall also be given to the co-location of the toll supervision facility with the OCC.

3. Systems supervised from the OCC shall include a traffic control system, the SCADA system for M&E plant monitoring and control, CCTV and communications.

4. Supervision of tunnel M&E systems shall be from a dedicated SCADA operator interface, emergency telephone console and CCTV monitoring position in the OCC.

1.16.2 Tunnel Ventilation

A. Design Reference Documents

1. In addition to complying with the Reference Documents listed in Section 1.16.1.I, the tunnel ventilation system shall be designed in accordance with Section 6.5 of the Midtown Tunnel (MTT) Design Criteria.

B. Design Criteria

1. General
   a. The design of the ventilation system shall assume a maximum permitted traffic speed through the tunnel of 35 miles per hour (mph), the likelihood of congestion at peak periods, and an external wind pressure ranging between zero and 0.4 lb/ft\(^2\) across the tunnel portals in either direction.
   b. The tunnel will only be operated in bi-directional traffic mode under exceptional circumstances, for example when the Existing Midtown Tunnel is closed for maintenance. It is recognized that under such circumstances the ventilation system would not be effective in the case of a fire and it will be necessary to institute special operating measures to provide for the safe use of the tunnel.
   c. Noise levels at any point in the tunnel, under normal operating conditions, measured at a height of 5 feet above the road surface, shall not exceed NR85, as defined in International Organization for Standardization (ISO) 1996-1:2003, when the ventilation system is running at full power in the absence of traffic.
d. The ventilation design shall minimize the risk of recirculation of smoke or exhaust fumes between the portals of the Existing Midtown Tunnel and New Midtown Tunnel.

e. The Design Development and Detailed Design Submission shall demonstrate that the proposed ventilation system will be capable of satisfying the following design criteria.

2. Control of Air Quality

a. The following air quality parameters shall be continuously monitored. The ventilation system shall be designed and automatically controlled to maintain air quality below the following thresholds under all reasonably foreseeable traffic conditions, including bi-directional traffic flow under emergency or maintenance operations:

i. Carbon monoxide (CO) see 1.17.4B.2.b below

ii. Nitrogen dioxide (NO2) 4.0 parts per million (ppm)

iii. Obscuration:

a). Free-flowing traffic \( \leq 0.002 \) per ft

b). Congested traffic \( \leq 0.003 \) per ft

b. Provision shall be made for continuous monitoring of CO under stationary traffic conditions to ensure that the following exposure times are not exceeded:

i. 120 ppm for 15 minutes;

ii. 65 ppm for 30 minutes;

iii. 45 ppm for 45 minutes; and

iv. 35 ppm for 60 minutes.

Fresh air requirements shall be calculated on the basis of predicted vehicle emissions for the year 2020, taking into consideration the likely spread of vehicle ages, standards of maintenance and traffic speeds.
3. Fire and Smoke Control

a. The ventilation system shall be designed to control heat and smoke from a fire following the NFPA Ultra-fast growth curve to a 100 megawatt (MW) peak heat release rate.

b. The effectiveness of the proposed design and compliance with the design requirements shall be demonstrated at an early stage in the design by computer modeling using suitable CFD software to identify any possible deficiencies.

c. The fans shall be designed to move air in the direction of traffic flow during normal operation of the tunnel. The fans shall be reversible and individually controlled to enable performance to be optimized during reverse traffic flow and emergency conditions.

d. The design shall be determined by the longitudinal air velocity required in the tunnel to control backlayering from the design fire at any point in the tunnel.

e. Design for compliance with NFPA 502 shall allow for the eventuality that all fans within a zone extending 300 ft downwind from the fire location will be rendered inoperative by a fire, that fans upwind of the fire are operating in relatively cool air and that all fans downwind will be operating in air at elevated temperatures.

f. Fans shall be located to generate adequate ventilation for the clearance of vehicle emissions across the whole of the tunnel cross-section with no pockets of still air, and to provide for ease of removal and re-installation.

g. The CFD model shall demonstrate that, for a design fire at any point in the tunnel, and subject to the stated traffic conditions, backlayering of smoke is controlled and a tenable region is established to allow evacuation up stream of the fire without the longitudinal airflow exceeding the limit permitted by NFPA 502 Section B.2.4. As a minimum, the CFD modeling shall simulate the system performance for the following fire scenarios:

i. Fire location 100 yd in from the entrance portal, unidirectional traffic, tunnel clear ahead of the fire.

ii. Fire location 100 yd before the exit portal, unidirectional traffic, tunnel filled with traffic behind the fire.
iii. Fire at the tunnel mid-point, unidirectional operation, one lane filled with traffic.

h. The calculation methods and formulae applied in the CFD model shall be checked and verified by an appropriately qualified independent checker.

4. Control

a. Air quality sensors strategically located in the tunnel shall alert the operator when air quality levels fall below the thresholds stated above.

b. The direction and velocity of air flow through the tunnel shall be monitored to enable the OCC Operator to check that the air flow is neither insufficient of excessive.

c. The OCC Operator shall have the means to override the control of individual ventilation fans at any time via the SCADA system.

d. Provision shall be made for the system to be controlled manually from a local control position, for use when the tunnel is closed to traffic for inspection, maintenance or repairs and automatic control of the ventilation is either not possible or insufficient to maintain the required levels of air quality.

e. The ventilation control system shall respond appropriately to the smoke control requirements for a fire at any given location, in accordance with a smoke control strategy to be reviewed by VDOT and the First Responders.

f. Since it is highly probable that the OCC Operator will become aware of the existence of a small fire, either by observation of an incident on CCTV or by emergency telephone, provision shall be made for the OCC Operator to call up and activate the appropriate ventilation plan by manually entering the location of a fire, or suspected fire, into the SCADA system.

g. All tunnel ventilation fan motors shall be continuously monitored for winding temperature and bearing vibration. If excessive temperature or vibration is detected, an alert shall be raised via the SCADA system. However, in neither case should the motor be
shut down automatically, since motors must be allowed run to destruction in the event of a serious fire.

5. Emergency Egress/Maintenance Corridor
   
a. The emergency egress/maintenance corridor shall be independently supplied with fresh air from outside the tunnel and pressurized to minimize the ingress of smoke when up to three emergency doors are opened while the tunnel ventilation system is operating in fire and smoke control mode.

b. At no time shall the air velocity at any point in the corridor exceed 36 ft/s.

1.16.3 Tunnel Lighting and Controls

   A. Design Standards

1. In addition to complying with the Reference Documents listed in Section 1.16.1.1.1, the tunnel shall be lit in accordance with the recommendations of ANSI/IESNA RP-22-05 American National Standard Practice for Tunnel Lighting.

2. Emergency Lighting shall be provided in accordance with NFPA 502.

   B. Design Criteria

1. The tunnel lighting design shall be based on the following criteria:

   a. Design traffic speed shall be in accordance with the Design Criteria for the Midtown Tunnel.

   b. Threshold zone luminance to be determined by the equivalent veiling luminance method as described in RP-22-05 Section 6.4.2 in the American National Standard Practice for Tunnel Lighting.

   c. Light sources to be energy-efficient types.

   d. Emergency lighting average illuminance 1 ft-candle (10 lux) on the road surface, max-min uniformity ratio ≤ 40:1 (as NFPA 502:2010, Section 12.6), minimum duration 1½ hours.
2. Particular attention shall be given to minimizing the impact on drivers’ vision of low morning sun conditions in mid-summer and low evening sun in mid-winter.

C. Wiring and Connections

1. Half of the roadway luminaires shall be fed from the ‘A’ incoming supply and half from the ‘B’ supply, to ensure that if either the ‘A’ or the ‘B’ supply fails approximately 50% of the roadway lighting will be maintained throughout the whole length of the tunnel.

2. Luminaires designated for emergency lighting shall be fed via separate distribution boards from UPS to NFPA 70 Article 700 Class I Type 60.

3. All wiring emanating from the lighting distribution boards shall be in fire rated cable meeting the requirements of NFPA 70 Article 700 and NFPA 502 Section 11.3.2.1. Final connections to luminaires shall be via fire rated junction boxes with fused connections and non-fire-rated flexible cables to plug-and–socket connections on luminaires. (It is accepted that luminaires and small plugs and sockets cannot be fire rated and may be lost in a fire, but through wiring shall be protected to reduce the risk of loss of lighting beyond the fire-damaged area).

D. Control

1. The lighting control system shall incorporate the following features:

   a. Fully automatic switching of daytime lighting in response to external luminance as measured by two luminance photometers at each end of the tunnel.

   b. Fully automatic switching from daytime to night-time lighting, based on an internal solar clock, with cycling of lamps to equalize burning hours.

   c. Automatic detection and isolation of failed photometers.

   d. Alarming of control system faults (including loss of communication with luminaires) and failure of complete lighting power supply circuits.

   e. Override to increase or decrease tunnel lighting from the lighting control panel.
f. Links to the SCADA system to permit remote indication of system status and alarms, and to increase and decrease lighting.

### 1.16.4 Tunnel Drainage Pumping Plant

**A. Design Standards**

1. Because of the possibility of a spillage of gasoline or similar flammable liquid finding its way into the road drainage system, all drainage sumps shall be classified and electrical equipment selected in accordance with the requirements of NFPA 70.

2. The drainage system shall be designed to meet the Virginia Pollutant Discharge Elimination System (VPDES) permit requirements including all maintenance, cleaning and spillage response activities.

**B. Design Criteria**

1. The tunnel drainage pumping plant shall be designed to operate safely and mitigate flooding of the tunnel in the following events:

   a. The peak design inflow from the associated drainage system(s).

   b. The maximum design delivery of water from the fire standpipe and/or fire suppression systems.

   c. Release of the whole contents of the largest capacity road tanker permitted to use the tunnel.

   d. Continuous seepage ingress of groundwater.

2. The Concessionaire shall also consider the need to evacuate water from the tunnel approaches in the event that the tunnel flood gates on the Norfolk side are closed and the tunnel approach has been flooded by a storm event.

3. Pumps, pipework and valves shall be suitable for use, without damage, with all substances that may reasonably be expected to find their way into the drainage system from time to time, such as saline water, tunnel cleaning agents and small quantities of oil and gasoline.

4. All equipment located in the drainage sumps shall be designed and located for easy and safe access for cleaning, inspection, maintenance and replacement.
5. A means of interception and safe containment of polluted or harmful liquids (from tunnel washing, fire fighting or spillages) shall be provided separate from the normal discharge route.

6. All sumps directly connected to the tunnel drainage system shall be designated as Class I Division 2 hazardous areas and electrical equipment installed or specified for use within them selected accordingly. Sumps shall normally be continuously ventilated to prevent an accumulation of potentially harmful fumes.

7. The drainage system shall be designed to comply with NFPA 502 paragraph 7.12.2.

8. The switchgear and control gear associated with the pumping plant shall be located at as high a level as is reasonably practicable so that, if the tunnel should flood as a result of the above design conditions for the drainage system being exceeded, the opportunity will exist to operate the pumping plant under manual control for as long as possible.

C. Control

1. Pumps shall normally operate under fully automatic control, including duty/standby changeover and duty cycling.

2. Provision shall be made for the OCC Operator to start and stop all pumps via the SCADA system.

1.16.5 Tunnel Fire Safety Equipment

A. Tunnel Fire Suppression System

1. General

   a. A fixed fire suppression system as described below shall be provided.

   b. The system performance shall be validated either by data from a comparable existing system, or by full-scale tests on a mock-up of the proposed installation. See also Section 1.16.16.B.1.
2. Design Criteria

a. The fire suppression system shall be water or foam deluge, water mist or hybrid water mist/deluge type, and designed to operate in combination with the tunnel ventilation and fire detection systems to control and restrict the impact of the design fire(s) determined as described in Section 1.16.2.B.3.a above.

b. The design of the fire suppression system shall take into account the relevant requirements and recommendations of the following standards and guidelines:

   i. The performance of the fixed fire suppression system shall be demonstrated using CFD modeling (See TR 1.16.5.A.3.a.i). The results of the system performance modeling will be validated by independent peer review.


c. The potential impact of a fire on the tunnel structure, equipment and occupants shall be assessed and criteria for their protection established by defining maximum temperatures at specific locations around a fire, and times for which those temperatures can be tolerated.

d. The design of the fire suppression system must take into account all factors that may affect the effectiveness of the system and the behavior of a fire in the tunnel, and the response to that fire. Any assumptions to be made should also be stated. Such data may include:

   i. Tunnel geometry and construction;

   ii. Ventilation plant and controls;

   iii. Longitudinal airflow;

   iv. Relevant fire and incident detection systems;
v. Best and worst case time delays between detection, confirmation and activation of the system;

vi. Best and worst case traffic density and composition;

vii. Range of ambient temperatures;

viii. Risk of corrosion;

ix. Evacuation procedures / timescales;

tax. Emergency traffic management / timescales; and

xi. Available water supply and reservoir capacity.

3. Design Methodology

a. The Concessionaire shall design the ventilation system and fire suppression system in accordance with prevailing industry standards:

i. The fire suppression system shall be designed to be effective both with and without the ventilation system running. Computer simulation software, such as the Fire Dynamics Simulator (FDS) by NIST, shall be used to model the performance of the ventilation system while the fixed fire fighting system (FFFS) is in use. The simulations shall document that the proposed ventilation and FFFS will provide the following:

a). Tenable conditions for escape and fire fighting at specified distances from the fire both upwind and downwind.

b). Protection of the structure from serious damage, particularly immediately above and to the side of the fire.

c). Sufficient cooling of surrounding surfaces to prevent spread of the fire to adjacent vehicles and to limit the extent of damage.

B. Fire Standpipe Systems

1. The standpipe system shall be designed in accordance with NFPA 502.
2. Hose valves shall be provided in the tunnel and on the tunnel approach (Boat Section) ramps at intervals not exceeding 275’.

3. Hose Valves shall be housed in a stainless steel panel recessed flush into the tunnel wall or approach ramp retaining wall, and fitted with two-way valves and 2½” hose connections to a thread pattern agreed with the Portsmouth and Norfolk Fire and Rescue Services.

4. As a minimum requirement, the standpipe system shall be capable of delivering a total flow of 750 gallons per minute. If a break tank is provided, the working capacity shall be sufficient for one hour’s operation at the above minimum flow rate. Fire pumps, if required, shall be to NFPA 20.

5. The standpipe system shall be configured with isolating valves located at strategic intervals to allow a section of the system to be taken out of service for maintenance or repair without affecting the availability of the remaining sections of the system.

6. Fire Department inlet connections shall be provided at Fire Department approved response locations at both tunnel portals, in accordance with NFPA 502.

7. The standpipe system may be normally wet or dry. If dry, Fire Department confirmation shall be obtained at Design Development and Detailed Design stage that the time to charge the system is acceptable. If a wet system is provided, all pipework shall be protected against freezing and equipped with a leak detection system.

A. Two emergency cabinets and a manual fire alarm pull box shall be provided adjacent to emergency escape doors, on the nearside wall of the road spaced to comply with NFPA 502 requirements. Each cabinet shall be housed in a low carbon, high molybdenum, austenitic stainless steel panel recessed flush into the tunnel wall. The following cabinets shall be provided:

1. Motorist Aide Call boxes
   a. Emergency motorist’s telephone, height to center of handset 3’ 6” above walkway level. Lifting the telephone handset shall cause the telephone to be connected automatically to the OCC.
2. Hose Valve Cabinet
   
a. One portable type 2-A:20-B:C dry powder fire extinguishers, total weight of each not more than 20 lb, free-standing with handles approximately 2’ 6” above walkway level.
   
b. Fire hose valves as detailed in Section B.
   
c. A switched and ground fault circuit interrupter (GFCI) power socket for emergency use, if required by the Fire and Rescue Services. Specification to be agreed with the Fire and Rescue Services. These sockets would be supported by the tunnel UPS system.
   
B. All compartment doors shall be hinged on the side nearest approaching traffic, be flush with the tunnel walls and fitted with recessed push-button catches and microswitches to signal to the SCADA system when the door is opened. This shall alert the OCC Operator and cause the immediate area to be automatically displayed on a CCTV monitor screen in the OCC. Signage shall be in accordance with NFPA 502.
   
C. Above every fire cabinet a permanently lit pennant sign shall be provided. Each face of the sign shall carry emergency telephone and fire extinguisher symbols and the fire cabinet location reference. Symbol height shall be 10” and white luminance 100 cd/m2.
   
D. The style and color of the symbols and legends on the signs shall be agreed with VDOT. Signs need to be clearly visible both when back-lit in poor ambient light and when front-lit if bright ambient light predominates.
   
E. A white flashing beacon shall be integrated into the sign to indicate when there is an unanswered incoming phone call.
   
1.16.7 Emergency Escape Doors
   
A. Emergency escape doors into the emergency egress corridor shall located adjacent to Emergency Points at intervals determined in accordance with NFPA502:2011 Section 7.15.6.2. Precise locations and design of doors shall be reviewed by VDOT and the City of Portsmouth and City of Norfolk Fire Marshals.
   
B. Emergency escape doors shall be minimum 1½-hour fire rated and shall open into a protected escape route leading to the open air. Open doors shall not obstruct the escape route.
C. Additional doors shall be provided at the extreme ends of the emergency egress corridor for First Responders’ access. These doors shall be fitted with access control as described in Section 1.16.12.A.2.

D. All doors shall be self-closing, able to be opened from either side and fitted with alarm contacts connected to the SCADA system.

E. All doors shall be clearly marked on both sides with an agreed code to indicate the location in the tunnel. The location codes on the road side of the doors shall be large enough to be read clearly by the nearest CCTV camera, to enable it be used by the OCC Operator to identify the location of an incident.

1.16.8 Emergency Exit Signs

A. A permanently lit ‘Emergency Exit’ sign shall be provided above the centre of every escape door, similar in construction to the fire cabinet pennant signs described above, with additional downward illumination to highlight the door.

B. Symbol and font height shall be at least 6 inches and white contrast luminance 30 ft-Lambert.

C. The style and color of the symbols and legends on the signs shall be agreed with VDOT. Signs need to be clearly visible both when back-lit in poor ambient light and when front-lit if bright ambient light predominates.

D. Permanently lit or reflective ‘Nearest Emergency Exit’ signs shall be provided at intervals of not more than 82 ft along both walls of each travel lane, and at 5 ft height, with two directional arrows pointing towards the nearest door or portal in both direction, and supplementary text giving the distances to the nearest door or portal in feet.

E. Additional Emergency Exit signs shall be installed in the emergency egress corridor indicating the shortest way out and the distance to the exit.

1.16.9 Deleted entire section

1.16.10 Traffic Monitoring and Control

A. Closed Circuit Television (CCTV)

1. A CCTV system suitable for general surveillance purposes shall be provided, to enable the OCC Operator to view any part of the tunnel interior, emergency escape routes and approach ramps with color, pan, tilt and zoom cameras.
2. Cameras shall be positioned so that, if one camera fails, full coverage of the tunnel interior can be obtained by use of the adjacent cameras on either side.

3. Multiple monitor screens shall be provided in the OCC. One or more screens shall cycle all the cameras at least once every 60 seconds, while at least one other shall display a single picture as selected by the OCC Operator.

4. An interface with the SCADA system shall be provided that will cause the view from the camera nearest to an alarm event to be displayed automatically in the OCC when certain events such as those listed below are alarmed:
   a. Opening a fire cabinet compartment door;
   b. Opening an emergency escape door;
   c. Activation of a fire alarm; and
   d. Activation of tunnel closure stop signals.

5. A real time recording feature shall be provided to permit simultaneous recording of the images from any two cameras. Recording shall commence automatically in the case of any of the events listed above. The OCC Operator shall also be able to start recording manually and stop recording at any time.

6. Every CCTV image shall include an information banner that shall include the camera’s identification and location and date and time in Universal Time Co-ordinated format. The Operator shall be able to suppress this information when viewing the pictures but not amend or delete it.

7. The CCTV system shall be capable of the future addition of up to two more monitor screens and six more cameras, over and above those necessary for coverage of the tunnel, its approaches and strategic road junctions beyond. Spare cable ducts shall also be provided for system cables as necessary.

B. Lane Control Signals

1. Light emitting diode (LED) based lane control signals shall be provided at each tunnel portal and at regular intervals through the tunnel to give the
following indications:

- Lane closed
- Lane open

2. Lane control signals shall be double aspect, suitable for use with bi-directional traffic.

3. Control of the lane control signals shall be initiated by the traffic control system, and implemented through the tunnel SCADA system.

4. Lane control signals shall be fully interlocked to prevent conflicting indications. Faulty signs or control functions shall cause the affected signs to show a blank face.

5. The signals shall be based on arrays of red and green LEDs on a black background, clearly visible in bright sunlight and dimmable to suit the full range of ambient lighting conditions.

C. Tunnel Closure

1. Traffic stop signals shall be provided to close the tunnel and prevent vehicles from entering in the event of an emergency, operated by remote control from the OCC through a compatible and interoperable system.

2. The location and the type of signals to be used shall be reviewed by VDOT.

D. Dynamic Message Signs (DMS)

1. Full matrix signs shall be provided in the tunnel at regular intervals above the travel lanes to display instructions and emergency messages to tunnel users.

2. Signs shall be located and spaced so as to be clearly visible with an unobstructed view to every driver when traffic is stationary.

3. Similar signs shall also be provided on the tunnel approaches.
4. The signs shall be based on arrays of white LEDs on a black background, clearly visible in bright sunlight and dimmable to suit the full range of ambient lighting conditions.

5. Provision shall be made to manually change sign text via a compatible and interoperable man/machine interface (MMI).

E. Overheight Vehicle Protection

1. Overheight vehicle detection shall be provided as part of a compatible and interoperable traffic control system.

1.16.11 Communications

A. Emergency Phones

1. An emergency telephone system shall be provided, with telephones located at all fire cabinets and portal fire panels as described in Sections 1.16.6 and 1.16.9 above.

2. The emergency telephones shall be designed so that an intelligible conversation can take place with background noise from traffic in the tunnel and the tunnel ventilation system.

3. The telephone system shall be served by two separately located telephone controllers. Each controller shall serve alternate telephones so that every other phone will be operational if one controller becomes disabled.

4. The OCC Operator shall be able to hold calls from, or call back to, any individual telephone on the system.

B. Radio Systems

1. A re-broadcasting system shall be provided by others to maintain STARS radio coverage in the tunnel of all channels required by the First Responders.

2. Provision shall be made for Highways Advisory Radio (HAR) messages to be broadcast within the tunnel.

C. Mobile Telephone Coverage

1. Suitable space and UPS power supplies shall be provided to enable third party cell phone service providers to install their equipment and antennas.
to give full coverage of all available mobile telephone networks in the tunnel.

D. Deleted

1.16.12 Tunnel Security Systems

A. General

1. Intrusion Detection

a. The perimeter of all areas around the tunnel portals and OCC shall be monitored to detect and alarm any unauthorized intrusion. An alarm shall be raised at the OCC through the SCADA OCC Operator Interface with details of the location and time when an intruder is detected.

b. Security lighting and a CCTV surveillance system shall be provided to give full coverage of these areas and to enable the movements of intruders to be viewed and tracked.

2. Access Control

a. An access control system shall be provided to cover designated entry points to restricted areas and buildings. The system shall be designed to permit only authorized vehicles and personnel to enter, and shall automatically log all movements in and out of the secure areas.

b. Every designated entry point shall be provided with a telephone link to the OCC Operator, accessible from both sides of the door or gate, to enable users to request assistance.

c. The OCC Operator shall be provided with the means to override the control of individual entry points in abnormal circumstances, to allow free access by First Responders, maintenance and construction personnel.

d. A means of locally unlocking and locking access gates and doors shall be provided for use in the event of system failure.

1.16.13 Electronic Control System (SCADA System) for M & E Plant
A. General

1. The SCADA System shall consist of two separate elements:
   a. A PLC system, to control and monitor M&E plant and equipment as necessary.
   b. A SCADA system, to act as a user interface for the Tunnel PLC system.

2. The SCADA System will control and monitor elements that are part of safety related systems. Those elements shall therefore be subject to a risk analysis to determine the appropriate Safety Integrity Level (SIL), as defined in IEC 61508, to which they will be designed and operated. Unless demonstrated otherwise, a rating of SIL2 for all parts of the PLC and SCADA systems shall be applied.

3. Both the PLC and the SCADA systems shall be designed for easy expansion and future changes to software in the future.

B. PLC System

1. The tunnel SCADA System shall be based upon a PLC system with a distributed I/O architecture utilizing established proprietary hardware and programming software.

2. The PLC system shall consist of duty and standby PLCs. It shall be designed to be highly resilient and fault tolerant to maintain road user safety systems both under normal and emergency operating conditions. Detection of faults and switching from duty to standby PLCs shall be fully automatic.

3. The PLC system shall include MMIs local to the tunnel to allow the control and monitoring of safety related systems in the event of a SCADA system failure. Subject to a suitable password being provided, the MMIs shall also be available to provide engineering and maintenance data.

C. SCADA System

1. The SCADA system shall consist of the following elements
   a. Communications network;
b. Data servers;

c. OCC Operator Interface;

d. Engineering Interface; and

e. Automatic Incident Detection (AID) system interface.

2. The SCADA level communications network shall consist of a dual fault tolerant, redundant fiber optic ring topology using ring management switches at each node.

3. Communications between the OCC and the tunnel equipment shall be carried using multiple longitudinal fiber optic cores.

4. Two SCADA servers shall be provided, operating on a duty/hot standby basis and receiving, processing and logging data in parallel. Should a fault in the duty server be detected, full control of the system shall be transferred automatically and seamlessly to the standby server within 20 seconds. There shall be no loss of data and an alarm shall be raised to advise the OCC Operator that this has happened.

5. SCADA outstations shall be provided at strategic locations as required.

6. The connection of a PC to an outstation shall not interrupt the flow of data to the SCADA servers. Completion of system modifications at an outstation shall only be by the use of the highest level security password.

7. Outstation control / software modifications shall generally be made to an offline copy of the stored program on the duty SCADA server and propagated to the outstation when modifications are complete.

D. SCADA Operator Interfaces

1. At least two SCADA Operator Interfaces shall be installed, one for the Operator in the OCC, and the second for maintenance and engineering purposes local to the tunnel.

2. Each SCADA Operator Interface shall consist of a desk-mounted MMI, capable of displaying pages for traffic monitoring and control or plant monitoring and control, and a printer for outputting reports and logs.

3. The SCADA Operator Interfaces shall be provided with high definition graphical displays showing the status of M&E systems within the tunnel.
and tunnel closure signs, signals and barriers. Emphasis shall be placed upon clarity of presentation and ease of use.

4. Each SCADA Operator Interface shall be user configurable to filter what is seen on the alarm screens. The means for intelligent suppression of the display of secondary alarms shall be provided.

5. Operator access shall be password controlled with four levels of authority as follows:
   a. Guest;
   b. Operator;
   c. Supervisor; and
   d. Engineer.

6. Pre-programmed help pages shall be provided, for the OCC Operator to call up during an emergency incident, listing recommended actions appropriate to the prevailing scenario, based on agreed emergency plans and alarm signals received.

7. Help pages shall be developed in consultation with the OCC Operators and the emergency services, and shall include, but not be limited to, the following:
   a. Fire in tunnel;
   b. Road Traffic Accident;
   c. Spillages;
   d. Flooding;
   e. Air Quality Alert;
   f. Normal Power Supply Failure;
   g. Standby Power Supply Failure;
   h. Tunnel Closure;
   i. Tunnel Evacuation;
j. Tunnel Ventilation Failure; and

k. Tunnel Lighting Failure.

E. Data Logging and Transfer

1. The SCADA system shall record, time stamp and categorize all faults, event signals and operator actions in event logs under one of the following three types:

   a. Alarm – those faults or events that require an immediate response either from the OCC Operator or maintenance personnel in order to maintain a safe environment for the road user.

   b. Alert – those faults or events that require a considered response either from the operator or maintenance personnel in order to maintain a safe environment for the road user.

   c. Record – those events that are part of the normal operation of the tunnel.

2. Provision shall be made to relay urgent fault alarms automatically through a telephone link, text message, email, and/or facsimile to an unspecified remote maintenance terminal.

3. Time stamping shall be synchronized to US Eastern Standard Time to a resolution of ±1 second or better.

4. Data storage shall be on non-volatile media to prevent loss of data in the event of server failure or switch-over.

5. The OCC Operator shall be able to enter details of incidents, with time, duration and general description, and to generate reports combining this information with selected events (e.g. road traffic accident observed, time logged, attendance requested, ventilation operated, etc).

6. The SCADA system shall provide the means to search logs and generate reports on:

   a. The frequency and duration of selected events.

   b. Power consumption and running costs of lighting, ventilation and drainage plant, linked to plant usage.
c. Air quality, linked to weather and traffic conditions and ventilation usage.

1.16.14 Electrical Power Supplies

A. Incoming Power Supplies

1. Power for the tunnel systems shall be supplied from two independent incoming high voltage supplies, designated ‘A’ and ‘B’, each normally supporting approximately 50% of the total electrical load. The ‘A’ and ‘B’ supplies shall be taken from the Portsmouth and Norfolk distribution networks respectively, to minimize the risk of common point failure.

2. Lighting and ventilation systems shall be split approximately 50/50 between the ‘A’ and ‘B’ supplies so that if one supply fails, only 50% of the system capacity will be disrupted.

3. Cabling, transformers and switchgear associated with ‘A’ and ‘B’ supplies shall be physically segregated to the extent possible and reasonable.

4. If either supply should fail, or equipment needs to be temporarily taken out of service for inspection, maintenance or repair, provision shall be made for the whole of the tunnel electrical load to be transferred to the alternative supply until normal operation can be restored.

5. Switchgear controlling interconnecting cables between the ‘A’ and ‘B’ substations shall be interlocked to prevent through feeding between the Portsmouth and Norfolk supply networks.

B. Standby Supplies

1. Standby generation shall be provided with sufficient fuel feed and/or fuel storage capacity to support essential tunnel systems for three days continuous operation to maintain traffic flow under emergency conditions. NFPA identifies those systems that are identified as essential. Refueling points shall be located at ground level away from the tunnel and plant rooms. If the designer opts to utilize a Natural Gas fired generator, fuel will be obtained and metered from the local distribution system. A day tank or other storage type tank to satisfy the three continuous days operation will be at the discretion of the designer, after weighing the risks associated with a Natural Gas shut down during the emergency incident.
2. At no time shall failure of a supply or switching operations involve an increased risk to tunnel users or interruption of normal operation of the tunnel.

3. Essential systems shall be fed via UPS, so that during switching intervals, generator start-up and in the event of failure of the standby generators, supplies to the following will be maintained seamlessly for at least 30 minutes:
   a. Emergency lighting and escape signage.
   b. Fire detection and alarm systems.
   c. Power outlets in fire cabinets.
   d. Radio, telephone and public address systems.
   e. CCTV and incident detection systems.
   f. SCADA Plant monitoring and control system.
   g. The traffic control system specified in Section 1.16.1.E.2.b.vii.

4. The UPS shall be fed from an emergency bus, which shall automatically switch between alternate power supplies in the event of a power interruption.

5. Standby generators shall be sized to support continuously the essential emergency load that may be imposed by the tunnel electrical systems, including recharging the UPS batteries.

6. Under no circumstances shall air for cooling or combustion purposes be drawn from the tunnel.

C. Cable and Wiring

1. All sub-main and final sub-circuit cabling and wiring in the tunnel road space shall be protected from fire, either by the use of fire rated cables to NFPA 70 Article 700 or 708 as appropriate, or by being enclosed in fire protected ducts to give an equivalent level of fire performance.

2. All cables buried in the ground or passing through the structure shall be enclosed in ducts, with 25% spare ducts left empty for unspecified future use.
3. Where it is not possible to obtain suitable fire rated versions of exposed cables required for instrumentation, data transmission or communications equipment in the tunnel, resilience to fire shall be provided by alternative means, such as duplication by alternative routing.

4. Final connections to equipment that will not be expected to continue operating under direct impingement of fire may be made in cables with a fire rating similar to that of the equipment served. In such instances, suitable precautions shall be taken to ensure the continued functioning of equipment not directly involved in the fire.

1.16.15 Tunnel Support Buildings

A. Secure buildings shall be provided adjacent to the tunnel to contain the electrical and mechanical plant and equipment associated with the power supplies and ancillary systems necessary for operation of the tunnel.

B. Separate rooms shall be provided for HV and LV equipment.

C. Office and washroom facilities shall be provided for use by maintenance personnel. These may be shared with the Existing Midtown Tunnel if it is practical to do so.

D. Where required by code, rooms shall be provided with normal and emergency lighting, anti-condensation heating, fresh air ventilation and small power sockets for maintenance use. Fire alarm, intruder alarm and access control systems shall also be provided, with remote alarms relayed to the OCC Operator via the SCADA system.

E. If lead-acid batteries are selected for the UPS, ventilation to the battery room shall be provided by a duty/standby fan arrangement to ensure continuous ventilation at all times and to prevent any accumulation of hydrogen gas from the batteries.

F. Rooms containing heat-emitting or heat-sensitive equipment shall be provided with cooling by fresh air or air conditioning as appropriate.

G. All rooms will be protected per the Virginia State Building Code.

1.16.16 Testing and Commissioning

A. Testing

1. Testing shall be designed to verify that the equipment and installations
comply with the Technical Requirements. Testing shall verify that installation is in accordance with the Technical Requirements and that performance of all systems, both in isolation and in conjunction with other systems, is in accordance with the Technical Requirements.

2. VDOT shall be given the opportunity to witness any or all tests at their discretion, and will provide the Concessionaire with a list of tests that VDOT would like to witness. The Concessionaire will provide an agreed amount of notice before the date of all tests to enable VDOT to make the necessary arrangements to attend.

B. On Completion

1. VDOT will verify that the completed systems conform to the functionality, performance and safety requirements, as in accordance with the Technical Requirements.

2. Specific performance tests shall include, but not necessarily be limited to:
   a. Tunnel ventilation;
      i. Air velocity and uniformity;
      ii. Noise levels; and
      iii. Efficiency of smoke extraction.
   b. Tunnel lighting;
      i. Luminance levels.
   c. Drainage pumping plant;
      i. Pump discharge flow and pressure.
   d. Fire suppression system;
      i. End-to-end time for detection, alarm, location and confirmation of a fire, with a reasonable allowance for any human intervention;
      ii. Times to charge the system.
      iii. Time to establish full operation of the system; and
iv. Rate of water consumption under full availability and pump failure conditions.

e. Fire hydrants;

i. Flow and pressure.

f. Deleted

g. EC and traffic control systems.

i. Comprehensive functional tests.

3. For each test, a test report shall be provided to include the following:

a. Test methodology;

b. Relevant codes or standards;

c. Specific details of the equipment or system tested;

d. Full record of measurements taken, with locations;

e. Evidence of calibration of test equipment;

f. Applicable acceptance criteria;

g. Test results; and

h. Any further actions or re-testing required.

1.17 Tunnel Design Criteria

Tunnel Design Criteria is provided in Attachment 1D.

1.18 Tolling and Traffic Management System

The Concessionaire shall provide a tolling and traffic management system consistent with the Agreement, including Good Industry Practice. The tolling and traffic management systems may be separate and independent so long as they meet the requirements herein.

1.18.1 Existing Intelligent Transportation System Infrastructure
A. Pursuant to the terms of the Agreement, the existing VDOT Intelligent Transportation System (ITS) infrastructure and telecommunication system to the extent that spare capacity is available within, along, or adjacent to the Project corridor, will be made available for use by the Concessionaire or its agents or subcontractors in order to support the tolling and traffic management systems.

B. Maintenance activity for/on fiber optic cable and/or duct bank including junction/splice pits jointly occupied by the Concessionaire and VDOT, if any, shall be subject to a joint agreement between the Concessionaire and VDOT.

1.18.2 Business and Toll Operating Model

A. The business and toll operating model shall comply with the requirements of the Agreement.

B. A facility or facilities shall be provided to support traffic management, incident response, maintenance, and tolling operations, including handling of services directly related to the operation and maintenance of the tolled facility network.

C. Tolling equipment shall be installed to detect the presence of a transponder for users on the tolled facilities by means of E-Z Pass-compliant (or any successor to E-Z Pass used on other State Highways) transponder detection equipment.

D. Transponders that shall be read will be E-Z Pass compliant (or any successor to E-Z Pass used on other State Highways), either issued by VDOT or by another member of the Interagency Group (IAG).

E. Toll pricing shall be in accordance with the Agreement.

F. A violation enforcement system (VES) shall be implemented to enable the detection and enforcement of violators. Enforcement will follow practices established on similar systems and shall be in compliance with the requirements of the Agreement. Enforcement may include manual processes, video enforcement, or integrating customer service, technology and operational performance elements.

1.18.3 Systems Integration and Protocols

A. The Concessionaire shall implement a system engineering approach, consistent with Federal Rule 940, in the development of systems and their associated interfaces. The system engineering approach shall address the following items where applicable:

1. System architecture;
2. System specification;
3. Interface identification;
4. Interface specification;
5. Interface control;
6. System integration; and
7. Configuration management.

B. The Tunnel Facilities Control Room shall be required to interface to Eastern Region Operations (ERO) Advanced Traffic Management System (ATMS) at the ERO TOC.

C. The Concessionaire shall develop and maintain Project architecture in conformity with the ERO ITS architecture. The Project architecture shall document all interconnects and information flows between the Toll Facility OC and the existing ERT Traffic Control Rooms; and interconnects to other transportation and emergency management agencies.

D. The Concessionaire shall prepare a Rule 940 checklist for planned ITS infrastructure for submission to FHWA via VDOT’s ERO TOC.

E. The Concessionaire shall ensure that such standards, protocols, and interfaces are present in the Toll Facility OC Central Control Computer System (CCCS), so as to make the TMS and ERT tunnel traffic control system interoperable with ERO ATMS, in accordance with the Interface Specification and including any mutually agreed revisions during the Operations.

1.18.4 Tolling System and TMS Design Documentation

The following tolling system and TMS design documentation shall be prepared and submitted to VDOT by the Concessionaire:

A. Tolling Concept of Operations which shall describe the intended behavior and functionality of the tolling system and TMS and their operational interaction with ERO ATMS.

B. Technical Specifications - shall be a document or documents that specify the technical design of the integrated sub-systems that will comprise the tolling system and TMS and its interfaces.
C. Interface Specification (Attachment 3D) – shall be the physical and logical architecture of system interface between the Toll Facility OC ITS and ERO ATMS.

D. Process Definition Deliverable or other agreed document - shall set out the business processes relating to the tolling system and TMS (subject to intellectual property (IP) regulations, and the requirements of the Agreement) and the processes for interacting with the appropriate VDOT system and/or other systems as documented in the Concept of Operations.

E. Test Strategy - shall establish the principles of, and the Concessionaire’s approach to, the testing of the tolling system and TMS and their interfaces, including the test stages and processes.

F. Security Plan - shall be a document (or part of another document) that sets out how the security of the tolling system and TMS, including the subsystems, communication links, roadside equipment, and Toll Facility OC shall meet the relevant requirements for enforcement evidence and that data are held securely and only accessible to authorized personnel.

G. Disaster Recovery Plan - shall be a document (or part of another document) that sets out the procedures to be adopted in the event of failure of the tolling system and/or TMS.

1.18.5 Design of the Tolling System

A. A tolling system shall be provided to impose, charge, collect, use, and enforce payment of tolls in accordance with the Agreement.

B. The tolling system is to comprise the following equipment and/or systems:

1. Tolling system roadside equipment; and
2. Tolling system equipment and/or subsystems.

C. The tolling system roadside equipment is to comprise:

1. Transponder detection equipment; and
2. Control equipment.
D. Access to the tolling system overhead and roadside equipment shall be provided such that it does not jeopardize the safety of the technician or the operations of any lanes.

E. The tolling system shall have a transponder transaction performance as set forth in Section 4.4, for properly fitted and operating transponders, excluding signal attenuation due to metallic wind screen or similar.

F. The Concessionaire shall provide toll charge transaction information in compliance with an interface specification to be developed between the Concessionaire and VDOT or other toll transaction account management services provider.

G. The Concessionaire shall develop interface file format and transfer protocols for the transmission of toll transaction data and related information in cooperation with VDOT and in accordance with an interface specification to be developed and the Electronic Toll Collection (ETC) Agreement.

H. Communication between the tolling system roadside equipment and the Toll Facility OC will be via the fully redundant network.

1.18.6 Design of the Vehicle Enforcement System

A. A vehicle enforcement system (VES) shall be provided that detects vehicles that do not have a transponder or a valid transponder.

B. The VES is to comprise:
   1. VES equipment; and
   2. Control equipment.

C. When tolls for any toll section are suspended, there shall be a means to suspend vehicle enforcement.

D. The VES roadside equipment shall have an in service availability (ISA) as set forth in Section 4.4.

1.18.7 Design of the Technical Shelters

A. The Concessionaire shall provide suitable technical shelters housing electrical cabinets for the tolling system and TMS equipment as required.

B. The technical shelters shall be equipped with the following provisions:
1. Heating, ventilating and air conditioning (HVAC) systems as required to support installed equipment;

2. Fire detection; and

3. Intrusion detection.

C. Each service panel for the technical shelters shall be equipped with telemetry equipment that reports, for the main power and each branch circuit, the current flow and any tripped breakers.

D. The telemetry shall be powered by an uninterruptible power source to enable the telemetry to communicate for the first 20 minutes after a power failure.

E. Service panels feeding technical shelters shall be equipped with a backup generator sized to accommodate the attached electrical load, including DMS connected to the service panel.

1.18.8 Traffic Operations Center

A. The Concessionaire shall provide a Traffic OC that complies with Applicable Laws to accommodate equipment and personnel for the operation of the facility.

B. The Concessionaire shall obtain building permits and other Governmental Approvals required for the construction and occupancy of the Traffic OC.

C. The Concessionaire shall procure any zoning variances required for the property to be used for the Traffic OC.

D. The Concessionaire shall provide a Traffic OC with the following amenities:

1. Offices;

2. Meeting rooms;

3. A control room with a video wall;

4. A computer equipment room, with raised computer floor or an equivalent means of distributing cables;

5. Restrooms, showers, change room, and lockers;

6. External and internal access security system;
7. HVAC systems;
8. Fire detection and alarm system;
9. Emergency and backup power;
10. Maintenance management rooms and storage; and
11. Adequate surface areas for employee and visitor vehicle parking within the constraints of the property boundaries and the remaining site space following the deduction of the building footprint.

E. All offices and rooms shall be accessible to all employees and visitors in accordance with the requirements of Applicable Law.

1.18.9 Traffic Management System

A. A traffic management system (TMS) shall be provided that meets the requirements of the Agreement and enables the Concessionaire to monitor and manage traffic flow on roadways within the O&M Boundaries.

B. Any ERO ATMS related equipment that may be in conflict with proposed Concessionaire equipment will be left as is and untouched.

C. The TMS must allow the Concessionaire to:
   1. Support response to emergency situations on the Toll Facility Network in the shortest possible timeframe;
   2. Optimize the traffic flow on the Toll Facility Network;
   3. Control flow, and any regulatory DMS, on and approaching the Toll Facility Network;
   4. Detect and manage traffic incidents effectively, through a comprehensive incident management system, to mitigate the impacts of incidents and prevent secondary incidents occurring;
   5. Provide credible and timely driver information about travel times, traffic conditions and incident situations, and provide timely and accurate toll prices to motorists related to Toll Facility Network;
6. Provide an interface with ERO ATMS in accordance with the Interface Specification (Attachment 3D);

7. Support provision of driver aid to motorists in vehicles that have stopped on the Toll Facility Network;

8. Permit ERO TOC to control DMS via the Toll Facility OC CCCS in accordance with the Agreement;

9. Provide for the control and monitoring of TMS components and subsystems through a modern and comprehensive computer-based control facility using graphical user interface (GUI); and

10. Monitor facilities, plant, and equipment.

D. The TMS is to comprise the following equipment and/or systems:

1. TMS roadside equipment; and

2. TMS equipment and/or systems located in the Toll Facility OC.

E. The TMS roadside equipment is to include:

1. DMS for the lanes to provide toll and driver information (T&DI) and general traffic management information;

2. Pan tilt-zoom (PTZ) CCTV cameras to provide video surveillance;

3. Traffic monitoring sensors to provide traffic volume, lane occupancy, and speed data;

4. Lane control devices; and

5. At all access points.

F. The TMS Toll Facility OC based equipment and/or systems are to comprise of:

1. An AID subsystem;

2. A CCTV subsystem; and

3. A CCCS.
G. The CCCS shall have an ISA of at least 99.995% and the CCCS (redundant components) of at least 99.9%.

H. The type and format of DMS messages must comply with the requirements of MUTCD, VDOT ERO Master Concept of Operations for DMS, guidance published by FHWA, and/or VDOT published standards as appropriate.

I. The TMS roadside equipment shall have an ISA as set forth in Section 4.4.

J. Equipment cabinets shall be provided for the TMS roadside equipment at appropriate locations along the alignment and within the Project Right of Way.

K. Existing VDOT-owned TMS roadside equipment that may be taken over by the Concessionaire will be removed or integrated into the new TMS system.

1.18.10 Closed Circuit Television Video Coverage

A. Dedicated CCTV cameras shall be provided for the following functions:

1. Surveillance of the Project’s incident detection and response limits as described in the O&M Boundaries, including roadways, bridges, tunnels, approaches and interchanges AID on the Project.

B. CCTV video coverage must be provided by PTZ CCTV cameras mounted on poles to enable Toll Facility OC operators and VDOT operators to observe traffic along every section of the corridor within the Project Right of Way at all hours of the day and in all weather conditions normally encountered in Virginia, consistent with reported visibility restriction (i.e., during snow storms, fog, etc.). The video provided must be stable, jitter-free, and suitable for video-based AID.

C. The Concessionaire shall replace VDOT’s cameras that are disturbed by the Work.

D. Dedicated cameras shall be provided for surveillance of the Project’s incident detection and response limits as described in the O&M Boundaries or to enable video-based AID under Toll Facility OC operator control.

E. CCTV line-of-sight distances shall provide for full CCTV coverage without image degradation.

F. All cameras installed for VDOT by the Concessionaire shall meet the requirements of VDOT camera specifications.
G. The video surveillance system must enable the identification of the number and vehicle types involved in an incident at all locations within the surveillance area.

H. The video provided must be stable at all zoom settings when viewing objects up to one mile away.

1.18.11 Video-based Automatic Incident Detection

A. For selected locations, the Concessionaire shall implement video-based AID for the Project’s incident detection and response limits as described in the O&M Boundaries. This shall be at locations where:

1. The risk of traffic incidents is expected to be higher than average, and
2. Rapid detection of incidents is required for special reasons, such as near critical infrastructure.

B. The video-based AID system should be capable of:

1. Detecting 95% of incidents involving stopped vehicles, slow vehicles, and slow traffic that are within the field of view of a fixed CCTV camera or other equipment as specified;
2. Detecting pedestrians on the roadway; and
3. Detecting incidents and providing an alarm to the tunnel control room in less than 30 seconds.

C. Upon the detection of an incident, the AID system must record the video at a rate of at least five frames per second for a period of 60 seconds.

1.18.12 Closed Circuit Television Communications Standards

A. CCTV communications standards shall be MPEG-4 at 4Mbps or H.264, or a mutually agreed equivalent. Video performance requirements will be based on a minimum requirement of D1 resolution as defined by NTSC, a 30–frames-per-second video image and no pixilation upon panning or tilting of the camera. Final video rates/formats are to be agreed to before activating the system.

B. Each location will be capable of providing multiple video streams, with the ability to configure each stream independently.

C. All equipment used will be able to be managed using Telnet, Web-based GUI, and/or local port command-based interface.
D. Each location shall be able to combine video and data (to be used for PTZ) in the same unit.

1.18.13 Traffic Monitoring Sensors

E. Traffic monitoring sensors shall be installed to monitor and report in real time traffic volume, lane occupancy and speed data at key locations along the roadway (outside of the tunnels). In addition to such sensors, the Concessionaire shall employ fixed camera-based software to detect incidents inside the tunnels.

F. Information collected on the project by the ITS will be made available to VDOT.

1.18.14 DMS

A. The T&DI DMS for the tolled facility shall be located prior to each entry to the tolled facility and will display sufficient information to allow drivers to make appropriate decisions on whether to use the tolled facility. The T DMS and DI DMS will be independent roadside elements and likewise independently connected to, and managed by, the Toll System and the Traffic Management System respectively. The information to be displayed will be selected prior to final design following behavioral studies and market research.

B. DMS shall be installed at suitable distances from the tolled facility entrance at locations shown on the approved Signing Roll Plan to support motorist decision making and orderly movement of traffic. Static signs (in lieu of DMS) may be utilized at the Concessionaire’s discretion as long as they meet the information requirements.

C. The Concessionaire shall reference ERO’s DMS Master Plan to avoid over-populating signs and to seek co-gantry opportunities.

D. The T&DI DMS shall have the following minimum features:

1. Full graphics monochrome LED display providing a minimum of three lines of text;

2. Deleted

3. Capability to display toll price;

4. Capability to display travel time information;
5. Capability to display traffic management information, including warning and recommended diversions;

6. Advanced fault detection and reporting; and

7. Conformance to the National Transportation Communications for ITS Protocol (NTCIP) or other industry protocol agreed with VDOT.

E. If communication with the Toll Facility OC CCCS is lost and the T&DI DMS has no reported errors, the T&DI DMS shall display a user-defined graphic/message.

F. DMS shall be installed on the Project to provide traffic management information to motorists.

G. The traffic management DMS shall have the following minimum features:

1. Full graphics monochrome LED display providing a minimum of three lines of text;

2. Capability to display traffic management information, including warning and recommended diversions;

3. Advanced fault detection and reporting; and

4. Conformance to the National Transportation Communications for ITS Protocol (NTCIP) communications protocol or other industry protocol agreed with VDOT.

H. The DMS must not display erroneous information due to a fault with the sign or the loss of pixels.

1.18.15 TMS Availability

A. An ISA of at least 99.99% is required for the calculation of accurate travel time on tolled lanes.

B. All other TMS functions, unless noted otherwise, must have an ISA of at least 99.9%.

C. In cases where redundancy is provided, the system must switch between redundant components seamlessly (without impact to operator functionality). The system must also provide the capability to manually switch between redundant devices to support software upgrades/reversion and maintenance procedures.
1.18.16 Communications Infrastructure

A. The existing communications infrastructure must remain in place or be replaced in kind, as specified in the Standard Documents in Section 3.5.2.

B. VDOT will provide one conduit from its existing infrastructure inventory in, along, or adjacent to the Project, to the extent available, to the Concessionaire for telecommunications fiber installation.

C. If spare conduits in existing VDOT duct banks are not available, then the Concessionaire shall provide and install, duct banks, telecommunications conduit and fiber capacity in, along, or adjacent to the Project where communications infrastructure does not currently exist, in order to satisfy the project requirements.

D. Design, construction, and installation of the telecommunications infrastructure shall be consistent with ERO TOC Communications Master Plan.

E. Communications cables will be placed in buried conduit, embedded conduit, or bridge-mounted conduit. Conductor cables will be placed in buried conduit, embedded conduit, or bridge-mounted conduit and shall be in separate conduit and related appurtenances.

1.18.17 Existing VDOT TMS Roadside Equipment

A. Existing VDOT TMS roadside equipment or third-party TMS roadside equipment installed under permit with VDOT includes the following equipment located within the Project Right of Way:

1. Weather stations;

2. DMS for the existing lanes to provide general traffic management and regulatory information;

3. CCTV cameras; and

4. Traffic monitoring sensors.

B. The Concessionaire shall relocate existing VDOT TMS roadside equipment located within the Project Right of Way that is affected by construction, including power and communication service to the equipment, and shall ensure that loss of functionality is minimized.

C. Any third-party TMS roadside equipment located within the Project Right of Way that is affected by construction, including power and communication service to
the equipment, shall be relocated by the third-party equipment owner under the direction of VDOT. The Concessionaire shall provide notification of disturbance of equipment three weeks prior to commencing such activities.

D. VDOT will remain responsible for the operations and maintenance of the existing and relocated VDOT TMS roadside equipment as further set forth in the O&M Boundaries.

E. Third-party equipment owners shall remain responsible for the operation and maintenance of their existing and relocated TMS roadside equipment.

1.18.18 Power

A. The Concessionaire shall install and connect power service for the tolling system and TMS equipment for the Project.

B. The power supply for the tolling system, ITS, lighting and TMS equipment shall be separately metered from roadway lighting, traffic signals, and VDOT equipment. At VDOT’s sole discretion, new tolling system and TMS equipment may be connected to existing VDOT electrical service panels.

1.18.19 Interface with the Hampton Roads Region ATMS

A. Deleted

B. Deleted

C. The tolling system and TMS shall not cause any unscheduled interruption or adverse affect to the continued functioning of the ERO ATMS or the operations supporting it.

D. The ERO ATMS shall not cause any unscheduled interruption or adverse affect to the continued functioning of the tolling system and TMS or the operations supporting it.

E. The tolling system and TMS shall be capable of being electrically (and, where relevant, optically) and mechanically isolated from the ERO ATMS.

F. The Concessionaire shall:

1. Deleted

2. Work with VDOT and its subcontractors to construct, test, and operate all specified interfaces; and
3. Prepare and document the designs which may include but not be limited to the following:
   a. The content of the data to be exchanged;
   b. The format of the data to be exchanged;
   c. The static data which are required to decipher the meaning of the data exchanged;
   d. The bearer protocols to be used;
   e. Any sequencing constraints or assumptions;
   f. Error handling measures;
   g. Measures to ensure data integrity;
   h. The nature of testing and the associated test data to be used; and
   i. Any other information necessary for the interface to operate correctly.

4. The tolling system and TMS shall have a mechanism to control the rate of transmission of messages/file to the ERO ATMS, with such mechanism being mutually agreed to and in accordance with the Interface Specification (Attachment 3D).

5. If the interface to the ERO ATMS is unavailable, the tolling system shall be able to store all records for an agreed period of up to five days on secure media and transmit them to the ERO ATMS once the interface is restored.

1.18.20 Data Processing Capacity

The Concessionaire shall ensure that the tolling system and TMS have sufficient data processing capacity.

1.18.21 Alarm Reporting

The tolling system and TMS shall have the capability to monitor the status of all relevant components and to raise alarms in the event of component failure, performance...
degradation, or any other potential issues that might adversely affect the operation or performance of the tolling system and TMS.

1.18.22 Security

A. The Concessionaire shall prepare and submit no later than six months prior to the Existing Project Assets Tolling and O&M Work Commencement Date.

B. The Security Plan shall embody the following key principles for the protection of data:

1. Integrity: Data shall be protected from being corrupted by unauthorized changes, whether by system error, human error, or intentional alteration. Data shall only be modified by authorized users according to defined privileges and procedures.

2. Confidentiality: Data shall be protected from unauthorized disclosure. Access to systems shall be restricted to authorized users with privileges appropriate to the confidentiality of the data.

3. Availability: Data shall be prevented from being lost or becoming inaccessible. Authorized users shall be able to gain access to information to which they are privileged whenever they are authorized to do so.

1.18.23 Disaster Recovery

A. The Concessionaire shall prepare and submit no later than six months prior to the Existing Project Assets Tolling and O&M Work Commencement Date a disaster recovery plan for the Project operations, which shall, at a minimum, include the following:

1. Mitigate any adverse impact on the tolling system and its operation and/or TMS, in any circumstances where the ability of the Concessionaire to provide the operation of the tolling system would otherwise be impaired; and

2. Make provision for action to be taken by the Concessionaire in the event of the unavailability of its premises.

B. The Disaster Recovery Plan shall identify the measures to be taken in the event of:

1. Toll Facility OC site loss;
2. Roadside equipment site loss;
3. System data loss or corruption;
4. Systems failure;
5. Failure of the communications link with the ERO ATMS;
6. Failure of the communication links between the roadside equipment and the Toll Facility OC;
7. Loss of power in the locality; and
8. Inability of staff to gain access to, or work effectively at, the Toll Facility OC.

1.18.24 Performance Recording and Reporting

The tolling system and TMS shall incorporate the necessary tools to enable the recording and reporting of performance to meet the requirements under the Agreement.

1.18.25 Testing

A. Completed systems shall be tested to verify that functionality, performance and safety are in accordance with the Technical Requirements and relevant specifications.

B. Testing and commissioning, where applicable, shall be based on the application of a systems engineering methodology such as ANSI/GEIA EIA-632. Testing and commissioning will be based on the following documents:

1. A Verification Cross Reference Index (VCRI), which will be developed and documented to establish the way in which requirements are satisfied. The VCRI shall utilize test, demonstrate, inspect and analyze as methods for acceptance;
2. A test series that shall demonstrate compliance with the performance requirements through a test plan and procedures;
3. A testing strategy document that details how the testing plan will be implemented to demonstrate conformance of the proposed solution to the various functional, technical, and performance requirements; and
4. A test plan document that describes how the testing strategy will be executed to demonstrate the various functional, technical, and performance requirements for compliance to requirements, which shall include:

   a. Test specifications for each of the test cycles;

   b. Detailed requirements traceability matrix linking each of the test series to relevant requirement(s); and

   c. Detailed test script(s) for each of the test series, including input / process / output at each of the steps so that conformance can be monitored.

C. This testing strategy shall include:

   1. System design and integration overview;

   2. User Acceptance Testing - to ensure that individual functions operate as defined in the requirements specification or similar documents and the complete end-to-end process is tested;

   3. Factory Acceptance Testing - tests to be conducted at the supplier’s premises to verify that the equipment, subsystem or system complies with the functional and performance requirements of that supplier’s subcontract;

   4. Site Acceptance Testing (SAT) - tests to be conducted at the point of installation (tolling point and along Project) to confirm the factory acceptance testing results, plus any omissions and/or errors noted during the factory testing; and

   5. Integration Acceptance Testing - a test conducted to ensure that the complete tolling system and TMS meets the end-to-end system-level functional and performance requirements in normal operating conditions.

1.18.26 Standards

The tolling system and TMS shall be designed, implemented, maintained, repaired, and replaced in accordance with all relevant standards as set forth in the Standard Documents in Section 3.5.2.

1.18.27 VDOT Testing and Integration Obligations
VDOT will participate as necessary in the requirements for testing and integration as outlined above where such testing and integration involves VDOT’s infrastructure. The Concessionaire shall schedule adequate time for notification and testing by VDOT.

1.19 Maintenance During Construction

A. In accordance with the Agreement and subject to Section 1.19.B below, the Concessionaire shall be responsible for all maintenance during the construction of the Project in accordance with the Standard Documents in Section 3.5.2 and in accordance with Paragraph 105.14 of the Road and Bridge Specification.

B. Where the Concessionaire’s MOT Plan requires traffic to operate on intermediate asphalt surfaces, the Concessionaire shall be responsible for maintenance of these roadways, including repair of any damage caused by its operations or use by public traffic.

C. In accordance with the Agreement, the Concessionaire shall maintain and operate the facility within the O&M Boundaries.

1.20 As Built Records

A. On completion of the construction Work, the Concessionaire shall provide to VDOT the Record Documents and Manuals, in accordance with the Standard Documents in Section 3.5.2, which shall consist of two hard-copy sets, one electronic file of each plan in .tif format or .pdf format, and one electronic file in MicroStation .dgn format of the final construction plans.

B. The As-Built documents will be organized and indexed to facilitate easy retrieval of information and will be certified by the Concessionaire to reflect the actual condition of Project at the end of the construction of the Project.

C. Record Documents

1. Design criteria and calculations and specifications;
2. Design and check certificates;
3. Testing and Commissioning Records; and
4. ‘As built’ record drawings.

D. Manuals
1. OCC Operator’s Handbook. This shall contain an outline of the layout, functioning and control of the tunnel systems and equipment, in sufficient detail to provide the OCC Operators with a level of understanding of the facilities appropriate to their duties. The handbook shall also include details of procedures for supervision and operation of the tunnel under normal, emergency and maintenance conditions.

2. First Responders’ Handbook. Similar in many respects to the OCC Operator’s Handbook, this shall contain an outline of the layout, functioning and control of the tunnel systems and equipment, to provide First Responders with a general understanding of the tunnel and its operation, with particular emphasis on facilities available to assist them when attending an emergency and any unusual features that they should be aware of. The handbook shall also include details of access routes and key contacts.

3. Equipment Operation and Maintenance Manuals. These manuals shall contain all information needed for engineering and maintenance staff to understand the design and equipment of the tunnel and to maintain, repair and replace all parts of the tunnel mechanical and electrical systems.

4. Plant maintenance, inspection and replacement schedules. These shall be based on the recommendations of the manufacturers and suppliers of the installed equipment and the available opportunities for access to the tunnel as agreed between the Concessionaire and VDOT.

### 1.21 Surveys

A. The Concessionaire shall preserve all survey control monuments established by VDOT and will notify VDOT as soon as it is known that a monument is in a position that will interfere with new construction or with Concessionaire activities. If a monument is disturbed, or cannot be preserved in place, the Concessionaire shall set the new monument in accordance with the Standard Documents in Section 3.5.2.

B. All surveying work throughout the term of the Agreement shall be performed by the Concessionaire in accordance with VDOT’s Survey Manual.

C. The Concessionaire is responsible for examination and verification of any data made available by VDOT.

D. The Concessionaire shall make available to VDOT hard copy and electronic files of all survey data, for existing and new conditions and infrastructure, which at a minimum include:
1. Survey control data;

2. Digital Terrain Model (DTM) and Construction Cross-Sections: Compatible to VDOT’s current DTM format;

3. Horizontal and Vertical Control for Bridges: Certified plats, field notes, coordinates, and computations will be furnished by the Concessionaire prior to the Concessionaire beginning work on these structures;

4. Pipes, Culverts, Ditches and Related Appurtenances: Existing, newly installed control and as built survey data for existing and new pipes, culverts and ditches which at a minimum include horizontal and vertical controls, type, size, materials and inlet/outlet control, catch basins and manhole and other related infrastructure; and

5. Road right of way: Existing, newly constructed/installed control and as-built survey data for right of way cross section showing roads, lanes, shoulders, access and egress ramps and connections, embankments, utilities, drainage and all infrastructure within the road right of way, and for areas where connecting roads and infrastructure are impacted by the Work. The survey interval shall not be farther than 100-foot intervals. The data prepared by the Concessionaire shall include coordinates, type, size, material and references.

E. The Project Right of Way shall be staked by the Concessionaire in areas where Work shall occur if no limited access fence is present prior to the start of the Project. Right of way stakes shall be placed at a minimum of 100-foot intervals on each side of the roadway or as directed by VDOT and the stakes shall be marked with both the station and offset back to centerline. All final boundary stakeouts shall be performed by the Concessionaire.

F. Final right of way monumentation will be performed by the Concessionaire in accordance with the following:

1. RM-1: The Concessionaire shall furnish and shall be responsible to install RM-1 right of way monuments in accordance with the Road and Bridge Standards.

2. RM-2: The Concessionaire shall furnish and shall be responsible to install RM-2 right of way monuments and optional locator posts, including the required caps, in accordance with the Road and Bridge Standards.
TECHNICAL REQUIREMENTS
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G. VDOT will determine a reasonable alternative form of permanent monumentation to be used if RM-1 or RM-2 monuments are unsuitable for marking the Right of Way at various locations.

H. The Concessionaire will indicate this alternative monument usage on the final As-Built plan in accordance with VDOT’s Survey Manual. Electronic data files along with paper sketches and drawings will be furnished by the Concessionaire. All electronic data files furnished by the Concessionaire will be in the format of VDOT’s current computer hardware and software.

I. Additional surveying work and supplemental layout work shall be performed by the Concessionaire as needed to successfully complete the work. The Concessionaire shall provide and protect construction benchmarks within the construction limits. Construction benchmarks shall be located not farther than 500 feet apart for the total length of the Project. Construction benchmarks that are disturbed during construction operations shall be reestablished by the Concessionaire. All drawings, field notes, and computations from such survey work performed by the Concessionaire shall be submitted to VDOT as defined in the Concessionaire’s Project Development Plans.

1.22 Security

1.22.1 General Requirements

A. Subject to the requirements of the Agreement, the Concessionaire shall adhere to the intent of VDOT policy on critical infrastructure information and sensitive security information (CII/SSI) to the extent such information is directly related to the Concessionaire’s performance of its obligations under the Agreement. The Concessionaire shall ensure that relevant CII/SSI is protected and not disclosed to unauthorized persons. The Concessionaire shall ensure that all personnel having access to CII/SSI for the Concessionaire and all subcontractors have completed the non-disclosure forms in Attachment 3E.

B. VDOT may request fingerprint-based criminal history background checks on contractors working on specific structures or functions.

C. The Concessionaire shall review with VDOT any information that should be designated as CII/SSI as specific design details become available. Any requirements for security review or other inspections will be mutually agreed to with VDOT.

1.23 Railway-Highway Provisions
If the Concessionaire’s Work requires hauling materials across the tracks of a railway, it shall make arrangements with the railway for any new crossing(s) required or the use of any existing crossing. Charges made by the railway company for the construction or use of new or existing crossings and their subsequent removal and for watchperson or flagger service at such crossings shall be reimbursed by the Concessionaire directly to the railway company under the terms of their own arrangements before Final Acceptance of the applicable Project Asset.

Work to be performed by the Concessionaire in construction on or over the railway right of way shall be performed at times and in a manner that will not interfere unnecessarily with the movement of trains or traffic on the railway track. The Concessionaire shall use care to avoid accidents, damage, or unnecessary delay or interference with the railway company’s trains or other property. If any interruption of railway traffic or fouling of railway track is required by the Concessionaire’s actions, it shall obtain prior written approval from the railway company.

The Concessionaire shall conduct operations that occur on or over the right of way of any railway company fully within the rules, regulations, and requirements of the railway company and in accordance with the requirements of any agreements made between VDOT and railway company that are made a part of the Agreement. The Concessionaire shall furnish the VDOT project manager a copy of all agreements between the railway and the Concessionaire. In compliance with Federal Railroad Administration regulations and as determined by the railway company, Concessionaire’s employees that require Roadway Worker Protection training shall be provided same at the Concessionaire’s expense.

A. Flagger or Watchperson Services: Flagger or watchperson services required by the railway company for the safety of railroad operations because of work being performed by the Concessionaire or incidental thereto will be provided by the railway company. The cost for such services will be borne by the Concessionaire.

No work shall be undertaken on or over the railway right of way until the watchpersons or flaggers are present and in authority at the Project site. The Concessionaire shall continuously prosecute the affected work to completion to minimize the need for flagger or watchperson services.

B. Approval of Construction Methods on Railway Right of Way: The Concessionaire shall submit to VDOT a plan of operations showing the design and method of proposed structural operations and shall provide VDOT a copy of railway company’s approval before performing any work on the railway company’s right of way unless otherwise indicated in the railroad agreement. The plan shall be clear and legible, and details shall be drawn to scale. The plan shall show, but not be limited to, the following:
1. Proximity of construction operations to tracks;
2. Depth of excavation with respect to tracks;
3. Description of structural units;
4. Vertical and horizontal clearances to be afforded the railroad during installation and upon completion of excavation;
5. Sheeting and bracing; and
6. Method, sequence and schedule of operations.

Any review of or comment on the plan of operations by VDOT shall not relieve the Concessionaire of any liability under the Agreement. The Concessionaire shall arrange the work so as not to interfere with the railway company’s operation except by agreement with the railway company.

C. Insurance: In addition to insurance or bonds required under the terms of the Agreement, the Concessionaire shall carry insurance covering operations affecting the property of the railway company as required by the any agreements between the Concessionaire and the railway company related to the Project. The original railroad protective liability insurance policy and certificate of insurance showing insurance carried by the Concessionaire and any Contractor shall be submitted to the railway company for approval and retention.

Neither the Concessionaire nor any Contractor shall begin any work affecting the railway company until the railway company has received the insurance.

Notice of any material change in or cancellation of the required policies shall be furnished VDOT and the railway company at least 30 days prior to the effective date of the change or cancellation. The insurance shall be of the following kinds and amounts:

1. Concessionaire’s public liability and property damage insurance: The Concessionaire shall furnish evidence to VDOT with respect to the operations to be performed that he carries regular Concessionaire’s public liability insurance. The insurance shall provide for a limit of at least the dollar value specified in the Agreement for all damages arising out of bodily injuries to or the death of one person, and subject to that limit for each person, a total limit of at least the dollar value specified in the Agreement for all damages arising out of bodily injuries to or death of two or more persons in any one occurrence, and regular Concessionaire’s property damage insurance providing for a limit of at least the dollar value
specified in the Agreement for all damages arising out of bodily injury to or destruction of property in any one occurrence, and subject to that limit per occurrence, a total or aggregate limit of at least the dollar value specified in the Agreement for all damages arising out of injury to or destruction of property during the policy period. The Concessionaire’s public liability and property damage insurance shall include explosion, collapse, and underground damage coverage. If the Concessionaire subcontracts any portion of the Work, it shall secure insurance protection in its own behalf under the Agreement’s public liability and property damage insurance policies to cover any liability imposed on it by Law for damages because of bodily injury to, or death of persons and injury to, or destruction of property as a result of work undertaken by the Contractor. In addition, the Concessionaire shall provide similar insurance protection for and on behalf of any Contractors to cover their operation by means of separate and individual Concessionaire’s public liability and property damage policies. As an alternative, the Concessionaire shall require each Contractor to provide such insurance in its own behalf.

2. Railroad protective insurance and public liability and property damage:
The policy furnished the railway company shall include coverage for contamination, pollution, explosion, collapse, and underground damage. The policy shall be of the type specified hereinafter and shall be expressed in standard language that may not be amended. No part may be omitted except as indicated hereinafter or by an endorsement that states an amendment or exclusion of some provision of the form in accordance with the provisions of a manual rule. The form of the endorsement shall be approved as may be required by the supervising authority of the State in which the policy is issued. Several parts of the requirements and stipulations specified or inferred herein may appear in the policy in such sequence as the company may elect.

a. For a policy issued by one company:

(NAME AND LOCATION OF INDEMNITY COMPANY), a _____________ Insurance Company, herein called the (Type of Company) Company, agrees with the insured named in the Declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the Declarations made by the named insured and subject to all of the terms of his policy.

For a policy issued by two companies:
(NAME AND LOCATION OF INDEMNITY COMPANY) and (NAME AND LOCATION OF INDEMNITY COMPANY), each a ________________ Insurance Company, herein called (Type of Company) the Company, severally agree with the insured named in the Declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the Declaration made by the named insured and subject to all of the terms of this policy, provided the named Indemnity Company shall be the insured with respect to Coverage __________ and no other and the named Insurance Company shall be the insurer with respect to Coverage __________ and no other.

b. Insuring agreements:

i. Coverages: Coverage A—Bodily injury liability: To pay on behalf of the insured all sums that the insured shall become legally obligated to pay as damages because of bodily injury, sickness, or disease including death at any time resulting there from (hereinafter called bodily injury) either i sustained by any person arising out of acts or omissions at the designated job site that are related to or are in connection with the work described in Item 6 of the Declarations; or ii sustained at the designated job site by the Concessionaire, any employee of the Concessionaire, any employee of the governmental authority specified in Item 5 of the Declarations, or any designated employee of the insured, whether or not arising out of such acts or omissions.

Coverage B—Property damage liability: To pay on behalf of the insured all sums the insured shall become legally obligated to pay as damages because of physical injury to or destruction of property, including loss of use of any property because of such injury or destruction (hereinafter called property damage) arising out of acts or omissions at the designated job site that are related to or are in connection with the work described in Item 6 of the Declarations.

Coverage C—Physical damage to property: To pay for direct and accidental loss of or damage to rolling stock and other contents, mechanical construction equipment, or motive power equipment (hereinafter called loss) arising out of acts or omissions at the designated job site that are related to or are in connection with the work described in Item 6 of the Declarations; provided such property is owned by the named
insured or is leased or entrusted to the named insured under a lease or trust agreement.

ii. Definitions: Insured includes the named insured and any executive officer, director, or stockholder thereof while acting within the scope of his duties as such.

Concessionaire means the Concessionaire designated in Item 4 of the Declarations and includes all Subcontractors of the Concessionaire but not the named insured.

Designated employee of the insured means i any supervisory employee of the insured at the job site; ii any employee of the insured while operating, attached to, or engaged on work trains or other railroad equipment at the job site that is assigned exclusively to the Concessionaire; or iii any employee of the insured not within i or ii who is specifically loaned or assigned to the work of the Concessionaire for prevention of accidents or protection of property, the cost of whose services is borne specifically by the Concessionaire or governmental authority.

Contract means any contract or agreement to carry a person or property for a consideration or any lease, trust, or interchange contract or agreement respecting motive power, rolling stock, or mechanical construction equipment.

iii. Defense and settlement supplementary payments: With respect to such insurance as is afforded by this policy under Coverages A and B, the Company shall defend any suit against the insured alleging such bodily injury or property damage and seeking damages that are payable under the terms of this policy, even if any of the allegations of the suit are groundless, false, or fraudulent. However, the Company may make such investigation and settlement of any claim or suit as it deems expedient.

In addition to the applicable limits of liability, the Company shall pay i all expenses incurred by the company, all costs taxed against the insured in any such suit, and all interest on the entire amount of any judgment therein that accrues after entry of the judgment and before the Company has paid or tendered or deposited in court that part of the judgment that does not exceed the limit of the Company’s liability thereon; ii premiums on appeal bonds required in any such suit and
premiums on bonds to release attachments for an amount not in excess of the applicable limit of liability of this policy, but without obligation to apply for or furnish any such bonds; iii expenses incurred by the insured for first aid to others that shall be imperative at the time of the occurrence; and iv all reasonable expenses, other than loss of earnings, incurred by the insured at the Company’s request.

iv. Policy period and territory: This policy applies only to occurrences and losses during the policy period and within the United States, its territories or possessions, or Canada.

c. Exclusions: This policy does not apply to the following:

i. liability assumed by the insured under any contract or agreement except a contract as defined herein

ii. bodily injury or property damage caused intentionally by or at the direction of the insured

iii. bodily injury, property damage, or loss that occurs after notification to the named insured of the acceptance of the work by the governmental authority, other than bodily injury, property damage, or loss resulting from the existence or removal of tools, uninstalled equipment, and abandoned or unused materials

iv. under Coverage Ai, B, and C, to bodily injury, property damage, or loss, the sole proximate cause of which is an act or omission of any insured

v. under Coverage A, to any obligation for which the insured or any carrier as his insurer may be held liable under any workers’ compensation, employment compensation, or disability benefits Law or under any similar Law; provided that the Federal Employer’s Liability Act, U.S. Code (1946) Title 45, Sections 51-60, as amended, shall for the purpose of this insurance be deemed not to be any similar Law

vi. under Coverage B, to injury to or destruction of property owned by the named insured or leased or entrusted to the named insured under a lease or trust agreement
vii. under any liability coverage, to injury, sickness, disease, death, or destruction: i with respect to which an insured under the policy is also an insured under a nuclear energy liability policy issued by the Nuclear Energy Liability Insurance Association, Mutual Atomic Energy Liability Underwriters, or Nuclear Insurance Association of Canada or would be an insured under any such policy but for its termination upon exhaustion of its limit of liability; or ii resulting from the hazardous properties of nuclear material and with respect to which any person or organization is required to maintain financial protection pursuant to the Atomic Energy Act of 1954 or any Law amendatory thereof or the insured is (or had this policy not been issued would be) entitled to indemnity from the United States or any agency thereof under any agreement entered into by the United States, or any agency thereof, with any person or organization.

viii. under any Medical Payments Coverage or any Supplementary Payments provision relating to immediate medical or surgical relief or to expenses incurred with respect to bodily injury, sickness, disease, or death resulting from the hazardous properties of nuclear material and arising out of the operation of a nuclear facility by any person or organization.

ix. under any liability coverage, to injury, sickness, disease, death, or destruction resulting from the hazardous properties of nuclear material if: i the nuclear material is at any nuclear facility owned or operated by or on behalf of an insured or has been discharged or dispersed there from; ii the nuclear material is contained in spent fuel or waste at any time possessed, handled, used, processed, stored, transported, or disposed of by or on behalf of an insured; or iii the injury, sickness, disease, death, or destruction arises out of the furnishing by an insured of services, materials, or parts for equipment in connection with the planning, construction, maintenance, operation, or use of any nuclear facility; if such facility is located in the United States, its territories or possessions, or Canada, this exclusion applies only to injury to or destruction of property at such nuclear facility.

x. under Coverage C, to loss attributable to nuclear reaction, nuclear radiation, or radioactive contamination or to any act or condition incident to any of the foregoing.
As used in exclusions vii, viii, and ix, the following definitions apply: Hazardous properties include radioactive, toxic, or explosive properties. Nuclear material means source material, special nuclear material, or byproduct material. Source material, special nuclear material, and byproduct material have the meanings given them in the Atomic Energy Act of 1954 or in any Law amendatory thereof. Spent fuel means any fuel element or fuel component (solid or liquid) that has been used or exposed to radiation in a nuclear reaction. Disposable material means material containing byproduct material and resulting from the operation by any person or organization of any nuclear facility included in the definition of nuclear facility under i or ii below. Nuclear facility means

i. any nuclear reactor

ii. any equipment or device designed or used for separating the isotopes of uranium or plutonium; processing or utilizing spent fuel; or handling, processing, or packaging waste

iii. any equipment or device designed or used for the processing, fabricating, or alloying of special nuclear material if at any time the total amount of such material in the custody of the insured at the premises where such equipment or device is located consists of or contains more than 25 grams of plutonium or uranium 233 (or any combination thereof) or more than 250 grams of uranium 235

iv. any structure, basin, excavation, premises, or place prepared or used for the storage or disposal of waste (includes the site on which any of the foregoing is located, all operation conducted on such site, and all premises used for such operations) Nuclear reactor means any apparatus designed or used to sustain nuclear fission in a self-supporting chain reaction or to contain a critical mass of fissionable material. With respect to injury to or destruction of property, injury or destruction includes all forms of radioactive contamination of property.

d. Conditions: The following conditions, except conditions iii through xii, apply to all coverages. Conditions iii through xii apply only to the coverage noted there under.

i. Premium: The premium bases and rates for the hazards described in the Declarations are stated therein. Premium
bases and rates for hazards not so described are those applicable in accordance with the requirements of the manuals used by the company. The term contract cost means the total cost of all work described in Item 6 of the Declaration. The term rental cost means the total cost to the Concessionaire for rental or work trains or other railroad equipment, including the remuneration of all employees of the insured while operating, attached to, or engaged thereon. The advance premium stated in the Declarations is an estimated premium only. Upon termination of this policy, the earned premium shall be computed in accordance with the Company's rules, rates, rating plans, premiums, and minimum premiums applicable to this insurance. If the earned premium thus computed exceeds the estimated advance premium paid, the Company shall look to the Concessionaire specified in the Declarations for any such excess. If less, the Company shall return to the Concessionaire the unearned portion paid. In no event shall payment or premium be an obligation of the named insured.

ii. Inspection: The named insured shall make available to the Company records of information relating to the subject matter of this insurance. The Company shall be permitted to inspect all operations in connection with the work described in Item 6 of the Declarations.

iii. Limits of liability, Coverage A: The limit of bodily injury liability stated in the Declarations as applicable to "each person" is the limit of the Company’s liability for all damages (including damages for care and loss of services) arising out of bodily injury sustained by one person as the result of any one occurrence. The limit of such liability stated in the Declarations as applicable to "each occurrence" is (subject to the provision respecting each person) the total limit of the Company’s liability for all such damage arising out of bodily injury sustained by two or more persons as the result of any one occurrence.

iv. Limits of liability, Coverages B and C: The limit of liability under Coverages B and C stated in the Declarations as applicable to "each occurrence" is the total limit of the Company’s liability for all damages and all loss under Coverages B and C combined arising out of physical injury to, destruction of, or loss of all property of one or more persons or organizations, including the loss or use of any property
attributable to such injury or destruction under Coverage B, as the result of any one occurrence. Subject to the provision respecting "each occurrence", the limit of liability under Coverages B and C stated in the declaration as "aggregate" is the total limit of the Company’s liability for all damages and all loss under Coverages B and C combined arising out of physical injury to, destruction of, or loss of property, including the loss or use of any property attributable to such injury or destruction under Coverage B.

Under Coverage C, the limit of the Company’s liability for loss shall not exceed the actual cash value of the property, or if the loss is a part thereof, the actual cash value of such part, at time of loss, nor what it would then cost to repair or replace the property of such part thereof with other of like kind and quality.

v. Severability of interests, Coverages A and B: The term the insured is used severally and not collectively. However, inclusion herein of more than one insured shall not operate to increase the limits of the Company’s liability.

vi. Notice: In the event of an occurrence or loss, written notice containing particulars sufficient to identify the insured and also reasonably obtainable information with respect to the time, place, and circumstances thereof and the names and addresses of the injured and of able witnesses shall be given by or for the insured to the company or any of its authorized agents as soon as is practicable. If a claim is made or a suit is brought against the insured, he shall immediately forward to the Company every demand, notice, summons, or other process received by him or his representative.

vii. Assistance and cooperation of the insured, Coverages A and B: The insured shall cooperate with the Company and upon the Company’s request attend hearings and trials and assist in making settlements, securing and giving evidence, obtaining the attendance of witnesses, and conducting suits. Except at his own cost, the insured shall not voluntarily make any payment, assume any obligations, or incur any expense other than for first aid to others that shall be imperative at the time of an accident.
viii. Action against Company, Coverages A and B: No action shall lie against the Company unless as a condition precedent thereto the insured shall have fully complied with all the terms of this policy, nor until the amount of the insured’s obligation to pay shall have been finally determined either by judgment against the insured after actual trial or by written agreement of the insured, the claimant, and the Company. Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this policy to the extent of the insurance afforded by this policy. No person or organization shall have any right under this policy to join the Company as a part to any action against the insured to determine the insured’s liability. Bankruptcy or insolvency of the insured or of the insured’s estate shall not relieve the Company of any of its obligations hereunder.

ix. Action against Company, Coverage C: No action shall lie against the Company unless as a condition precedent thereto there shall have been full compliance with all the terms of this policy nor until 30 days after proof of loss is filed and the amount of loss is determined as provided in this policy.

x. Insured’s duties in event of loss, Coverage C: In the event of loss, the insured shall protect the property, whether or not the loss is covered by this policy. Any further loss attributable to the insured’s failure to protect shall not be recoverable under this policy. Reasonable expenses incurred in affording such protection shall be deemed incurred at the company’s request. The insured shall also file with the Company, as soon as practicable after loss, his sworn proof of loss in such form and including such information as the Company may reasonably require and shall, upon the Company’s request, exhibit the damaged property.

xi. Appraisal, Coverage C: If the insured and the Company fail to agree as to the amount of loss, either may demand an appraisal of the loss within 60 days after the proof of loss is filed. In such event the insured and the Company shall each select a competent appraiser, and the appraisers shall select a competent and disinterested umpire. An award in writing or any two shall determine the amount of loss. The insured and the Company shall each pay his chosen appraiser and shall bear
equally the other expenses of the appraisal and umpire. The Company shall not be held to have waived any of its rights by any act relating to appraisal.

xii. Payment of loss, Coverage C: The Company may pay for the loss in money, but there shall be no abandonment of the damaged property to the Company.

xiii. No benefit to bailee coverage: The insurance afforded by this policy shall not enure directly or indirectly to the benefit of any carrier or bailee (other than the named insured) liable for loss to the property.

xiv. Subrogation: In the event of any payment under this policy, the Company shall be subrogated to all of the insured’s rights of recovery therefore against any person or organization. The insured shall execute and deliver instruments and papers and do whatever else is necessary to secure such rights. The insured shall do nothing after loss to prejudice such rights.

xv. Application of insurance: The insurance afforded by this policy is primary insurance. If the insured has other primary insurance against a loss covered by this policy, the Company shall not be liable under the policy for a greater proportion of such loss than the applicable limit of liability stated in the Contract bears to the total applicable limit of all valid and equitable insurance against such loss.

xvi. 3-year policy: A policy period of 3 years is comprised of three consecutive annual periods. Computation and adjustment of earned premium shall be made at the end of each annual period. Aggregate limits of liability as stated in this policy shall apply separately to each annual period.

xvii. Changes: Notice to any agent of knowledge possessed by any agent or by any other person shall not affect a waiver or a change in any part of this policy or stop the Company from asserting any right under the terms except by endorsement issued to form a part of this policy signed by *_______________ provided, however, changes may be made in the written portion of the declaration by *_______________ when initialed by such *_______________ or by endorsement issued to form a part of this policy signed by such
xviii. Assignment: Assignment of interest under this policy shall not bind the Company until its consent is endorsed hereon.

xix. Cancellation: This policy may be cancelled by the named insured by mailing to the Company written notice stating when the cancellation shall become effective. This policy may be cancelled by the Company by mailing to the named insured, Concessionaire, and governmental authority at the respective addresses shown in this policy written notice stating when such cancellation shall be effective (not less than 30 days thereafter). The mailing of notice shall be sufficient proof of notice. The effective date and hour of cancellation stated in the notice shall become the end of the policy period. Delivery of such written notice either by the named insured or the Company shall be equivalent to mailing. If the named insured cancels, the earned premium shall be computed in accordance with the customary short rate table and procedure. If the Company cancels, the earned premium shall be computed pro rata. The premium may be adjusted either at the time cancellation is effected or as soon as practicable after the cancellation becomes effective, but payment or tender of unearned premium is not a condition of cancellation.

xx. Declarations: By acceptance of this policy, the named insured agrees that such statements in the Declarations as are made by him are his agreements and representations, that his policy is issued in reliance on the truth of such representations, and that this policy embodies all agreements existing between himself and the Company or any of its agents relating to this insurance.

e. For a policy issued by one company:

In witness whereof, the ________________ Indemnity Company has caused this policy to be signed by its president and a secretary at ________________ and countersigned on the Declarations page by a duly authorized agent of the Company.

(Facsimile of Signature)  (Facsimile of Signature)
Secretary  President

For a policy issued by two companies:

Section 1  Design and Construction Requirements  April 30, 2010
- 152 -  Revised January 7, 2011
Revised March 29, 2011
Revised August 26, 2011
Revised October 24, 2011
In witness whereof, the _____________________ Indemnity Company has caused this policy with respect to Coverages __________________ and such other parts of the policy as are applicable thereto to be signed by its president and a secretary at __________________ and countersigned on the Declarations page by a duly authorized agent of the Company.

(Facsimile of Signature)  (Facsimile of Signature)
Secretary  President

D. Submitting Copies of Insurance Policies: Prior to beginning construction operations on or over the railway right of way, the Concessionaire shall submit to VDOT evidence of the railway company’s approval and a copy of the required insurance policies.
DOWNTOWN TUNNEL/MIDTOWN TUNNEL/MLK EXTENSION PROJECT

The Technical Requirements

Comprehensive Agreement Exhibit C

Section 2

Public Information and Communications
2 Public Information and Communications

2.1 Public Information

2.1.1 General Requirements

The Concessionaire in collaboration with VDOT shall develop the required process and procedures for media relations and public information in the form of Public Information and Communications, which will be consistent with the Agreement. These processes and procedures will acknowledge that there are differing responsibilities for both parties depending on the status of the Project.

2.1.2 Interface and Liaison with VDOT

A. Management protocols shall be developed between the Concessionaire’s project communication team and VDOT’s Project Manager. These protocols shall detail:

1. A regime of regular reporting to VDOT on marketing and communication activities, current and outstanding community issues, and recent media activity.

2. Media protocols, as established, to provide clarity of responsibility in relation to media comment on particular aspects of the Project.

3. Stakeholder relations protocols, assigning responsibility for briefing and information to stakeholders on Project progress and milestones.

4. Requirements in relation to VDOT’s review and comment on Project marketing, communication, and public outreach material.

5. Processes for managing communication surrounding emergency management and recovery operations.

6. Recognition that each party has a brand that it needs to promote and defend.

B. The Concessionaire in collaboration with VDOT’s Project Manager will determine which party leads all meetings related to the Project.

C. Meetings and public interface required by Federal and State Law (e.g., Design Public Hearing) will be conducted in accordance with the current version of VDOT’s Policy Manual for Public Participation in Transportation Projects. The Concessionaire will conduct additional meetings, public interface and marketing activities in accordance with the Communication Plan. These endeavors fall
outside the purpose of the Policy Manual and accordingly will not need to follow the guidelines established.

D. The Concessionaire shall collaborate with VDOT in the development of all communications and marketing strategies to ensure they are consistent with both parties’ values, needs, and goals. The Concessionaire shall provide VDOT with advance copies of communications materials for review and comment prior to dissemination.

2.1.3 Project Communication Team

A. The Concessionaire shall establish a Project communication team through which all communication and public outreach activities on the Project on behalf of the Concessionaire will be coordinated.

B. The Project communication team will be established and coordinated by the Concessionaire. It may include:

1. A Public Affairs Manager who shall have responsibility for coordinating delivery of the Public Information Plan. The Public Affairs Manager will manage the relationship with VDOT and reporting on all communication and outreach activity.

2. A Public Information Manager and adequate support staff and/or consultants, responsible for community outreach and information activities during the performance of the Design-Build Work. The Public Information Manager will report to the Design-Build Contractor’s functional management but will operate as a member of the Project communication team.

3. The Project communication team will develop and agree upon team protocols for communication between team members, incorporating measures related to notification and approval timeframes, media interface, and preparation of Project communication materials.

2.1.4 Construction Period Public Information and Involvement

A. The Concessionaire’s and VDOT’s communications team shall maintain an open dialogue with the stakeholders and communities immediately surrounding the Project with the objective of building a long-term relationship based on trust and respect. The Concessionaire will work with the communities to identify specific concerns and strategies for mitigation.
B. The Concessionaire shall prepare and implement Project Development Plans (PDPs) in accordance with Section 3.3.

2.1.5 Pre-Operations and Operations – Public Engagement and Awareness

A. The Concessionaire shall ensure that motorists are educated about the features and benefits of the Project, so that they can make an informed choice about their use of the tolled facility once open to traffic.

B. The Concessionaire shall develop a public engagement and awareness program to fit within the context of the broader Public Information and Communications Plan for the Project. It shall address but will not be limited to:

1. Education about congestion pricing.

2. Information on requirements for using tolled facilities, including transponder requirements.

3. Plans for the opening of the Project to traffic and communications that will facilitate smooth ongoing operations.

4. Interface with E-Z Pass marketing and communications, to facilitate distribution of transponders to motorists who intend to use the tolled facilities.

5. Education about driver information systems in use on the tolling pricing schemes, so motorists understand on-road sources of information that will facilitate choice and Lane Control Signals (LCS) of the Lane Use Management System (LUMS).

6. Provision of information to motorists and stakeholders to facilitate the MOT during ongoing maintenance activities. This shall include:

   a. Packaging of all MOT information, such as anticipated delays and lane closures, for provision to the Project Communication Team and to VDOT on a regular basis, to facilitate communication to the media, stakeholders, and the broader community.

   b. Communication with property owners in direct impact areas.

7. Communication with elected officials and other key stakeholders shall be managed collaboratively by Concessionaire and VDOT. Public officials and other key stakeholders may want to have direct contact with the Concessionaire and may do so, so long as VDOT is aware of the invitation.
and the nature of conversations to be held. A senior member of VDOT’s project team may be invited to accompany the Concessionaire to engagements of this nature. The Concessionaire does not need to communicate any activity to VDOT with elected officials or any person or body if the focus of the communication is solely a private corporate communication, including those directly related to the Concessionaire’s activities related to the Project.

8. Coordination with local agencies.

9. Notification program to inform motorists and the broader community about expected traffic changes/delays.

2.2 Media Relations

2.2.1 Media Outreach

A. While there will be some overlap between the parties on some communication and outreach activities during the performance of the Design-Build Work, VDOT will serve as the sole source to the news media and community stakeholders on specific lane closures, delays, detours, and other construction impacts associated with the Project during the performance of the Design-Build Work. The Concessionaire and VDOT will ensure close coordination with each other on media outreach activities, issues, and responses, and will promote consistency with the Public Information and Communications Plan.

B. The Concessionaire shall:

1. Develop and provide to VDOT for review and approval a set of media protocols governing responsibilities and reporting in relation to contact with the media, including guidelines for information sharing, policies to promote consistent messages, and procedures specific to managing emergencies and incidents.

2. Develop and provide to VDOT for review and comment a set of media protocols within the Project team.

3. Proactively build and maintain relationships, in collaboration with VDOT, with local media.

4. Provide timely response to media inquiries and keep VDOT informed of media inquiries regarding the Project and the nature of responses that are documented as mutually agreed.
5. Provide relevant Project information to the media in a timely fashion.

6. Monitor all media coverage of the Project.

7. Provide copies of all press releases or other media materials to VDOT in advance of distribution.

2.3 Project Marketing

2.3.1 Project Branding

All public communication on the Project will be undertaken within the framework of a uniform project ‘brand’ to ensure consistency of the marketing and communication across all Project phases. The branding will be developed by the Concessionaire and is subject to VDOT’s approval, which shall not be unreasonably withheld.

2.3.2 Market Research and Analysis

A. Communication, marketing, and public outreach activities will be designed to respond to the issues, attitudes, and attributes of the communities and market segments relevant to the Project.

B. The Concessionaire shall:

1. Conduct market research as required to guide marketing and communication activities.

2. Establish project communication benchmarks and measure and report on community awareness, attitudes, and satisfaction towards the Project.

2.4 Communities and Public Outreach

2.4.1 Integrated Public Information and Communications Plan

A. The Concessionaire shall deliver an integrated Public Information and Communications Plan that:

1. Provides an effective framework for communication between the Concessionaire and stakeholders.

2. Effectively engages the community in the design, construction, and operation of the Project to minimize negative impacts and maximize positive outcomes.
3. Builds a strong and enduring relationship with stakeholders and the community within the toll facilities catchments over the Term.

4. Identifies risks and risk management associated with the Project.

5. Develops a strong and enduring brand relationship between the community, toll facility drivers, and the owners and operators of the Project.

6. Maximizes public awareness of the features and benefits of the tolled facilities.

7. Ensures the public understands how best to use the tolled facilities and the requirements for travel on the system, including congestion pricing and paying tolls, obtaining and using transponders, and user eligibility requirements.

B. The Public Information and Communications Plan, will build on the protocol, plans and efforts agreed during the Interim Agreement phase. These shall be consistent with VDOT’s goals for the Project, will be presented to VDOT for review and comment and will form the basis for all communication activities during the design and construction of the Project, as well as during the pre-operational and operational period.

C. The plan shall provide a detailed outline of communication tools and strategies to be employed during each phase of the Project development, delivery, and operation, including the matters outlined in the sections below.

D. The plan shall contain a crisis communications plan and procedures for coordination with VDOT and responsiveness to the media.

2.4.2 Stakeholder Outreach and Information

A. The Concessionaire shall develop, deliver, and operate the Project in a manner consistent with building and maintaining effective working relationships with all stakeholders in the Project’s success.

B. The Concessionaire shall:

1. Develop and maintain a comprehensive stakeholder database to track and manage stakeholder communication that will be shared with VDOT’s CRM system.

2. Develop and maintain the Project web site.
3. Provide web site copy to VDOT for review and input prior to posting. The web site shall at a minimum contain a graphical Project overview, contact information, plan of work for the coming month, overall Project schedule, a frequently asked questions area, and updated Project photos. The web site shall be updated as necessary throughout the duration of the Project.

4. Provide a point of contact and phone number for the public to ask questions and share concerns during the Project.

5. Develop, in collaboration with VDOT, a proactive program of stakeholder engagements to brief local stakeholders on the Project’s progress, features and benefits.

6. Develop tailored marketing and communication material for relevant stakeholder groups.

7. Establish ongoing mechanisms for stakeholder information and input during the Project’s operational phase, including communications surrounding enforcement technologies and strategies.

8. Establish partnerships with local groups and organizations where there is mutual benefit in supporting the Project.
The Technical Requirements

Comprehensive Agreement Exhibit C

Section 3

Project Management
3 Project Management

3.1 General

A. The Concessionaire shall establish and maintain an organization that effectively manages all elements of the Project. This project management effort will be defined and guided by the Project Development Plans (PDPs), as described in Section 3.3.

3.2 Project Administration

3.2.1 General Requirements

A. The Concessionaire's management approach shall provide all components of an effective and efficient management system, including communication and reporting; documentation of the Work; supervision of Work personnel and activities; all tools, facilities, and materials; environmental protection and mitigation; safety of Work personnel; and any other management elements needed to produce and document a high-quality, safe, efficient, and operable project that complies with Good Industry Practice.

B. The Concessionaire’s Contractors shall prequalify in accordance with VDOT’s Contractor Prequalification Program.

C. The Concessionaire shall note and comply with the requirements of the eVA vendor system throughout the Term.

3.2.2 Project Workers

A. Each party shall notify the other party, in writing, if they believe any person employed by VDOT or the Concessionaire, or any Contractor:

1. Is not performing his or her work in a proper or skillful manner;

2. Is intemperate or disorderly; or

3. Is acting in an unsafe manner.

The party receiving the notice will immediately investigate the specifics of the notification and provide a response to the party initiating the notification and provide a response to the party initiating the notification, within 5 days, detailing a plan of action to resolve the written concerns. If the employees’ actions create an unsafe environment for the Concessionaire’s workers, VDOT personnel or
travelling public, the Concessionaire will immediately stop the operations to resolve safety issues in accordance with the Agreement.

### 3.2.3 Quality Management System


B. Where applicable, the QMSP shall be consistent with the relevant requirements of the current version of ISO 9001:2008.

C. The QMSP shall describe the system, policies, and procedures that address the Work required delivering the Project and providing documented evidence that the Work was performed in accordance with the Agreement.

D. The Concessionaire’s QMSP shall include a Quality Management Plan that describes the roles of the Design-Build Contractor and the O&M Contractor in the implementation of the pertinent sections of the Concessionaire’s quality management system for the Work.

E. The Concessionaire’s Contractors shall adhere to the QMSP.

F. The Concessionaire will regularly audit and report to VDOT its compliance with all PDPs as part of their quality systems as described in Section 3.3 and Attachment 3A.

G. The Concessionaire and its Contractors will ensure that their quality records are freely and readily available to VDOT in order to enable them to monitor and establish whether the Concessionaire’s obligations under the Agreement are met.

H. The Concessionaire may use VDOT’s resources for the following construction quality control activities where VDOT routinely provides these services:

1. Offsite programmatic inspection, including supplier plant acceptance inspections; and

2. Offsite programmatic testing, including supplier plant acceptance testing.
3.2.4 Submittals

A. The Concessionaire shall coordinate, deliver, and process all submittals to VDOT as required by the Agreement. VDOT shall follow the Design Review Process as outlined in Attachment 3E.

B. The Concessionaire shall issue to VDOT and other appropriate parties electronic copies of all correspondence, minutes of meetings, and other external documents reflecting or constituting any and all communications with:

1. Governmental Authorities;
2. Stakeholders directly impacted by this Project including right of way issues;
3. Utilities; and
4. Railroads.

C. The Concessionaire shall provide design and construction submittals to VDOT as both hard-copy and electronic files. These documents will be deemed “received” by VDOT (thereby triggering the applicable timeframe for review) on submission of either the electronic files or hard copy of the submittal.

D. Design submittals and RFC Drawings will be submitted in .pdf format and 5 hard paper copies.

E. VDOT may request the CADD .dgn files at interim design submittals to facilitate review

F. Deleted

G. The Concessionaire will transfer all electronic document submittals into VDOT’s Electronic Document Management System (EDMS) or through a secure website maintained by the Concessionaire. All files shall be well organized and easy to locate in accordance with Section 3.2.8 (Document Management System). The file transfer shall be conducted as follows:

1. The Concessionaire shall not include any files as attachments to e-mail messages that are greater than 10 MB.
2. E-mail may be used to notify VDOT of the availability of the document files, and if a file transfer protocol or SharePoint website or other type of approved electronic data storage and retrieval system is used, the e-mail must include a link to the document file to facilitate access and download.

H. Deleted

I. Deleted

J. Deleted

K. RFC documentation shall include all drawings, specifications, revisions thereto, and any other items necessary to construct the Work. All RFC documents shall be submitted to VDOT for approval and concurrence by the VDOT Chief Engineer. The Concessionaire shall ensure that the RFC documentation is sealed by a Professional Engineer licensed by the Commonwealth of Virginia.

L. The Concessionaire shall identify submittals by the complete State project and job designation numbers.

M. Where public safety is a concern, a Professional Engineer, holding a valid license to practice engineering in the Commonwealth, shall certify submittals for but not limited to falsework supporting a bridge superstructure; concrete structures and pre-stressed concrete members; lighting, signal, and pedestrian poles; sign structures; breakaway support systems; anchor bolts; and foundations.

N. Deleted

O. Deleted

3.2.5 Plans and Working Drawings

A. The Concessionaire shall furnish all plans and drawings showing such details as are necessary to give a comprehensive understanding of the Work specified. Except as otherwise shown on the plans, dimensions shown on the plans are measured in the respective horizontal or vertical planes. Dimensions that are affected by gradients or vertical curvatures shall be adjusted as necessary to accommodate actual field conditions and shall be specifically denoted on the working drawings.

B. The Concessionaire shall furnish working drawings and maintain a set for VDOT in accordance with the Agreement.

3.2.6 Accommodations for VDOT Staff during Performance of the Design-Build Work
A. The Project office complex (Command Center) shall include the following:

1. Minimum of 150 square feet per person. (Anticipate 22 Personnel at Project Peak)

2. The Concessionaire will make every effort to utilize the existing Pinners Point facility (152 Tunnel Facility Drive, Portsmouth, VA 23707) as the Command Center for the Project. If different, the Physical Location will be within the O&M Boundaries as identified in the Turnover Plan. Final location shall be approved by the VDOT Project Manager. Any proposed locations outside of the O&M Boundaries shall also be reviewed and approved by the VDOT Project Manager.

3. Minimum of 5 – 12’ x 12’ hard offices

4. Minimum of 17 – 8’ x 8’ cubicles or work areas with work surface, cabinets and drawers, and other standard items in office cubicles.

5. Standard office furniture (desk 60”x 34”, chairs with rolling casters, rolling pad, stapler, tape dispenser)

6. 1 – 4 drawer metal fire protection file cabinet per person

7. 1 – 4 shelf bookcase per person

8. 1 dry erase board per 10 people

9. 1 Computer or laptop per person/workstation. Each computer or laptop shall have minimum of 4 GB RAM not to exceed $4,000 each. All computers or laptops shall have color monitors with minimum diagonals of 17” and mouse/keyboards will be supplied. All computers or laptops shall include, the latest software version of Microsoft Office, Adobe Acrobat Reader and Writer, Adobe Photoshop Elements and Norton Antivirus or acceptable antivirus protection.

10. All computer and copying equipment shall have networking and internet capabilities. All power cords, cabling and hardware is to be supplied and connected so as to provide interconnection between the computer or laptop and accessories, as well as connection to the internet.

11. Provide infrastructure and access capabilities to the internet
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12. 1 black/white printer not to exceed $1,000 each per 4 persons. Printer shall have capabilities to print on 8.5” x 11”, 8.5” x 14” and 11” x 17” paper. Printer shall have a minimum memory of 128 MB and a printer speed of at least 52 ppm.

13. 1 color printer not to exceed $2,000 per 10 persons. Printer shall have capabilities to print on 8.5” x 11”, 8.5” x 14” and 11” x 17” paper. Printer shall have a minimum memory of 160 MB and a printer speed of at least 27 ppm for black and white pages and color pages.

14. Special software (i.e. Microstation V8, Geopack, Autocad, Primavera V6, Microsoft Project, ArcGIS, Highway Capacity Software and CORSIM) for 4 computers. All cost for special software licensing is to be borne by the Concessionaire.

15. 1 microwave oven minimum of 1000 watts per 20 persons

16. 1 full size refrigerator per 20 persons

17. 1 wastebasket per person

18. 1 first aid kit per 5 persons

19. 1 copy machine per 10 persons with minimum features: capable of coping 8 ½” by 11” up to 11”x 17”, sorter, automatic feed and paper selection, magnification and reduction, service contract for maintenance and drum toner replacement

20. 1 scanner/plotter/fax machine

21. Smoke detectors and fire extinguishers in accordance with local codes

22. Installation and payment of phone service available for each cubicle with answering and message services

23. Installation and payment of internet service available for each computer

24. Installation and payment of utilities to operate all field office functions

25. Minimum 22 Parking spaces readily adjacent to the office structure

26. Minimum 12’ x 16’ conference room with conference table and conference chairs to seat 10 people. Conference room to be supplied with a phone suitable for conducting conference calls.
27. Plan Rack for 24” x 36” drawings with 12 plan clamps
28. 4 Plan and Drafting Tables (30” x 96”) with adjustable stools
29. 10’ x 10’ Receptionist area with counter style work area
30. Water Coolers or continual supply of bottled adequate for 22 people
31. Office structure shall be watertight and have a robust HVAC system to maintain a constant temperature of 72 degrees Fahrenheit in all areas of the office throughout all seasonal effects.
32. Adequate lavatory facilities to account for 40 personnel both Men and Women
33. All utility (electric, gas, water, sewer, telecommunications, phone) feeds, connections, disconnections and bill payments shall be borne by concessionaire.
34. 15’ x 10’ Kitchen area with a sink and dish washing capabilities. Two lunch style tables and chairs to seat a total of 8 people
35. 10’x10’ Storage room with a door having a locking assembly. 10 spare keys shall be provided to the VDOT project manager.
36. Adequate number of windows to allow for natural light entrance per architectural standards. Windows shall have screens and the capability to open to allow the entrance of outside air. Windows shall also have locking assemblies.
37. Adequate overhead lighting in all parts of the office per Architectural standards.
38. Exterior doors shall be equipped with adequate locking assemblies. 40 spare keys shall be provided to the VDOT project manager
39. 1 – Paper shredder per 20 people
40. Bi-weekly Janitorial Services
41. Exterior Way Finding and Project Office Identification Signage
B. The Project office complex (Command Center) shall be available from 60 days after the later of Financial Close or any LNTP or notice to proceed issued pursuant to Section 8.02 or 8.03 of the Agreement to 120 days after Final Completion.

3.2.7 Documentation Management System

A. The Concessionaire shall establish and maintain an Electronic Document Management System (EDMS) to store and record all relevant documents generated on the Project, including those records required under Applicable Law.

B. In the provision of an EDMS, the Concessionaire shall:

1. Use data systems, standards, and procedures with consistent naming and searching protocols;

2. Ensure document retention for any minimum statutory period(s);

3. Provide a secure EDMS, such that only authorized users have access and that it is protected from theft, damage, unauthorized or malicious use;

4. Provide a mechanism, mutually agreed by VDOT and the Concessionaire, for the electronic transfer of documents including metadata in standard business file format for uploading into the EDMS employed by VDOT; and

5. Provide VDOT with procedures for accessing all relevant documents generated under the Agreement. All electronic information submitted to VDOT shall be searchable, where possible, and legible.

C. In the relevant PDP, the Concessionaire shall describe:

1. Methods by which all documents issued and received by the Concessionaire shall be uniquely coded and retrievable in a user-friendly format;

2. The routing, filing, control, and retrieval methods for all documents; and

3. Methods to facilitate data sharing, including procedures for accessing all documents.

3.2.8 Project Meetings
A. The project manager(s) and other pertinent representatives of the parties shall meet within 10 days after the Financial Closing Date to discuss issues affecting the administration of the Work and to implement the necessary procedures, including those relating to submittals, to facilitate the ability of the parties to perform their obligations under the Agreement.

B. Within 14 days after issuance of the Design Work Notice to Proceed, the parties and their respective representatives shall conduct a pre-construction meeting to discuss the Concessionaire’s planned construction operations. At the pre-construction meeting, the parties shall discuss, among other things, the sequence of the Work, scheduling, constructability issues, coordination with Governmental Authorities and Utilities, and maintenance of traffic.

C. Following issuance of the Design Work Notice to Proceed, the Concessionaire shall hold monthly progress meetings with VDOT. During such meetings, progress during the prior month, Work to be undertaken during the next month, and encountered or anticipated issues shall be reviewed, and the Concessionaire shall collect information from any Contractors responsible for Work completed during the specified duration and Work scheduled during the upcoming reporting duration. These meetings shall be attended by the Concessionaire Representative and other personnel as requested by VDOT, including relevant Contractors. The Concessionaire shall be responsible for preparing, maintaining and distributing minutes of the meetings to all attendees for review. The meeting minutes shall be provided to VDOT within three days after the monthly progress meeting.

D. As part of, and in conjunction with, the monthly meetings required by Section 3.2.8.C above, the Concessionaire shall provide VDOT with any proposed update of the Baseline Schedule for VDOT’s review, and, if required by the Technical Requirements, approval, and a progress narrative that describes, at a minimum, the overall progress for the preceding month, a critical path analysis, a discussion of problems encountered and proposed solutions thereof, work calendars, constraints, delays experienced and any pending Time Impact Analysis (TIA), documentation of any logic changes and duration changes. The monthly progress narrative shall also include the following:

1. A statement by the Concessionaire that the schedule submitted is the Project Schedule;

3.2.9 Source of Supply and Quality Requirements

A. The QMSP shall describe procedures for ensuring that materials used throughout the Work conform to the requirements of the Agreement. Unless otherwise specified in the Technical Requirements, materials, equipment, and components that are to be incorporated into the finished Work shall be new. The
Concessionaire shall file a statement of the known origin, composition, and manufacture of all materials to be used in the Work, including optional or alternate items as part of the AFC Documents. The Concessionaire’s statement shall be electronically submitted to VDOT by use of VDOT’s Form C-25 after satisfying Concessionaire’s QMSP.

B. All materials or equipment must conform to the requirements of the Agreement, and shall be furnished with valid test data required to document the quality of the material or equipment at least two weeks prior to delivery. The Concessionaire shall change the source of supply and furnish material or equipment from other approved sources if the requirements are not met and shall notify VDOT of this change, and provide the same identifying information noted in this section, prior to installation or use. Materials shall not contain Hazardous Substances or be furnished from a source containing toxic, hazardous or regulated solid wastes.

3.2.10 Invoicing

A. The invoices will be a mutually agreed-upon format, and include a reasonable level of back-up documentation. Such invoices shall include the following:

1. The project number;

2. A letter from VDOT’s project manager verifying the total amount of costs set forth in the invoice, the timeframe such costs were incurred;

3. Back-up documentation for vouchers for more than $500.00 (the voucher back-up documentation will include the paperwork retained by VDOT for audit purposes); and

4. Back-up documentation including the production of VDOT’s timesheets, as housed in VDOT’s financial system.

3.3 Project Development Plans

3.3.1 General

A. The Concessionaire shall provide Project Development Plans (PDP) as defined in this section, and detailed in Attachment 3A to this Exhibit D. Such PDPs shall address the activities of the Concessionaire and shall not obligate VDOT to perform any activity unless defined in the Agreement.

B. VDOT’s right to review and approve the PDPs is set forth in Attachment 3A.
C. The PDPs shall meet the requirements of the Agreement. Further information regarding the development of the PDPs is noted in the following sections and in Attachment 3A. Each PDP shall be developed by the Concessionaire to comply with the following:

1. The scope, goals and objectives of the plan is clearly stated and detailed descriptions of items is provided;
2. The plan is fully compliant with the Agreement;
3. Applicable codes, standards, specifications, and regulatory requirements, are stated;
4. The plan is consistent with ISO principles;
5. Each plan is consistent and links to other relevant PDPs;
6. The requirements for submission, review and acceptance by VDOT is as described in Attachment 3A;
7. The plan identifies individuals responsible for ensuring that required activities are planned, reviewed, implemented and controlled, and their progress monitored by qualified professionals;
8. The resources and particular competencies required for defined roles and activities for successful execution of the plan are stated, including the need for staff training;
9. The requirements for records are established, including maintenance of records, record retention, retrieval, and disposal;
10. Documents and data are controlled and responsibility for review and approval assigned;
11. Procedures for updates and revisions to the plan are stated;
12. The requirements for reviews, quality management, adequacy and effectiveness of the plan are stated and flow through to PDP revision procedures;
13. The plan clearly indicates that the Concessionaire has full responsibility for the plan and all quality control and quality assurance activities;
14. Quality control and assurance procedures and internal audit procedures are clearly stated, including the processes for identifying and controlling non-conformances;

15. Recording and reporting procedures are in place to address conformance, non-conformance, corrective actions and preventative actions, and are made available for audits and reported regularly; and

16. The plan is developed and updated to facilitate external audits, including those performed by VDOT and/or FHWA.

### 3.3.2 Project Development Plans

A. The PDPs the Concessionaire will prepare, implement, update and/or coordinate are:

1. Concessionaire Management Plan;
2. Document Management Plan;
3. Quality Management System Plan;
   a. Design Quality Management Plan; and
4. Project Management;
5. Environmental Management Plan;
6. ROW Acquisition and Relocation Plan;
7. Utilities Plan;
8. Maintenance of Traffic Plan;
9. Public Information and Communications Plan;
10. DBE/SWaM Plan (Construction Period);
12. Operations and Maintenance Plan; and

B. The Concessionaire shall produce and maintain up-to-date documentation showing its internal quality reviews and results of compliances, non-compliances, and corrective actions taken.

C. VDOT may audit and monitor the activities described in the PDPs to assess the Concessionaire’s compliance.

D. Material assumptions and procedures contained in the PDPs shall be of an auditable nature.

E. The PDPs and updates shall be made available to VDOT in electronic format.

3.3.3 Project Development Plan Updates

A. The Concessionaire shall update and improve the effectiveness of its PDPs as per the terms of the Agreement and have mechanisms in place to monitor progress and identify opportunities for improvement.

3.3.4 Submission Timetable

A. The PDPs will be developed in accordance with the milestones defined in Section 3.4.1 (Project Schedules) and Attachment 3A of this Exhibit D.

B. PDPs must be reviewed and approved by VDOT before implementation and following changes that materially affect the prosecution of the Work.

3.4 Schedules

3.4.1 Project Schedules

A. Purpose, Format, and Content of the Project Schedule:

1. The Project Schedule shall be generated and developed in general compliance with the guidelines of the VDOT Post-Award Scheduling Guide Release 2 – July 14, 2008 and as further specified herein..

2. The purpose of the Project Schedule is to ensure that adequate planning, scheduling, and resource allocations occur to provide a reasonable and executable baseline work plan, baseline activity costs and baseline resource data, and continuous monitoring and reporting for Work performed and remaining. The Baseline Schedule and the monthly updates to the Project Schedule shall be used for coordinating the Work,
monitoring the progress of Work performed, identifying Work to be performed, and evaluating changes.

3. The Project Schedule shall consist of the approved Initial Baseline Schedule, the approved Baseline Schedule, the monthly Project Schedule Updates as further described in Section 3.4.3 (e) herein below, and the As-Built Schedule.

4. The Initial Baseline Schedule and accompanying Exhibits are the Concessionaire’s initial plan for the design and construction of the Project and shall be submitted to VDOT for review and approval prior to incorporation in the Comprehensive Agreement. This schedule shall be used to monitor performance of the Work until the Baseline Schedule is approved by VDOT pursuant to Section 3.4.2 below. VDOT shall have 21 days to review Project Schedule submittals to ensure compliance with the Technical Requirements. Project Schedule submittals found to be incomplete or materially deviating from the Technical Requirements may be returned for revision and resubmission without further technical review.

5. VDOT shall review submittals of the Project Schedule for conformance with these Technical Requirements, the applicable provisions in the Comprehensive Agreement, and good planning and scheduling practices.

B. General Requirements:

The Project Schedule shall:

1. Include an adequate number of activities, sufficient to ensure adequate planning of the Work and to permit monitoring and evaluation of progress and perform the analysis of potential time impacts.

2. Provide a sufficient level of detail with respect to management and oversight of the Project consistent with the guidelines noted in the VDOT Post-Award Scheduling Guide;

3. Ensure that design activities identify AFC Documents.

4. Apply the Critical Path Method (“CPM”) of network calculation to generate the Project Schedule (the critical path shall be based on the longest network path through the Project) and prepare the Project Schedule using the Precedence Diagram Method (“PDM”) to establish relationships and interdependencies between the individual activities required to complete the Project; Total Float criteria are not acceptable for
identifying or representing the Critical Path. The switch in Primavera Project Management shall be set to longest path in any schedule calculations and graphical representations. The Concessionaire shall take care to distinguish between the critical path and near critical paths.

5. Ensure that activity identification numbers, textual descriptions, and codes are consistently applied in the Project Schedule and are unique for each specific activity.

6. Divide all Work through Final Completion into activities with appropriate logic ties to show the Concessionaire’s overall approach to sequencing, include logical relationships between activities reflecting the Concessionaire’s actual intended sequence of Work, logically tie all activities to avoid open ends, and the Project Schedule shall not use imposed constraint dates to begin or complete any activity unless such dates are called for specifically in the Agreement or are mutually agreeable to the parties. The Project Schedule shall have a single start and a single completion point. Activities shall be used in lieu of lags where an activity is appropriate, i.e. use a concrete curing activity in lieu of a 7 or 28 day lag to achieve strength for a subsequent activity.

7. Avoid the use of non-typical relationships that cannot be shown to demonstrate a true dependency. Use of relationships and lags to position an activity at certain dates will not be permitted.

8. Show the Project milestones including commencement of design work, the anticipated issuance of Design Work Notice to Proceed, Construction Segment Notice to Proceed and the Scheduled Substantial Completion Date; The following milestones shall be included in the Project Schedules:

   a. Execution of the Comprehensive Agreement
   b. Financial Close
   c. Milestones should be included for significant components of work that are critical to the start of key subsequent activities and will assist with managing the Project Schedule. Milestones may consist of key design submissions required prior to the start of fabrication; completion of dredging; key permitting required for start of construction activities; completion of tunnel fabrication; major traffic changes; and other items required for the successful management of the Project and high priority items required for public relations needs.
d. Milestones shall be added to the Project Schedule at VDOT’s request and as needed by the Concessionaire.

e. Milestones shall be added to the Project Schedule at VDOT’s request and as needed by the Concessionaire.

9. Show phasing of the Work as detailed in the plans, subcontractor work, procurement, fabrication, delivery, installation, testing of materials and equipment, commissioning of systems, and any long-lead time orders for major or significant materials and equipment.

10. Each activity in the Baseline Schedule shall be allocated an estimated cost/planned value. The Work Breakdown Structure (WBS) and cost loading shall be organized and cost distributed consistent with the estimate prepared during the Interim Agreement phase and reconciled to the final agreed to estimate Design-Build Contract Price (the “Estimate”). The WBS shall be complete and address 100% of the Project scope at all levels of the WBS.

11. Include a well organized WBS, the development of which is based on a deliverable-oriented methodology that captures all the Project activities. The WBS shall include, as a minimum, the four (4) work streams, D-Groups, and bid items.

12. The Initial Baseline Schedule shall include all activities with early start days prior to 180 days after Financial Close, broken down into Work Packages and deliverables generally completed in not less than one but no more than 30 days (unless such deliverable is a procurement, design or other non-construction activity).

13. Depict the required coordination with and work to be performed by other Contractors, Utility Owners, Governmental Authorities, engineers, architects, Contractors, and suppliers;

14. Identify Regulatory Approvals required and the dates by which such approvals are necessary;

15. Incorporate the ROW Acquisition and Relocation Plan; and

16. Include with each submission of the Project Schedule, the following:

  a. Include two sets of compact disks containing an electronic working copy of the Project Schedule in Primavera
proprietary exchange format (XER) file format. Each submission shall have a unique file name to indicate the type and order of submission. Each compact disk shall be labeled to indicate the type of submission, file name, and schedule data date.

b. A narrative progress report of the Project Schedule consistent with Section III.7 of the VDOT Post-Award Scheduling Guide. The narrative shall indicate, at a minimum, the Concessionaire’s plan of operation for meeting the interim milestones and the Scheduled Substantial Completion Date, an evaluation of the critical path, a discussion of Project-specific issues encountered since the last submission as such issues relate to the schedule, proposed solutions thereof, work calendars, constraints, delays experienced, and the status of any submitted or pending Time Impact Analyses, float consumption, documentation of any logic changes, duration changes, resource changes or other relevant changes. The report shall identify the Baseline Schedule in effect at the data date of the current update and the preceding Schedule Update for that period.

c. Time-scaled logic diagram indicating the critical path, early start and early finish dates, total float, grouped by WBS, and sorted by early start and then total float.

C. For each occurrence of Major Maintenance or Concessionaire Project Enhancement, the Concessionaire shall follow the principles above for the preparation and approval of a Project Schedule relating to such Work and will perform progress monitoring and reporting.

D. The scheduling software employed by the Concessionaire shall be compatible with VDOT’s scheduling software. The Concessionaire’s scheduling software must have the capability to import and export data in the Primavera proprietary exchange format (XER). As of the Agreement Date, VDOT’s scheduling software is the latest version of Primavera’s Project Management software (currently P6 version 7.1). Any changes in scheduling software will be mutually agreed upon by all parties.

E. Float available in the Project Schedule, at any time, shall not be considered for the exclusive use of either VDOT or the Concessionaire. During the course of the Work, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. A Project Schedule showing work completing in less time than the applicable Scheduled Substantial Completion Date, and accepted by VDOT, will be considered to have project float. Project float will be
a resource available to both VDOT and the Concessionaire. Delays caused by the VDOT resulting in the Concessionaire failing to complete by such a date earlier than the applicable Scheduled Substantial Completion Date shall not be grounds for a delay claim nor will the Concessionaire begin to accrue liquidated or actual damages for failure to meet such a date earlier than the applicable Substantial Completion Date. No time extensions will be granted unless a Delay Event occurs which impacts the critical path of a Project Asset, consumes all available float or contingency time, extends the work beyond the Substantial Completion Date as defined by the Agreement, and is it is determined that responsibility for the Delay Event resides with VDOT. Float sequestering techniques will not be an acceptable practice in Scheduling on this Project. VDOT reserves its right to have the Concessionaire demonstrate the calculation of its durations and costs based on quantities, resource loading, and productivities.

3.4.2 The Baseline Schedule

A. Within 60 days of the Financial Closing Date, the Concessionaire shall submit to VDOT for its review and approval a proposed Baseline Schedule, which shall include the Concessionaire’s detailed plan for design and construction of the Project. The Concessionaire shall develop its proposed Baseline Schedule from the Initial Baseline Schedule. The Concessionaire shall submit to VDOT six hard copies (printed on 11” by 17” paper) of its proposed Baseline Schedule, along with two sets of CD’s containing an electronic version of the proposed Baseline Schedule created in the Primavera proprietary exchange format (XER).

B. The Concessionaire shall address any and all comments received from VDOT on the proposed Baseline Schedule until VDOT approves the proposed Baseline Schedule. Upon approval by VDOT, the proposed Baseline Schedule will become the Baseline Schedule.

C. The Baseline Schedule shall utilize similar WBS and activity coding as the Initial Baseline Schedule.

D. The Baseline Schedule shall be cost-loaded to an activity-level consistent with the Estimate. The cost-loading shall include direct costs used in the Estimate.

E. The resource-loading shall be provided via the Baseline Schedule narrative as supported by the HCSS generated equipment report.

F. Activities in the Baseline Schedule shall be assigned project-specific activity codes. Activity codes shall not be used in lieu of a WBS.
G. The Baseline Schedule shall include all major activities of the Work in sufficient detail to enable VDOT to monitor and evaluate design and construction progress from the Financial Closing Date through Final Completion.

H. The Baseline Schedule shall include separate activities for major submittals proposed by the Concessionaire, together with appropriate activities for VDOT’s review or approval, provided that such review and/or approval times by VDOT shall be no less than the time provided for such reviews in the Agreement.

I. The Baseline Schedule shall be resource-loaded, via the narrative, broken down into work packages and deliverables generally completed in not less than one but no more than 20 working days (unless such deliverable is a procurement, design or other non-construction activity), with dollar value (price) of each activity identified. The total cost loaded into the Baseline Schedule shall be equal to the total of the direct costs in the Design-Build Contract. Project overhead costs and Project-wide costs not applicable to a specific activity should be identified and addressed in the Baseline Schedule narrative. No activity on the critical path shall have duration greater than 20 working days. Critical resources should be identified in the Project Schedule narrative.

3.4.3 Monthly Progress Reports and Project Schedule Updates

A. The Project Schedule shall be current, reflecting actual progress ending on the last day of each calendar month and shall be kept current and submitted as a component of the Monthly Progress Report consistent with Section V of the VDOT Post-Award Scheduling Guide.

B. The Monthly Progress Report shall describe the work performed since the previous update as well as the Concessionaire’s plan for accomplishing the remaining Work only if changed from the Project Schedule Update. It shall describe the current status of the Project and any deviations from scheduled performance as well as the causes and effects of the deviations. It shall also describe any progress deficiencies or schedule slippages against the Project Schedule in effect on the data date for the current Schedule Update, as well as any actions taken or proposed to avoid or mitigate the progress deficiencies or schedule slippages.

C. Monthly Progress Reports shall have a reporting period ending on the last day of each calendar month and shall be submitted on or before the 7th of the month following the reporting period. The Monthly Progress Report shall be submitted in accordance with this section for VDOT’s review and comment.

D. VDOT will notify the Concessionaire of comments within five business days of receipt of an acceptable submission.
E. Project Schedule Updates:

1. Concessionaire shall update the Project Schedule monthly to reflect actual progress to date and to forecast progress going forward (the Project Schedule Updates). The Concessionaire will not be required to provide updates of any cost or resource information in the Project Schedule Update. The Project Schedule Update shall be submitted as an attachment to the Monthly Progress Report. The last day of the reporting period shall be the status date or data date used to calculate the schedule. Project Schedule Updates shall comply in all respects with the Project Schedule requirements set forth in this Section 3.4.

2. The approved Initial Baseline Schedule will be the basis for Project Schedule Updates until such time as the Baseline Schedule is approved by VDOT. Thereafter the Baseline Schedule shall be the basis for Project Schedule Updates.

3. Project Schedule Updates shall depict activities that have started, are on-going, or have completed during the reporting period as of the new data date; show actual start dates for activities that have started; and actual finish dates for completed activities.

4. Project Schedule Updates shall depict remaining duration for on-going activities. Remaining duration for unfinished activities shall be based on the amount of time required to complete the remaining work as of the new data date.

5. Activity relationships for the remaining activities shall be modified as necessary to correct out-of-sequence progress for on-going activities or to reflect the Concessionaire’s current plan for completing the remaining Work.

6. Changes to the Project Schedule shall be documented in the Monthly Progress Report. Such changes include: additional, revised or deleted activities, durations, calendar assignments, lag, or logic ties.

7. If a Project Recovery Schedule is required pursuant to Section 3.4.5A, then the Project Recovery Schedule will be included in the monthly update.

8. Upon achieving Final Completion, the Project Schedule Update submitted and approved with the final Monthly Progress Report will be identified by the Concessionaire as the As-Built Schedule.
3.4.4 Revisions to the Baseline Schedule

A. The Concessionaire may revise the Baseline Schedule. In such an event, the Concessionaire will submit a revised Baseline Schedule to VDOT for review and approval. Once approved, this revision shall then become the Baseline Schedule.

B. VDOT may elect to require revisions to the Baseline Schedule by the Concessionaire. VDOT will make such requests in writing. The Concessionaire shall make such revisions within seven days after receiving VDOT's request. The Concessionaire may request in writing from VDOT an additional five days to complete such revisions. Once approved, this update shall then become the Baseline Schedule. At no time shall the Concessionaire continue to reflect an item of non-concurrence from VDOT in the updates to the Baseline Schedule. If the Concessionaire objects to VDOT’s request for revisions, the Concessionaire may refer the matter to dispute resolution pursuant to Article 21 of the Agreement.

C. In the event of a Delay Event for which VDOT grants relief to the Concessionaire in accordance with the terms of the Agreement, the Baseline Schedule shall be revised and submitted to VDOT for approval in accordance with Section 3.4.2 above.

3.4.5 Project Recovery Schedule

A. Whenever the Project Schedule shows any Scheduled Substantial Completion Date having 90 days (or 10% of the time remaining to achieve the applicable Scheduled Substantial Completion Date, whichever is less), of negative float or more, the Concessionaire shall submit a Project Recovery Schedule to VDOT for approval. Project Recovery Schedule submittals shall include a list of all activities changes, and an accompanying narrative explaining the nature of the changes (the “Project Recovery Schedule”).

B. Once a Project Recovery Schedule is reviewed and approved by VDOT, with no exceptions, it shall become the Baseline Schedule and shall also be used as the basis for subsequent Monthly Progress Reports. The Concessionaire shall archive all approved Project Schedules.

3.4.6 Time Impact Analysis (TIA) for Proposed Extensions of Time

All parties agree to address schedule issues as quickly and as contemporaneously as possible.
The following shall apply if a Time Impact Analysis (TIA) is required under the Technical Requirements:

A. The TIA shall be based on the date on which the alleged Delay Event is determined to have occurred, or, in the event of a proposed Change Order, the date on which the implementation of such Change Order is proposed to be commenced. In the event that the Concessionaire perceives that a Delay Event has occurred, such Delay Event Notice shall be provided in accordance with the requirements of the Agreement.

B. The TIA shall show the current status of the Work using the most recent Project Schedule Update prior to the initiation of the events in question. The time computation of all affected activities shall be shown in the TIA along with a demonstration of steps used to mitigate impacts.

C. Each TIA shall include a fragmentary network (fragnet) demonstrating how the Concessionaire proposes to incorporate the impact into the most recent Project Schedule Update prior to the initiation of the events in question. A fragnet is defined as the sequence of new activities and/or activity revisions, and logic relationships, that are proposed to be added to the existing schedule to demonstrate the influence of impacts to the schedule. The fragnet is subject to the same requirements for activities including resource information for added scope and assignment of activity codes and assignment to the appropriate WBS structure, existing or amended. In the event of an alleged Delay Event, the Concessionaire shall demonstrate the calculation of its durations based on quantities, resource loading, and productivities for both the fragnet activities and the affected and impacted activities. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. The Concessionaire shall insert the fragnet into the most recent Project Schedule Update prior to the initiation of the alleged Delay Event, run the schedule calculations, and submit the impacted schedule in accordance with this section. The Concessionaire shall include a narrative report describing the effects of new activities, resources and relationships to Agreement milestones and the applicable Scheduled Substantial Completion Date with each TIA.

D. The Concessionaire shall not be entitled to any extension of the applicable Scheduled Substantial Completion Date automatically as the result of an activity delay. All parties recognize that certain events will not affect the existing critical activities or cause non-critical activities to become critical, thereby not causing any effect on the applicable Scheduled Substantial Completion Date. No extension of time will be granted without demonstration to VDOT of merit for the time extension.
E. All TIA or requests for extension of time shall also address concurrent and predecessor delays in the determination of excusable/inexcusable and compensable/noncompensable events.

F. VDOT reserves its right to identify and generate fragnets for inclusion in the Project Schedule should it become aware of the Concessionaire-caused delays.

G. Two copies of each TIA report together with an electronic file (in XER file format) of the Project Schedule impact analysis shall be submitted to VDOT for its review in accordance with Article 13 of the Agreement.

H. Upon approval, a copy of the TIA signed by VDOT will be returned to the Concessionaire and incorporated into the next update to the Baseline Schedule.

I. The approved TIA related to a Change shall be incorporated into, and attached to the applicable Change Order.

J. A disapproved TIA will be returned to the Concessionaire with appropriate comments for revisions or VDOT’s basis for rejection of the alleged Delay Event. Should Concessionaire disagree with VDOT’s assessment of Delay Event, Concessionaire may pursue recourse in accordance with provisions established in Article 21 of the Agreement.

3.5 Standard Documents

3.5.1 General Requirements

A. The Work shall conform to the Standard Documents in Section 3.5.2. Where the Concessionaire’s design requires design methods or construction procedures not covered by Section 3.5.2 of the Technical Requirements, the Concessionaire shall obtain VDOT’s approval before using such methods or procedures.

B. Subject to the provisions of the Agreement, Work carried out after Final Completion shall comply with applicable Federal and State Laws and VDOT’s Standard Documents noted in Section 3.5.2.

C. When a provision of “Division 1 – General Provisions” of the 2007 Road and Bridge Specification is applicable, Section 3.5.3 of the Technical Requirements shall apply.

3.5.2 Standard Documents

The design and construction work for the Project shall be performed in accordance with the applicable Federal and State Laws, Standards, Specifications and Reference
Documents to include, but not limited to the documents listed herein. The Concessionaire shall meet or exceed the minimum design standards and criteria.

The standards, special provisions and reference guides applicable during the performance of the Design-Build Work shall be the version of those documents as noted herein below or those in effect as of the Agreement Date, whichever is the most current as of the Agreement Date, including all supplements, errata, revisions and interims. Following Final Completion, all subsequent design and construction must meet the standards current at the time the Work is performed.

Groupings of standards are for ease of reference only and it is the responsibility of the Concessionaire to ensure that all relevant standards and specifications have been applied.

**Standards and Specifications**

**General**


VDOT Post Construction Manual (Updated July 2009)

VDOT Construction Inspection Manual (April 2008)

VDOT’s Minimum Quality Control & Quality Assurance Requirements for Design-Build & Public-Private Transportation Act Projects August 2008


VDOT Right of Way and Utilities Division Manuals, Vol. I (July 1999) and II (November 2003)

VDOT Land Use Permit Manual

VDOT Policy Manual for Public Participation in Transportation Projects (Revised January 2010)

VDOT Instructional & Information Memorandums (I&IM) All Divisions, as of January 7, 2010

VDOT Traffic Engineering Memoranda, August 1, 2007

VDOT - Hampton Roads Region Advanced Traffic Management System

VDOT - Limits of Operation and Maintenance of Traffic

VDOT Road and Bridge Standards, Vol. 1 and Vol. 2 (2008), including all revisions as of January 7, 2010

VDOT Road and Bridge Specifications (2007), including all revisions as of January 7, 2010

TECHNICAL REQUIREMENTS
Exhibit C

VDOT Mobility Management Division Memoranda
VDOT Appraisal Guidelines
Americans with Disabilities Act Accessibility Guidelines for State and Local Government Facilities
Virginia Construction Code, 2003
VDOT Manual of Instruction for Material Division to include all associated memorandum included on VDOT Materials website.
VDOT CADD Manual (Version 2009)
VDOT State Noise Abatement Policy
ISO 9001 Quality Management Systems 2000
Virginia Uniform Statewide Building Code
CSX Transportation Design and Construction Standard Specifications, General and Special Conditions, June 1, 2002
CSX Transportation Public Project Information for Construction and Improvement Projects that may involve the Railroad, May 08, 2009
American Railway Engineering and Maintenance-of-Way Association for railroad engineering with particular attention to Chapter 1, Part 1, Roadbed; and Chapter 28, Clearances.
Federal Railroad Administration regulation 49 CFR 214, Railroad Workplace Safety

Roadway Design
VDOT Policy for Integrating Bicycle and Pedestrian Accommodations
VDOT Road Design Manual, Vol. I (all revisions as of January 7, 2010)
AASHTO: A Policy on Design Standards Interstate System, Jan 2005
Access Board’s Revised Draft Guidelines for Accessible Public Rights of Way dated November 23, 2005

**Pavement Design**
VDOT Guidelines for 1993 AASHTO Pavement Design, Revised – May 2003

**Demolition, Renovation, and Site Clearance**
VDOT Asbestos Project Monitoring and Clearance Air Monitoring Procedures, dated September 16, 2003
VDOT Special Provision for Inspection of Structures for Asbestos Containing Materials (ACM) on Design-Build Projects, June 22, 2009
Virginia Department of Transportation Special Provision for Asbestos Removal for Road Construction Demolition Projects, March 18, 2009
VDOT Special Provision for Asbestos Removal and NESHAP Related Demolition Requirements for Structures on Design-Build Projects, June 22, 2009
VDOT Specifications for Asbestos Removal in Occupied Buildings
VDOT Special Provision Copied Note for Demolition of Structures not Requiring Asbestos Removal, June 25, 2009

**Geotechnical**
VDOT Requirements for the Preparation of Alternate Retaining Wall Plans (03-06-08)
VDOT Requirements for General Notes for Alternate Retaining Wall Plans (03-06-08)
U.S. Army Corp of Engineers Laboratory Soils Testing EM-1110-2-1906

**Structures**
TECHNICAL REQUIREMENTS
Exhibit C

Guide Specifications for LRFD Seismic Bridge Design, 1st Edition
Guide Specifications for Bridges Vulnerable to Coastal Storms
AASHTO Guide for Protective Screening of Overpass Structures, 1990
Guide Specifications for Highway Bridge Fabrication with HPS 70W Steel, 2000
AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 4th Edition, 2001 (to be used for the design of dynamic message sign supports only)
AASHTO Fracture Critical Non-Redundant Steel Bridge Members Current Spec. with all Interim Specifications
AASHTO/AWS D1.5M/D1.5:2008 Bridge Welding Code, with 2009 AASHTO Interim
VDOT Manual of Structure and Bridge Division, Vol. V
23CFR650 Subpart C – National Bridge Inspection Standards (NBIS), Subsection 650.301 or the latest revision(s)

FHWA Technical Manual for Design and Construction of Road Tunnels – Civil Elements, June 2010 (FHWA-NHI-09-010) (for reference only)

FHWA Road Tunnel Design Guidelines, July 2004 (for reference only)


Best Practices for Implementing Quality Control and Quality Assurance for Tunnel Inspection, Prepared for T-20, October 2009

Guidelines for Steel Box Pier Caps

Stage I Report Template

For culverts and rehabilitation and/or widening of existing structures:


AASHTO Guide Specifications for Horizontally Curved Steel Girder Highway Bridges with Design Examples for I-Girder and Box-Girder Bridges, 2003


FHWA Technical Manual for Design and Construction of Road Tunnels - Civil Elements, June 2010 (FHWA-NHI-09-010) (for reference only)

FHWA Road Tunnel Design Guidelines, July 2004 (for reference only)

Highway and Rail Transit Tunnel Inspection Manual 2005 Edition


Drainage

VDOT 2002 Drainage Manual (including current Errata Sheets and revisions as of January 7, 2010)

VDOT Hydraulic Design Advisories as of January 7, 2010


US Army COE, Hydrologic Modeling System (HEC HMS)

Virginia, Erosion and Sediment Control Law and Regulations, FY 2009
Virginia Storm Water Act
Virginia Storm Water Management Law and Regulations
FEMA National Flood Insurance Program Regulations
US Army COE, River Analysis System (HEC RAS) Version 4.1
General Permit for Discharges of Stormwater from Construction Activities, General Permit No. VAR10
FHWA Hydraulic Engineering Circulars (HEC)/HDS, latest edition/revisions as of January 7, 2010
FHWA Hydraulic Engineering Circulars (HEC) 24, Highway Pump Station Design

**Traffic Control Devices and Lighting**
The Virginia Supplement to MUTCD (2005)
National Fire Protection Association NEC Standards, 2008
VDOT Traffic Calming Guide for Local Residential Streets, 2002
ANSI/IESNA RP-8-2000 – Practice for Roadway Lighting
IESNA RP-19-01 Roadway Sign Lighting
* Traffic control devices and lighting not owned and operated/maintained by VDOT
Hampton Roads District may be subject to additional standards/specifications.
Additional jurisdictions include but are not limited to:
  - City of Portsmouth
  - City of Norfolk

**Miscellaneous**
VDOT Survey Manual (January 2009)
VDOT Guardrail Installation Training Manual (GRIT) January 2007
U.S. Green Building Council’s Leadership in Energy and Environmental Design
iv. United States Environmental Protection Agency/Department of Energy’s “Energy Star” rating

**Tunnel Operations Standards**

National Fire Protection Association (NFPA) Standards

National Electrical Safety Code (NESC), 2008

ASHRAE 90.1-2004/2006 IECC or equivalent

IESNA RP-22-05 IESNA Recommended Practice for Tunnel Lighting

**ITS**

Institute of Electrical and Electronics Engineer (IEEE) 802.3 Local and Metropolitan Area Networks

National Electric Manufacturers Association (NEMA) TS-4 Hardware Standards for Dynamic Message Signs (DMS) with NTCIP Requirements


National Transportation Communications for ITS Protocol (NTCIP)

Hampton Roads Region Operations ITS Architecture ([www.vdot-itsarch.com](http://www.vdot-itsarch.com))

Hampton Roads Region Operations Incident Management Plan

Hampton Roads Region Operations Telecommunications Plan

**Special Provisions**

**General**

Virginia Department of Transportation Special Provision for Elastic Inclusion, June 24, 2007.

Virginia Department of Transportation Special Provision for Quality Assurance/Quality Control for the Construction of Deep Foundation Systems for Design-Build and PPTA Contracts, November 10, 2009

Virginia Department of Transportation Guide Special Provision for Drilled Shafts for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Reinforced Earth Walls, July 5, 2007
Virginia Department of Transportation Special Provision for Density Control of Embankments and Backfill, Revised – November 26, 2006

Virginia Department of Transportation Special Provision for Wave Equation Analysis for LRFD for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for T-Wall Retaining Wall System for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Mechanically Stabilized Earth Walls (Concrete Panel Facing) for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Mechanically Stabilized Earth Walls (Modular Cantilever Facing) for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Mechanically Stabilized Earth Walls (Segmental Block Facing) for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Dynamic Pile Testing for Friction Piles for LRFD for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Dynamic Pile Testing for End Bearing Piles for LRFD for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Dynamic Pile Testing for End Bearing Piles for Design-Build and PPTA Contracts, November 18, 2009

Virginia Department of Transportation Special Provision for Section 514 - Field Offices for Design-Build and PPTA Contracts, April 30, 2010

Virginia Department of Transportation Special Provision for Design-Build Tracking (DBT) Numbers – February 8, 2008

Virginia Department of Transportation Special Provision for Reflection Cracking Retardant Material (English Units) (June 9, 1998)

Virginia Department of Transportation Special Provision for Sealing Cracks in Asphalt Concrete Pavement or Hydraulic Cement Concrete Pavements (Prior to Overlay) (June 10, 1998)

Virginia Department of Transportation Special Provision for Undersealing Portland Cement Concrete Pavement (January 3, 1995)

100

Virginia Department of Transportation Special Provision for Use of Domestic Material, July 9 2002 (S102C0B)
Virginia Department of Transportation Special Provision for Section 1051.10 Construction Stakes, Lines and Grades, July 9 2002 (S105A0B)

Virginia Department of Transportation Special Provision for Section 107.19 Railway-Highway Provisions, January 14, 2008 (S107I00-0708)

Virginia Department of Transportation Supplemental Division 1 General Provisions, September 9, 2009 (SS1D006-0909)

Virginia Department of Transportation Special Provision for Section 107. – Legal Responsibilities, 2007

200

Virginia Department of Transportation Special Provision for Low Permeability Concretes, December 2, 2002 (S217A0B)

300

Virginia Department of Transportation Special Provision for Flowable Backfill, July 9, 2002 (S302A0B)

Virginia Department of Transportation Special Provisions for Section 301 – Clearing & Grubbing (November 15, 2006)

500

Virginia Department of Transportation Special Provision for Removal or Connection of Asbestos Cement Pipe, November 7, 2005 (S500A1B)

Virginia Department of Transportation Special Provision Copied Notes c504b0b – Section 504 – Sidewalks, Steps, and Handrailings, January 12, 2005

Virginia Department of Transportation Special Provision for Micro Tunneling for DB Projects dated September 14, 2009

Virginia Department of Transportation Special Provision for Jack and Bore for DB Projects dated October 13, 2009

S704E01 – Type B, Class VI Pavement Line Marking 11-21-08
Special Provision Copied Notes (SPCN)

SPCN c100ai02-0609 General Project Requirements, Supplemental Specifications (SSs), Special Provisions (SPs) and Special Provision Copied Notes (SPCNs) (available on VDOT’s web site)

SPCN c100b01-0908 Labor (available on VDOT’s web site)

SPCN c105hf1-0309 Section 105.06 Subcontracting (available on VDOT’s web site)

SPCN c211gg0-0609 Warm Mix Asphalt Pavement (available on VDOT’s web site)

SPCN c223ag1-0309 Section 223 Steel Reinforcement (available on VDOT’s web site)

SPCN c315gg0-0609 Warm Mix Asphalt Pavement (available on VDOT’s web site)

SPCN for PG 76-22 Asphalt Cement Adjustment – Design-Build Projects (Included in RFP Information Package – CD-ROM), dated October 7, 2009

Supplemental Specifications

SS1D005-0909 Supplemental Division 1 – General Provisions

SS21101-0609 Supplemental Section 211 – Asphalt Concrete

SS21402-0908 Supplemental Section 214 – Hydraulic Cement

SS21501-0908 Supplemental Section 215 – Hydraulic Cement Concrete Admixtures

SS21701-0609 Supplemental Section 217 – Hydraulic Cement Concrete

SS22401-0908 Supplemental Section 224 – Castings

SS22601-0609 Supplemental Section 226 – Structural Steel

SS23802-0308 Supplemental Section 238 – Electrical & Signals Components

SS31502-0609 Supplemental Section 315 – Asphalt Concrete Pavement

SS40501-0609 Supplemental Section 405 – Prestressed Concrete

SS51202-0909 Supplemental Section 512 – Maintaining Traffic
SS51401-0609 Supplemental Section 514 – Field Office

SS70003-0608 Supplemental Section 700 – General

SS70102-0109 Supplemental Section 701 – Traffic Signs

SS70301-0109 Supplemental Section 703 – Traffic Signals

Reference Documents

FHWA-IF-99-025 Drilled Shafts – Construction Procedures and Design Methods, August 1999

FHWA Geotechnical Engineering Circular No. 2 - Earth Retaining Systems, FHWA-SA-96-038, 1996

FHWA Geotechnical Engineering Circular No. 4 - Ground Anchors and Anchored Systems, FHWA-IF-99-015, 1999

FHWA Geotechnical Engineering Circular No. 5, Evaluation of Soil and Rock Properties dated April 2002

FHWA Geotechnical Engineering Circular No. 7 - Soil Nail Walls, FHWA-IF-03-017, 2003


FHWA Soil Nailing Field Inspectors Manual-Soil Nail Walls, FHWA-SA-93-068, 1993

FHWA The Osterberg Cell for Load Testing Drilled Shafts And Driven Piles, FHWA-SA-94-035, 1994


Load and Resistance Factor Design (LRFD) For Highway Bridge Superstructures (April 2007), FHWA-NHI-08-048
Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures (April 2007), FHWA-NHI-08-036

Load and Resistance Factor Design (LRFD) For Highway Bridge Superstructures (April 2007) Examples, FHWA-NHI-08-049

LRFD for Highway Bridge Substructures and Earth Retaining Structures (Jan 2007), FHWA-NHI-05-095


Earth Retaining Structures (RM), FHWA-NHI-07-071

Micropile Design and Construction Reference Manual (December 2005), FHWA-NHI-05-039

Mechanically Stabilized Earth Walls And Reinforced Soil Slopes - Design And Construction Guidelines (March 2001), FHWA-NHI-00-043

VDOT Clearance Chart (08-18-03)

VDOT Conductor Cable and Conduit Sizes (08-18-03)

VDOT Preliminary Sub Example

VDOT Rest in Walk pedestrian phasing (01-13-05)

VDOT Right Turn overlap phasing (01-13-05)

VDOT Right of way Diagrams (01-13-05)

VDOT Side street split phasing (01-13-05)

VDOT Signal Control Justification (08-18-013)

VDOT Signal Plan Update (01-13-05)

VDOT Hampton Roads Signal Symbols (08-18-03)

VDOT Signal Timing Submission Process (08-18-03)

VDOT Span Wire Design Notes (08-18-03)
3.5.3 Amendments to Division 1 of the 2007 Road and Bridge Specification

Pursuant to Section 3.5 of the Technical Requirements, Division 1 of the 2007 Road and Bridge Specifications shall not apply to the Project and is superseded by the Agreement and the Technical Requirements. For the Concessionaire’s convenience, this Section 3.5.3 provides cross-references between Division 1 and the corresponding provisions of...
the Agreement or the Technical Requirements (as applicable). Where sections of Division 1 are referenced in Section 3.5.2, the Concessionaire shall refer to the corresponding provisions of the Agreement or the Technical Requirements identified in this Section.

Notwithstanding the information in this Section, nothing in this Section shall relieve the Concessionaire from complying with the requirements of the Agreement and the Technical Requirements.

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### 3.5.4 Interpretation of Standard Documents

A. VDOT standards are interpreted using the following guidelines. The standard drawings, the specifications, supplemental specifications, special provisions, special provision copied notes, and supplementary documents listed in Section 3.5.2 are part of the Technical Requirements. A requirement occurring in one shall be as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete Project. In case of a discrepancy, the following order of precedence shall apply, with the highest governing item appearing first and the least governing item appearing last:

1. Technical Requirements;

2. Design Criteria and Basis of Design;
3. Special provision copied notes;
4. Special provisions;
5. Supplemental specifications;
6. Standards and specifications listed in Section 3.5.2;
7. Reference documents listed in Section 3.5.2; and
8. Standard Drawings (calculated dimensions, unless obviously incorrect, will govern over scaled dimensions).

B. The Concessionaire shall not take advantage of any obvious or apparent error or omission in the Agreement. If the Concessionaire discovers an error or omission in the Agreement, it shall immediately notify VDOT. The Concessionaire shall then make such corrections necessary for fulfilling the intent of the Agreement.

C. References to existing standards or manuals shall be deemed to include revisions or replacements as of the Agreement Date, subject to the terms of the Agreement.

3.6 Right of Way

A. The Concessionaire shall provide certain right of way (ROW) acquisition services for the Project. ROW acquisition services shall include the preparation of ROW plans, title examinations, appraisal, appraisal review, negotiation, relocation assistance and advisory services, closings, and legal services. The Concessionaire shall coordinate and determine required right of way for utility relocations and coordinate preparation of all required easement agreements, right of way plans and documentation for acquisition and vacation of existing property rights. All appraisers and acquisition firms shall be selected from VDOT’s pre-approved lists. VDOT will retain authority for approving just compensation, relocation benefits, and settlements. VDOT must issue a Notice to Commence Right of Way acquisition to the Concessionaire prior to any offers being made to acquire property. VDOT must also issue a Notice to Commence Construction to the Concessionaire once the property has been acquired prior to commencing construction on the property. The required right of way plans and documentation will be reviewed by VDOT and, as required, FHWA.

B. The Concessionaire shall carry out its responsibilities in accordance with the following requirements:

1. The Concessionaire shall acquire property in accordance with all applicable Federal and State Laws, including but not limited to the
Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (the “Uniform Act), and Titles 25.1 and 33.1 of the 1950 Code of Virginia, as amended. The acquisition of property shall follow the guidelines as established by VDOT and other State and Federal guidelines that are required and VDOT’s Right of Way and Utilities Division Manuals, Vol. I and II, as amended.

2. VDOT will designate a hearing officer to hear any Relocation Assistance appeals. VDOT agrees to assist with any out of State relocation by persons displaced within the rights of way by arranging with such other State(s) for verification of relocation assistance claim.

3. The Concessionaire shall submit a project-specific ROW Acquisition and Relocation Plan for VDOT’s review and comment.

4. The Concessionaire shall submit, as part of the ROW Acquisition and Relocation Plan, procedures for handling ROW Acquisitions and relocations to VDOT for review and comment before beginning ROW activities. These procedures must show the Concessionaire’s methods, including the appropriate steps and workflow required for title reports, appraisals, and review of appraisals, negotiations, acquisition, relocations and parcel closings. The Concessionaire shall have the same authority for administrative settlements as established for VDOT’s Regional Right of Way Manager in the VDOT Right of Way Division Manual. These procedures must include 21 days for VDOT to review and comment just compensation, relocation benefits, and administrative settlement.

5. The Concessionaire shall have access to, and use VDOT’s Right of Way and Utilities Management System (RUMS) to manage and track the acquisition process. When required, all entries made into RUMS shall be made weekly to accurately reflect current project status. VDOT’s standard forms and documents, as found in RUMS, shall be used to the extent possible. Any changes to the forms and documents must be approved by VDOT. Within 15 days after Financial Close, VDOT will commence provision of training and technical assistance to the Concessionaire in the use of RUMS.

6. The Concessionaire shall provide a current title examination (no older than 60 days) for each parcel at the time of the initial offer to the landowner. Each title examination report shall be prepared by a VDOT-approved title company, in accordance with VDOT’s Right of Way and Utilities Division Manuals, Vol. I and II, as amended, and shall include title insurance commitment. Should the Concessionaire select a law firm to certify title examinations, the certifying attorney shall provide evidence of
professional liability insurance. VDOT reserves the right to determine if the professional liability insurance coverage is sufficient. If any title examination report has an effective date that is older than 60 days, an update is required before making an initial offer to the landowner.

7. The Concessionaire shall prepare appraisals and appraisal reviews in accordance with VDOT’s appraisal guidelines. The appraiser shall be on VDOT’s approved fee appraiser list.

8. The Concessionaire shall provide appraisal reviews complying with technical review guidelines of VDOT’s appraisal guidelines. The reviewer shall be on VDOT’s approved fee appraiser list. VDOT will review the Concessionaire’s appraisal waiver, appraisal, and appraisal review for each parcel, and shall have the decision of final approval of each appraisal and just compensation offer.

9. The Concessionaire shall make direct payments of benefits to property owners for negotiated settlements, relocation benefits, and payments to be deposited with the court. Payment documentation is to be prepared and submitted with the Acquisition Report (Form RW-24). VDOT will process vouchers and issue State warrants for all payments and send to the Concessionaire, who will be responsible for disbursement.

10. Concessionaire shall prepare, obtain execution of, and record documents conveying title to such properties to the Commonwealth and deliver all executed and recorded general warranty deeds to VDOT. For all property purchased in conjunction with the Project, title will be acquired in fee simple, except that, with VDOT’s prior written concurrence, permanent easements may be acquired in lieu of fee simple interest for the construction, maintenance, and use of items such as noise walls, retaining walls, storm drainage structures, and earthen slopes. All property shall be conveyed to “Commonwealth of Virginia, Grantee” by a VDOT-approved general warranty deed, free and clear of all liens and encumbrances except encumbrances expressly permitted in writing by VDOT in advance. All easements, except for private utility company easements, shall be acquired in the name of “Commonwealth of Virginia, Grantee.” Private utility company easements will be acquired in the name of each utility company, except when the use of eminent domain is necessary.

11. The Concessionaire shall use its best efforts to settle claims with landowners. Such efforts do not require the Concessionaire to make an offer to the property owner in excess of “just compensation”. VDOT shall make the ultimate determination in each case as to whether settlement is appropriate or whether the filing of a condemnation action is necessary.
The Concessionaire shall not request the filing of a certificate until the landowner has been given a minimum of 45 days to consider the offer or terminate the negotiations. If, despite the Concessionaire’s best efforts, it is unable to reach a settlement with any landowners, VDOT will handle any necessary condemnation proceedings.

12. The Concessionaire shall be responsible for all contacts with landowners for ROW-related issues, prior to initiation of condemnation proceedings by VDOT. The Concessionaire shall provide documentation of all contact with property owners (including participants and organizations), a summary of discussions, agreed items, follow-up activities, and copies of items distributed, including but not limited to appropriate and timely documentation in the Acquisition Report (Form RW-24).

13. Once access is gained by the Concessionaire to acquired ROW, Concessionaire shall use reasonable care in determining whether there is reason to believe that the property may contain concealed or hidden waste or other materials or hazards that may require remedial action or treatment. VDOT shall be notified of the presence of such materials within Three (3) Business Days of such discovery. In no event shall an offer to acquire any interest in such property be made in advance of and without written concurrence from VDOT.

14. During the acquisition process and for a period of three years after the later of Final Completion or the Commonwealth has indefeasible title to the property, all Project documents and records not previously delivered to VDOT, including all costs of acquisition of ROW, and all documents and records necessary to determine compliance with the Laws relating to ROW Acquisition and the costs of relocation of Utilities shall be maintained and made available by Concessionaire to VDOT for inspection or audit.

C. The Concessionaire shall be responsible, at its sole expense, for demolishing and disposing of all existing buildings from the ROW and permanent and temporary easements, as necessary. All such work shall comply with Good Industry Practice and these Technical Requirements.

D. The Concessionaire shall exercise care to minimize impacts and damages to property, businesses, and residences, including noise, vibrations, temporary traffic patterns, and clearing of tree buffers. The Concessionaire shall address public, business, and government comments in coordination with VDOT within 21 days of receipt; however, the responsibility to coordinate, address and/or respond to the comments shall be the Concessionaire’s. Where requested, the Concessionaire shall provide stakeout and marking of existing property lines and impacts.
3.7 Utilities

3.7.1 General Requirements

A. The coordination, design, and relocation of all Utilities shall comply with these Technical Requirements, the Standard Documents Section 3.5.2 (including Right of Way and Utilities Division Manuals, Vol. I and II), and the requirements, standards and preferences of impacted Utility Owners.

B. The Concessionaire shall be responsible for coordinating and resolving any conflicts arising from such coordination, the Project construction with all Utilities in the area to determine if they may be affected (including VDOT’s fiber optic cables and conduits) and protect those utilities that will not be directly affected, in accordance with the Utilities Plan. The Concessionaire shall develop and maintain a utility tracking report as part of the Utilities Plan. The Concessionaire shall be responsible for coordinating the work of its Contractors and the various Utilities.

C. If the Concessionaire desires the temporary or permanent adjustment of Utilities for Concessionaire’s benefit, it shall conduct all negotiations with the Utility Owners and pay all costs in connection with the adjustment at no additional cost to the Project.

D. The Concessionaire shall be responsible for utility designations, utility locates (test holes), conflict evaluations, cost responsibility determinations, utility relocation designs, utility relocations and adjustments, utility reimbursement, determination of existing utility easements and the inclusion of such easements on plans, replacement land rights acquisition, and utility coordination required for the Project. The Concessionaire is responsible for coordinating all necessary utility relocations and adjustments to occur. The Concessionaire shall coordinate with each affected Utility Owner to determine those relocation costs that are the Concessionaire’s responsibility and those relocation costs that are the responsibility of the Utility Owner.

E. The Concessionaire shall submit a Utilities Plan for VDOT to review and approve to insure conformance with VDOT’s policies and procedures.
F. The Concessionaire shall initiate early coordination with all Utilities located within the Project ROW and shall jointly host with VDOT a utility informational meeting with all the affected utility companies. The Concessionaire and VDOT will review the Utility Relocation Plan and Estimate before any work is done by a utility company. The Utility Relocation Plan from the Concessionaire shall incorporate each Utility Owner’s plan and shall transcend the Project limits (or appropriate area) and responsibilities. The authorization of this plan and estimate by the Concessionaire shall allow the utility companies to perform any relocation and (or) adjustments as necessary within the Project ROW or their respective utility easements.

G. A utility field inspection will be conducted with all Utility Owners within the Project by the Concessionaire. Invitees will be provided with advance copies of plans, UT-9 forms, test hole data, schedule information, and proposed agreements. The Concessionaire shall provide meeting minutes for each utility field inspection.

H. The Concessionaire shall use a Master Utility Agreement (MUA) similar to that utilized by VDOT (provided for in VDOT’s *Utility Relocation Policies and Procedures Manual*) to establish the general framework for addressing the utility issues within the Project affecting a Utility Owner. The two-party agreement between the Concessionaire and the utility company shall set forth the terms and conditions under which the utility work will be performed, and shall adhere to VDOT’s *Utility Relocation Policies and Procedures Manual*.

I. VDOT will provide reasonable assistance in negotiations with Utility Owners as requested by the Concessionaire.

J. The Concessionaire shall be responsible for ensuring continuity of utility services impacted by its construction or operations; when a utility service interruption is necessary, the timing of and duration of the interruption shall be approved by the affected Utility.

K. The Concessionaire shall ensure that utility work is conducted in accordance with the relevant agreements and VDOT’s land use permit.

L. When the Concessionaire is responsible for performance of the construction of the utility work, the Concessionaire shall coordinate with the Utility Owner to obtain temporary construction easements or agreements.

M. The Concessionaire will utilize Good Industry Practice to eliminate and minimize utility attachments on bridges. A bridge attachment request will be provided for review and comment by VDOT for each proposed utility bridge attachment.
Tunnel facilities should have no other utility attachments other than those for tunnel operation and services, unless there are existing utility facilities attached to the existing tunnels which will need to be relocated or as mutually agreed by the Concessionaire and VDOT. Plan and estimates shall be provided for all utility relocations and approved by VDOT prior to authorization of any utility work. Plan and estimates will adequately address support of excavations adjacent to roadways and potential settlement.

N. The Concessionaire shall request that all contracts with Utility Owners will include As-Built drawings as a deliverable. VDOT will issue an as-built permit to the Utility Owners within 21 days of receipt of As-Built Drawings.

O. The Concessionaire shall be responsible for ensuring the appropriate abandonment or removal of all abandoned utilities within the Project ROW, where the necessity for abandonment is caused by the Work.

P. For all utilities for which the Concessionaire shall be required to design the utility relocation or adjustment, Concessionaire shall comply with all design guidelines, standards, and submittal requirements of the Utility Owner, and shall submit for review all drawings and specifications in accordance the schedule and format of the Utility Owner’s, and shall make any and all changes as required by the Utility Owner. Concessionaire shall utilize qualified and certified Professional Engineers to design all utility improvements and in absence of Owner guidelines, standards or preferences shall utilize commercially reasonable engineering judgment and practice.

Q. Upon completion of all construction, the Concessionaire shall certify that all utilities in conflict have been relocated and all reimbursement claims have been satisfied to VDOT’s project manager.

3.7.2 Concessionaire’s Responsibility for Utility Property and Services

A. At points where the Concessionaire’s operations are on or adjacent to the properties of any utilities, including railroads, and damage to which might result in expense, loss, or inconvenience, work shall not commence until arrangements necessary for the protection thereof have been completed. The Concessionaire shall cooperate with owners of utilities so that:

1. Removal and adjustment operations may progress in a timely, responsible, and reasonable manner; and

2. Duplication of adjustment work may be reduced to a minimum, and services rendered by those parties will not be unnecessarily interrupted.
B. If any utility service is interrupted as a result of accidental breakage or of being exposed or unsupported, the Concessionaire shall promptly notify the proper authority and shall cooperate fully with the authority in the restoration of service. If utility service is interrupted, repair work shall be continuous until service is restored.

C. The Concessionaire shall comply with all requirements of the Virginia Underground Utility Damage Prevention Act (the Miss Utility law). The Concessionaire shall wait a minimum of 48 hours after notifying the Miss Utility notification center before commencing excavation work. The Concessionaire may commence excavation work after 48 hours only if confirmed through the Ticket Information Exchange (TIE) System that all applicable utilities have either marked their underground line locations or reported that no lines are present in the Work vicinity. The Concessionaire shall wait an additional 24 hours before commencing excavation operations if any utility operators have failed to respond to the TIE within the first 48 hours. The Concessionaire shall wait to commence excavation work five business days after an approved request for markings is submitted for VDOT-owned utilities or in accordance with Applicable Law for all other utilities. All known utilities shall be protected by the Concessionaire during excavation operations.

D. The Concessionaire shall reasonably seek to determine whether other utilities are present in addition to those notified by Miss Utility and shall afford those additional utilities equivalent notification protocol.

3.7.3 Restoration of Work Performed by Others

A. VDOT may construct or reconstruct any utilities within the limits of the Project ROW or grant a permit for the same at any time during the Term of the Agreement. Prior to construction, reconstruction or issuance of a permit, VDOT shall coordinate with Concessionaire if work is within Project ROW, so as not to materially impact Concessionaire’s Work.

B. The Concessionaire shall receive all permit requests, review all permits, perform all coordination, and be the primary authority for allowing the permit. VDOT or any City within the Project ROW can issue the permit once they have written authorization from the Concessionaire.

C. If a utility company under permit by VDOT or VDOT constructs, reconstructs or permits another contractor to conduct utility work within the Project ROW, VDOT needs to coordinate with Concessionaire and is responsible for restoration of impacted area.
3.8 Work Restrictions

3.8.1 General Requirements

A. The Concessionaire shall compile and submit to VDOT a Traffic Management Plan (TMP) in accordance with VDOT’s Instructional and Information Memorandum IIM-LD-241.5 (Work Zone Safety and Mobility) and TED 351.3 on Work Zone Speed Analysis will be adopted for Maintenance of Traffic (MOT) on the Project. No construction shall occur until VDOT’s comments have been successfully addressed.

B. MOT development shall be consistent with the Agreement, including these Technical Requirements.

C. The Concessionaire shall develop an MOT Plan in accordance with the requirements of Section 3.3 (Project Development Plans).

D. The Concessionaire shall maintain traffic consistent with the MOT Plan.

3.8.2 Limits of Operation

A. The Concessionaire is advised that its general operations may proceed seven days a week, 24 hours a day, during the performance of the Design-Build Work except as may be modified herein.

B. The Concessionaire shall provide VDOT’s project manager a weekly work zone plan of all closures (road, lane, shoulder, etc.) on the Wednesday prior to the next week’s planned work activity.

C. The lane closure approval and coordination process shall conform to the requirements of the ERO ATMS and the Concessionaire will be required to complete the Lane Closure Request forms and submit in accordance with ATMS requirements.

3.8.3 Temporary Roadway Closures

A. Lane and Shoulder Closures on roadways managed by local governments - The Concessionaire shall comply with the requirements set forth by the locality.

B. Lane and Shoulder Closures on roadways managed by VDOT- The Concessionaire shall comply with the Limits of Operation and Maintenance of Traffic document maintained by the ERO TOC Operations Manager.
C. Lane closures or work that impacts traffic flow will not be permitted on holidays from noon the day before a holiday until noon the day after a holiday, unless approved by VDOT. When a holiday falls on a Friday, lane closures are not permitted from noon on Thursday to noon on Monday. When a holiday falls on Monday, lane closures are not permitted from noon on Friday to 6:00 AM on Tuesday. Further, because the Thanksgiving Day holiday occurs on a Thursday, work will not be permitted from noon on Wednesday until 6:00 AM on the following Monday. Existing Midtown Tunnel lane closures can happen each day 8:00 PM to 5:00 AM daily Sunday through Thursday. Lane closures for the Downtown Tunnel Eastbound can happen each day 8:00 PM to 5:00 AM daily Sunday through Thursday. Lane closures for the Downtown Tunnel Westbound can happen 8:00 PM to 5:00 AM daily Sunday through Thursday.

D. Existing Downtown Tunnels and Existing Midtown Tunnel full and lane closures (Eastbound or Westbound) can occur on weekends commencing Friday 8:00 PM to Monday 5:00 AM. Detour routes for full closures must be established and signed appropriately per MOT Plans. No tunnel closures can occur on any holiday weekends and at no time may an Existing Downtown Tunnel and Existing Midtown Tunnel be closed concurrently. Tunnel closures during municipal events listed below will require approval on a case by case basis.

E. For the purposes of these Technical Requirements, the term “holiday” herein shall apply to New Year’s Day, Martin Luther King Jr. Day, President’s Day, Easter, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran’s Day, Thanksgiving Day, and Christmas Day. Local special events will include:

<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
<th>LOCATION</th>
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<tbody>
<tr>
<td>04/30/11</td>
<td>NATO Festival</td>
<td>Town Point Park</td>
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<tr>
<td>04/30/11</td>
<td>NATOFEST Parade</td>
<td>Downtown</td>
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<tr>
<td>06/10-12/11</td>
<td>Annual Norfolk Harborfest / OPSAIL</td>
<td>Town Point Park</td>
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<tr>
<td>11/13/11</td>
<td>Norfolk Half Marathon - St. Paul’s Blvd/Granby Street/ Little Creek Road/Hampton Blvd/Brambleton Avenue/Boush Street/ ending at TPP</td>
<td>Town Point Park</td>
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<tr>
<td>11/19/11</td>
<td>Grand Illumination Parade</td>
<td>Downtown</td>
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Note 1: All of the events listed for 2011 are annual events and will occur in future years around the same time period.

Note 2: The future dates for the Marathon (full marathon starting is 2012) are:
- November 10-11, 2012
- November 9-10, 2013
- November 8-9, 2014
- November 7-8, 2015

Note 3: The Grand Illumination Parade always takes place annually on the third Saturday in November.
Note 4: As of 1/20/11 – there has been no confirmation as to whether or not there will be an Afr’Am Festival. In the past this event has taken place the weekend before Memorial Day at Town Point Par.

Note 5: I-264 lane closures may be allowed, provided that VDOT and the local municipality concur that the special event will not be impacted by adverse traffic patterns of the lane closure. Also upon application to VDOT and the local municipality, work restrictions regarding times and dates may be waived.

F. Subject to the provisions of 3.8.1 and an approved hurricane evacuation plan, the outside lanes of I-264 (Eastbound and Westbound) may be closed for extended periods of time to complete the widening and tie-ins associated with the New MLK Extension work as follows:
1. At least 2-full width lanes of traffic must be maintained at all times
2. The duration of each lane closure must not exceed 18 months
3. A full work-zone length closure is permissible from November 1 to July 31 for both Eastbound and Westbound
4. Westbound lane closures must be limited to 1800 ft during August, September and October. Eastbound lanes may be closed the full work-zone length during August, September and October.
5. A work-zone speed reduction will not be permissible

3.8.4 Concessionaire Proposed Closures

A. At VDOT’s sole discretion and concurrence, the Concessionaire may submit a request to Work outside the stated lane hours by providing adequate justification (including traffic analyses) demonstrating the viability of the request.

B. For non-emergency related maintenance, the Concessionaire shall forward to VDOT, for approval, a tunnel closure plan, Concessionaire is to relay reason for the tunnel closure, an alternatives analysis determining why the tunnel needs to be closed, times/dates and locations of the closure, detour routes and MOT plans.

3.8.5 Night Work

A. Work occurring after sunset and before sunrise will be considered nighttime operations. Vehicles operating on the pavement of a closed roadway or travel lane shall display four-way flashers or rotating amber beacons at all times. Vehicles using headlights, except for rollers and vehicles retrieving channelizing devices, shall travel facing in the same direction as adjacent traffic in order to avoid glare and confusion to drivers.

B. The Concessionaire shall maintain a supply of emergency flares for use in the event of unanticipated situations such as traffic accidents, equipment breakdowns, failure of lighting equipment, etc.
C. Illumination Requirements. Tower-mounted luminaries, whether fixed, portable, trailer mounted, or equipment-mounted, shall be of sufficient wattage and/or quantity to provide the required level of illumination and uniformity over the area of operation.

D. The uniformity of illumination, defined as the ratio of the average illumination to the minimum illumination over an area requiring an indicated illumination level, shall not exceed 5:1. Illumination levels on approach roadways should be increased sequentially to prevent motorists from becoming disoriented by rapid changes from full dark to very bright conditions. Existing street and highway lighting shall not eliminate the need for the Concessionaire to provide adequate lighting. Consideration will be given to the amount of illumination provided by existing lights in determining the wattage and/or quantity of lights to be provided. In the event of any failure of the lighting system, nighttime operation(s) shall be discontinued until the required level of illumination is restored.

1. Level I (5 foot-candles). Level I illumination shall be provided for all areas of general construction operations to include all work operations by Concessionaire’ personnel, including work zone traffic control set-up and operations, staging, excavation, cleaning and sweeping, spoil disposal, landscaping, planting and seeding, layout and measurements ahead of the actual work, borrow areas, spoil areas, and truck cleanup areas. Level I illumination shall be provided at the area of lane and/or road closure tapers continuously, including the setup and removal of the closure tapers.

2. Level II (10 foot-candles). Level II illumination shall be provided for flagging stations, asphalt paving, milling, and concrete placement and/or removal operations, including bridge decks.

3. Level III (20 foot-candles). Level III illumination shall be provided for pavement or structural crack filling, joint repair, pavement patching and repairs, installation of signal equipment or other electrical/mechanical equipment, and other tasks involving fine details or intricate parts and equipment.

E. Glare Control. All lighting shall be designed, installed, and operated to avoid glare that affects traffic on the roadway. The Concessionaire shall locate and aim lighting fixtures to provide the required level of illumination and uniformity in the work zone without the creation of objectionable glare.

F. The Concessionaire shall provide shields, visors or louvers on luminaries as necessary to reduce objectionable levels of glare. As a minimum, the following requirements shall be met to avoid objectionable glare on roadways open to traffic in either direction:
1. Tower-mounted luminaries shall be aimed either generally parallel or perpendicular to the roadway.

2. Luminaires shall be aimed such that the angle between the center of the beam axis and the vertical mounting pole is no greater than 45 degrees.

3. No luminaries shall be permitted that provide a luminous intensity greater than 20,000 candelas at an angle of 72 degrees above the vertical.

4. Except where prevented by overhead utilities or structures, towers shall be extended to their full working height when in use to reduce glare and provide uniform illumination.

G. The Concessionaire shall furnish and place warning signs to alert approaching motorists of lighted construction area(s). These warning signs shall be four feet (1200 mm) x four feet (1200 mm). The Concessionaire’s vehicles used on the Project shall be provided with amber flashing lights that shall be in operation while in the work area. The Concessionaire’s equipment shall be provided with a minimum of three square feet of reflective sheeting that is visible to approaching motorists. The Concessionaire shall provide personnel with ANSI Class II reflective vests, which shall be worn at all times while the workers are within the work area. The Concessionaire shall provide a light meter to demonstrate that the minimum light intensity is being maintained.

H. The Concessionaire shall provide sufficient fuel, spare lamps, and generators to maintain the lighting of the work site. The Concessionaire shall utilize padding or shielding or locate mechanical and electrical equipment to minimize noise generated by lighting operations. Noise generated by portable generators shall comply with all applicable Law.

I. The Concessionaire shall provide sufficient uniformed law enforcement officers with a marked law enforcement vehicle equipped with a blue flashing light for all interstate, primary and major secondary roadway nighttime work that is performed within the travel lanes.

3.8.6 Size and Weight Limitations

A. Hauling or Moving Material and Equipment on Public Roads: The Concessionaire shall comply with legal size and weight limitations in the hauling or moving of material and equipment on public roads unless the hauling or moving is covered by a hauling permit or is within the Project Right of Way.
B. The Concessionaire shall be liable for damage that results from the hauling or moving of material and equipment.

C. Furnishing Items in Component Parts of Sections: If the size or weight of fabricated or manufactured items together with that of the hauling or moving vehicle exceeds the limitations covered by hauling permit policies and other means of transportation are not available, permission will be given to furnish the items in component parts of sections with adequately designed splices or connections at appropriate points. Permission for such adjustments shall be requested in writing, and concurrence in writing shall be secured from VDOT prior to fabrication or manufacture of the items. The request shall state the reasons for adjustment and shall be accompanied by supporting data, including working drawings where necessary.

3.8.7 Use of Explosives

A. Explosives shall be stored and used in a secure manner in compliance with Good Industry Practice. Prior to prosecuting the Work, the Concessionaire shall conduct an on-site review of the work involved and develop a plan of operations for performing excavating work. Where feasible, the Concessionaire shall explore other means of loosening and or reducing the size of the excavation without blasting. When blasting becomes necessary, the Concessionaire’s plan of operations shall include a blasting plan detailing the blasting techniques to be used during excavation operations requiring the use of explosives. Both plans shall be submitted to VDOT for review prior to commencing blasting operations.

B. Explosives shall be purchased, transported, stored, used, and disposed of by a Virginia Certified Blaster in possession of a current criminal history record check and commercial driver’s license with hazardous materials endorsement and a valid medical examiner’s certificate.

C. The Concessionaire shall be responsible for damage resulting from the use of explosives. The Concessionaire shall notify each property and Utility Owner having a building, structure, or other installation above or below ground in proximity to the site of the Work of its intention to use explosives. Notice shall be given sufficiently in advance of the start of blasting operations to enable to owners to take steps to protect their property. The review of the Concessionaire’s plan of operations, blasting plan, and notification of property owners shall in no way relieve the Concessionaire of its responsibility for damage resulting from its blasting operations.
3.9 Maintenance of Traffic

3.9.1 General Requirements

A. The Concessionaire shall comply with pertinent requirements for maintenance of traffic (MOT) for the Work. The Concessionaire is responsible for safety of work zones. The Concessionaire shall appoint a single point of contact to address MOT and safety requirements.

B. Work zone information shall be shared with VDOT’s Eastern Region Operations (ERO) Advanced Traffic Management System (ATMS). Data sharing protocols shall be defined in the Traffic Management Plan and shall be reviewed by VDOT.

C. The Concessionaire shall provide a MOT Engineer to perform the following:

   1. Coordinate implementation of regional Transportation Management Plan as developed by VDOT;

   2. Oversee the design and implementation of the MOT Plans; and

   3. Coordinate MOT activities with the Public / Community Outreach staff and VDOT.

D. The MOT Engineer shall be a Professional Engineer registered in the Commonwealth of Virginia who has at least 5 years of MOT design and implementation experience or an individual demonstrating a minimum of 10 years experience in managing MOT design and implementation of similar project complexity.

E. The Concessionaire shall undertake appropriate traffic analyses for all MOT phase and stages in order to minimize traffic impacts.

3.9.2 Maintenance of Traffic during Construction

A. The MOT Engineer or designee shall be continuously available for MOT related activities during construction until Final Completion and elimination of all construction traffic control.

B. The Concessionaire shall conduct all work necessary to provide safe and efficient MOT during construction, including provisions for the movement of people, goods, and services through and around the Project while minimizing impacts to pedestrians, local residents, businesses, and commuters.
C. The construction activities will be performed in accordance with the Traffic Management Plan.

D. Existing VDOT Intelligent Transportation System (ITS) devices in the Project lanes shall remain operational throughout all of construction, unless replaced with temporary devices, until permanent ITS devices are fully operational. These ITS devices include:

1. Closed-circuit television (CCTV) cameras;
2. Dynamic message signs (DMS);
3. Ramp metering;
4. Detection;
5. Mile markers;
6. The existing reversible gate system; and
7. Weather stations.

E. Existing detection (traffic sensors) shall remain in place during construction activities, unless replaced with temporary devices. Replacement detection shall be installed, operational, integrated, and collecting data immediately upon taking in-pavement detection out of service.

F. The Concessionaire, at its sole cost and expense, shall be required to provide a uniformed law enforcement officer with a marked law enforcement vehicle equipped with a blue flashing light during set-up and take-down of all daytime intersection closures involving two or more lanes of traffic, as required in the Standard Documents.

G. Detour plans shall be developed by the Concessionaire and presented to VDOT for review and comment. The Concessionaire shall coordinate detour plans local, State and Federal agencies (as applicable) and submit and update the MOT Plan in advance of any planned detour activity. The Concessionaire shall be responsible for all planning, consultation and coordination with impacted parties, design, implementation and monitoring, and maintenance of detours whether within or outside the Project Right of Way. The provision of detours and marking of alternate routes will not relieve the Concessionaire of the responsibility for ensuring the safety of the public or from complying with any requirements of the Agreement.
H. Unless a design exception or design waiver is granted, the geometric design for temporary roadways and temporary traffic control shall be designed, at a minimum, to the existing posted speed limit.

I. During any suspension of Work, in accordance with the Agreement, the Concessionaire shall temporarily open to traffic such portions of the Project and temporary roadways as mutually agreed by the Concessionaire and VDOT.

J. Certified flaggers shall be provided in accordance with the requirements of the Virginia Work Area Protection Manual (VWAPM). Flaggers shall be able to communicate to the traveling public in English while performing the job duty as a flagger at the flagger station. Flaggers shall use sign paddles to regulate traffic in accordance with the requirements of the VWAPM. Flagger certification cards shall be carried by flaggers while performing flagging duties. Flaggers found not to be in possession of their certification card shall be removed immediately from the flagging site. Further, flaggers performing duties improperly will have their certifications revoked.

K. Connections with roads and public and private entrances shall be kept in a reasonably smooth condition at all times. Stabilization or surfacing material shall be applied to connections and entrances.

L. The Concessionaire shall schedule construction operations so that continuous access is provided to all affected roads and properties unless otherwise approved by VDOT. Connections or entrances shall not be disturbed by the Concessionaire until necessary. Once connections or entrances have been disturbed, they shall be maintained and completed as follows:

1. Connections that had an original paved surface shall be brought to a grade that will smoothly and safely accommodate vehicular traffic through the intersection, using pavement. Connections that had an original unpaved surface shall be brought to a grade that will smoothly and safely accommodate vehicular traffic through the intersection, using either the required material or a temporary aggregate stabilization course that shall be placed as soon as practicable after connections are disturbed.

2. Closures to mainline connections shall be minimized during construction. If there are delays in prosecution of work for other connections, connections that were originally paved shall have at least two lanes maintained with a temporary paved surface. Those that were not originally paved shall be maintained with a temporary aggregate stabilization course.

3. Mainline access/egress connections shall have all lanes open during construction unless otherwise agreed with VDOT. Other entrances shall be
graded concurrently with the roadway with which they intersect. Once an entrance has been disturbed, it shall be completed as soon as is practicable, including placing the required base and surface course or stabilization. If the entrance must be constructed in stages, such as when there is a substantial change in the elevation of the roadway with which it intersects, the surface shall be covered with a temporary aggregate stabilization course or other suitable salvaged material until the entrance can be completed and the required base and surface or stabilization course can be placed.

M. When the Concessionaire elects to complete the rough grading operations for the entire Project or exceed the length of one full day’s surfacing operations, the rough grade shall be machined to a uniform slope from the top edge of the existing pavement to the ditch line.

N. When the surface is to be widened on both sides of the existing pavement, construction operations involving grading or paving shall not be conducted simultaneously on sections directly opposite each other. The surface of pavement shall be kept free from soil and other materials that might be hazardous to traffic. Prior to opening of new pavement to traffic, shoulders shall be roughly dressed for a distance of three feet from the edge of the paved surface.

O. Where the Concessionaire places obstructions such as suction or discharge pipes, pump hoses, steel plates or any other obstruction that must be crossed by vehicular traffic, they shall be bridged in accordance with plans submitted by the Concessionaire and reviewed by VDOT. Traffic shall be protected by the display of warning devices both day and night. If operations or obstructions placed by the Concessionaire damage an existing traveled roadway, the Concessionaire shall repair damages, and if necessary, cease operations to do so.

P. Where existing hydraulic cement concrete pavement is to be patched, the operation of breaking and excavating old pavement shall extend for a distance of not more than two miles. Patching shall be coordinated with excavating so that an area of not more than one-half mile in which excavated patches are located shall be left at the end of any day’s work. Necessary precautions shall be taken to protect traffic during patching operations.

Q. The Concessionaire shall construct, maintain, and remove temporary structures and approaches necessary for use by traffic. After new structures have been opened to traffic, temporary structures and approaches shall be removed. The proposed design of temporary structures shall be submitted to VDOT prior to beginning construction of the structure.
3.10 Reporting

A. The Concessionaire shall prepare and provide to VDOT regular reports as more fully described below. All reports prepared by Concessionaire shall include, at a minimum, those items shown below in a format mutually agreed to with VDOT and sufficient to allow VDOT to meet its regulatory reporting responsibilities.

B. During the performance of the Design-Build Work, the Concessionaire’s weekly report shall include the following:

1. Specific construction schedule activities, including location of the work for the week concluding and the upcoming week;
2. Any proposed roadway or waterway closures;
3. Rolling 3-week forward-looking inspection notice, which shall include the fabrication schedule and planned construction activities; and
4. MOT weekly update, regarding any scheduled lane closures and identification of work areas for the ensuing two weeks.

C. During the performance of the Design-Build Work, the Concessionaire’s monthly report shall include the following:

1. Specific construction activities and deliverables planned for the next reporting period;
2. A progress narrative that describes, at a minimum, the overall progress for the preceding month, a critical path analysis, a discussion of problems encountered and proposed solutions thereof, any pending TIAs, float consumption;
3. Identification of activities requiring VDOT/FHWA input or assistance;
4. Action items/outstanding issues;
5. A work breakdown structure level 1 or level 2 design and construction schedule;
6. Project cost data as required by public funding agreements;
7. Quality management reporting, as defined within the Concessionaire’s QMSP, including quality inspection reports and daily inspection reports;
8. A statement by the Concessionaire that the schedule submitted is the Project Schedule;

9. Any changes to work including Notices of Intent, Work Orders, Change Orders, Liquidated Damages, Force Account work and any disputes;

10. Nonconformance reports and resolution reports;

11. Right of way acquisition activities;

12. Environmental compliance activities;

13. DBE/SWaM quarterly usage;

14. Safety activities;

15. Digital photographs in format acceptable to VDOT of the progress of the Project; and

16. A summary of any outstanding issues, any Delay Events, or Compensation Events that have occurred or are anticipated and the measures adopted (or to be adopted) to overcome such issues.

D. During the performance of the O&M Work, the Concessionaire’s quarterly O&M report shall be mutually agreed by the Concessionaire and VDOT and may include the following:

1. Planning and implementation of operations, including work plans for the future periods;

2. Roadway operations;

3. Incident response;

4. Routine maintenance activities;

5. Customer service log, detailing complaints or requests, and their disposition;

6. O&M inspections;

7. Long-term participation SWaM goal;
8. A summary of issues related to Performance Points during the reporting period;

9. Quality management activities; and


E. During the performance of the O&M Work, the Concessionaire’s annual report shall include the following:

1. Summary of quarterly issues and trends as required for VDOT’s reporting to FHWA; and

2. Annual budget(s), as required by the Agreement.

F. The Concessionaire Management Plan shall describe the proposed formats, means of distribution, and recipients of the reports.

G. The Concessionaire shall maintain at all times, at its office, a minimum of one hard-copy complete set of all reports shown above, for the previous six months only. All reports shall be available to VDOT for inspection and audit. Additional reports may be required, by mutual consent of the parties, and the reports listed above may also be deleted by mutual consent of the parties.

3.11 Third Parties and Permitting

3.11.1 Permitting

A. The Concessionaire shall coordinate in its dealings with Government Authorities and other entities having interests in the Project, with assistance from VDOT as reasonably requested. All permitting will be the responsibility of the Concessionaire unless otherwise required by Law. The Concessionaire shall provide copies of all permits and permit modifications to VDOT upon receipt.

B. Concessionaire will be responsible for all costs associated with compliance with any ordinance and applicable Law or any violations to Applicable Law attributed to the activities of the Concessionaire in accordance with the Agreement.

3.11.2 Third Parties

A. The Concessionaire shall give the Work the constant attention necessary to facilitate quality and progress and shall fully cooperate with VDOT and FHWA. If any portion of the Project is located within the limits of a municipality, military installation, or other federally owned property; the Concessionaire shall cooperate
with the appropriate officials and agents in the prosecution of the Work to the same extent as with VDOT.

B. The Concessionaire shall coordinate its activities with other contractors working in the area, facilitated by VDOT as applicable. The Concessionaire’s work program and schedule shall consider and coordinate with the work of other contractors involved with adjacent work including maintenance within and around the Project Right of Way.

3.11.3 Fire Hydrants

A. No Work shall be undertaken around fire hydrants, as required by local first responder guidelines, until provisions for continued service have been approved by the local fire authority.

B. When the Concessionaire’s Work requires the disconnection of “in service” fire hydrants, the Concessionaire shall notify the locality’s fire department or communication center prior to disconnection, as required by the local fire department. In addition, the Concessionaire shall notify the locality’s fire department or communications center after reconnection of such hydrants, as required by the local fire department.

3.11.4 Construction In, Over and/or Adjacent to Navigable Waters

A. The Concessionaire shall be responsible for obtaining a permit from the U.S. Coast Guard for the anticipated construction activities that cross a waterway and/or within the water channel under the jurisdiction of the U.S. Coast Guard.

B. Prior to starting demolition or construction operations the Concessionaire shall attend a coordination meeting with VDOT and the U.S. Coast Guard to present its planned operations and the potential impacts those operations may pose to water traffic. The Concessionaire shall, in consultation with the U.S. Coast Guard, establish the proper protocol for emergency closures and be governed accordingly. The protocols shall be confirmed in writing with VDOT and the U.S. Coast Guard and incorporated in the Project Development Plans.

1. Activities subject to Coast Guard regulation under the Permit. Following the U.S. Coast Guard coordination meeting, the Concessionaire shall incorporate its proposed schedule of operations as part of its Baseline Schedule. The Concessionaire shall be responsible for complying with all procedures, submittals, and schedule requirements set forth in the permit.
2. Activities that require channel closures or restrictions. In addition to the submittal of its proposed schedule of operations as described above, Concessionaire shall submit plans that comply with the Coast Guard Permit for falsework, cofferdams, dredging operations, floating equipment, fabricated tunnel segments and other obstructions to the channel or channels to VDOT for review. The Concessionaire’s attention is directed to the possibility that advance notice and time for review and approval of proposed operations by the US Coast Guard may vary depending on the type of proposed activities, the time of year for requested closure(s), the location of existing public oyster bed grounds, bridge(s) and waterway(s) involved, and the impact to entities served along or through the waterway(s).

C. VDOT shall review and provide written comments, if applicable, to the Concessionaire within 21 days following receipt of the Concessionaire’s plans. The Concessionaire shall incorporate VDOT’s comments and submit its plans to VDOT and to the U.S. Coast Guard. The Concessionaire may not commence activities that require channel closures or restrictions without the prior written approval of the U.S. Coast Guard. The Concessionaire shall be responsible for complying with all operational requirements that the U.S. Coast Guard may place on the Concessionaire as conditions of approval.

D. In addition, the Concessionaire shall request and obtain U.S. Coast Guard approval in writing before commencing any operations that deviate from the Concessionaire’s schedule of operations when these operations interfere or have the potential to interfere with navigation of water traffic outside of timeframes previously approved by the U.S. Coast Guard.

E. Notices shall be sent to the U.S. Coast Guard, Fifth District Bridge Office (OBR), 431 Crawford Street, Portsmouth, VA 23704-5004. Payment of any penalty or fine that may be levied by the U.S. Coast Guard for Concessionaire violations of bridge regulations found in 33 CFR Parts 115, 116, 117 and 118 shall be the responsibility of the Concessionaire.

3.11.5 Other Permitting for Construction In, Over and/or Adjacent to Navigable Waters

A. The Concessionaire shall be responsible for obtaining any other permits required by other State and Federal agencies including but not limited to the U.S. Army Corps of Engineers, the Virginia Department of Environmental Quality, and the Virginia Marine Resources Commission for the anticipated construction activities that cross a waterway and/or are otherwise under the respective agency’s jurisdiction.
B. Prior to starting demolition or construction operations the Concessionaire shall organize and attend coordination meeting(s) with VDOT and the respective agencies to present its planned operations and the potential impacts those operations may pose. The Concessionaire shall, in consultation with the agency(s), establish the proper protocol for permit compliance and conditions for work stoppage and be governed accordingly. The protocols shall be confirmed in writing with VDOT and the agency(s) and shall be incorporated in the Project Development Plans. VDOT and agency approval is required prior to commencement of construction activities.

3.12 Emergency Services

3.12.1 Liaison

The Concessionaire shall comply with VDOT requirements for participation in industry and statutory initiatives regarding emergency services.

3.12.2 Emergency and Extraordinary Services

A. The Concessionaire’s response to emergencies and extraordinary circumstances as part of the Project shall be in accordance with the Agreement and the Commonwealth of Virginia Emergency Operations Plan Volume 5 and shall ensure that:

1. Safety of motorists, pedestrians and workforce personnel shall be the primary objective for all decisions and actions;

2. Clearance of a travel lane for emergency response vehicles shall be by the most expedient route within the facility (in such circumstances, the decision of VDOT or the emergency services in charge shall govern);

3. Military vehicles acting in an emergency response capacity or in defense of the sovereign homeland of the United States of America shall be given free and unrestricted access to the facility; and

4. The Concessionaire shall participate in emergency exercises conducted by Governmental Authorities.

B. During special events that have significant impact on traffic flow, the Concessionaire shall designate a responsible party in charge to work with the VDOT District Public Information Manager (or designee) and ERO Incident Management Coordinator to develop traffic management plans for the event.
3.13 Safety

3.13.1 General Requirements

A. VDOT and the Concessionaire recognize that in every circumstance, activity, and decision related to the Project, safety of the public, VDOT personnel, and Concessionaire personnel is the primary concern. Ensuring and maintaining safety on the Project shall supersede any and all other objectives.

B. The Concessionaire shall designate a full-time project safety officer for the Term. The Safety Officer shall ensure that designated project personnel can be contacted by VDOT and emergency services personnel at all times.

3.13.2 Construction Safety and Health Standards

A. Compliance with construction safety and health standards is a condition of the Agreement, and shall be made a condition of each subcontract entered into pursuant to the Agreement. The Concessionaire and any Contractor shall not require any worker employed in performance of the Agreement to work in surroundings or under working conditions that are unsanitary, hazardous, or dangerous to their health or safety, as determined under construction safety and health standards promulgated by the U.S. Secretary of Labor in accordance with the requirements of Section 107 of the Contract Work Hours and Safety Standards Act.

B. The Concessionaire shall comply with the Virginia Occupational Safety and Health Standards adopted under the Code of Virginia and the duties imposed under the Code. Any violation of the requirements or duties that is brought to the attention of the Concessionaire by VDOT or any other person shall be immediately abated.

C. Unless otherwise determined unsafe or inappropriate in accordance with Occupational Health and Safety (OSHA) regulations, all Concessionaire personnel shall comply with all applicable safety requirements including but not limited to the following:

1. Hard hats shall be worn while participating in or observing all types of field Work when outside of a building or outside the cab of a vehicle, and exposed to, participating in or supervising construction.

2. Respiratory protective equipment shall be worn whenever an individual is exposed to any item listed in the OSHA standards as needing such protection unless it is shown that the employee is protected by engineering controls.
3. Adequate eye protection shall be worn in the proximity of grinding, breaking of rock and/or concrete, while using brush chippers, striking metal against metal or when working in situations where the eyesight may be in jeopardy.

4. A safety vest shall be worn by all exposed to vehicular traffic and construction equipment.

5. Standards and guidelines of the current Virginia Work Area Protection Manual shall be used when setting, reviewing, maintaining, and removing traffic controls.

6. Flaggers shall be certified in accordance with the Virginia Flagger Certification Program.

7. No person shall be permitted to position themselves under any raised load or between hinge points of equipment without first taking steps to support the load by the placing of safety bar or blocking.

8. All electrical tools shall be adequately grounded or double insulated. Ground Fault Circuit Interrupter (GFCI) protection must be installed in accordance with the National Electrical Code (NEC) and current Virginia Occupational Safety and Health (VOSH) agency. If extension cords are used, they shall be free of defects and designed for their environment and intended use.

9. No person shall enter a confined space without training, permits, and authorization.

10. Fall protection shall be required whenever an employee is exposed to a fall six feet or greater.

D. Concessionaire shall not impact any height restrictions at any overpasses through the use of but not limited to containment systems, false decking, etc.
DOWNTOWN TUNNEL/MIDTOWN TUNNEL/MLK EXTENSION PROJECT

The Technical Requirements

Comprehensive Agreement Exhibit C

Section 4

Operations, Maintenance, and Tolling
4 Operations, Maintenance, and Tolling

4.1 Inspection Requirements

4.1.1 General Requirements

A. The Concessionaire shall employ or shall cause the O&M Contractor to employ trained and competent personnel to plan and implement a program of inspections of the O&M Work. This program shall achieve the following:

1. Provide for the continuing safety of the O&M Work for users;

2. Prioritize Defects requiring immediate and urgent attention because they are likely to create a hazard or serious inconvenience to users;

3. Identify other Defects to be included for repair within the Concessionaire’s annually recurring maintenance and repair program (e.g., Life Cycle Maintenance Plan);

4. Responsiveness to reports or complaints received from stakeholders;

5. Take account of Incidents and Emergencies affecting the O&M Boundaries;

6. Monitor the effects of extreme weather conditions; and

7. Collate data to monitor performance of the entire project and to establish priorities for future maintenance operations.

B. The Concessionaire shall require personnel performing inspections of road pavements and structures to be certified as inspectors in accordance with Standard Documents in Section 3.5.

C. All structures, as defined by National Bridge Inspection Standards (NBIS), shall be inspected in accordance with the NBIS of the Code of Federal Regulations, 23 Highways – Part 650 and Structure IIM 27.6. The Concessionaire shall make available all inspection reports within two weeks of completion of the inspection report to the VDOT Hampton Roads District Bridge Engineer.
D. Concessionaire will be subject to the Performance Requirements in Attachment 4A.

4.1.2 Inspection Frequency

A. The Concessionaire shall establish inspection procedures and carry out inspections so that:

1. All Defects that present a hazard are identified, documented, and repaired such that the hazard is mitigated within the time scales set out in Attachment 4A; and

2. All other Defects are identified, documented, and repaired within the time scales set out in Attachment 4A.

B. The periods stated in Attachment 4A shall be deemed to be periods from the time the relevant Defect was first identified by or brought to the attention of the Concessionaire.

C. The Concessionaire shall consider all reports and complaints on the condition of the Assets received from all sources and investigate and respond as appropriate. The Concessionaire shall record these as O&M Records, together with details of all relevant inspections and actions taken in respect of Defects, including temporary protective measures and repairs. These records shall be made available to VDOT upon request.

4.1.3 Safety Inspections

The record of a safety inspection shall include details of the weather conditions, road surface condition, and any unusual features related to the method of inspection.

4.1.4 Environmental Inspections

The Concessionaire shall perform inspections of the tunnels and other Project facilities in accordance with the applicable regulatory requirements to determine compliance with all applicable environmental regulations and document the findings and follow-up corrective actions for regulatory violations. The Concessionaire shall also accommodate periodic environmental compliance assessment inspections performed by VDOT by providing access to all facilities, records, personnel, etc. and shall implement corrective actions for any identified regulatory violations.
4.1.5 General Inspections

A. The Concessionaire shall perform general inspections in accordance with the O&M Plan so that the repairs of all material Defects are included in planned programs of Work.

B. O&M Records in respect of general inspections shall include details of the manner of inspection (e.g., center lane closure or shoulder), the weather conditions, and any other unusual features of the inspection. These reports shall be made available for VDOT inspection upon request.

4.2 Maintenance Requirements

4.2.1 General Obligations

The Concessionaire shall operate and maintain within the O&M Boundaries pursuant to the Agreement, including Good Industry Practice.

4.2.2 O&M Data Management

A. Prior to Substantial Completion of each Project Asset, the Concessionaire shall implement a computer-based Maintenance Management System (MMS) to record inventory, failures, repairs, maintenance activities, inspections performance, communications, and notifications of Incidents and Defects. The Concessionaire shall enter all of the Assets into the MMS with Asset Identifications (IDs) consistent with those descriptions and units of measure used by VDOT. The inventory shall, where appropriate, include separate records for subcomponents of each Asset. All information shall be recorded in a consistent manner and shall be searchable by individual attributes.

B. The MMS shall include relevant condition information with respect to each Asset, including at a minimum location, equipment nomenclature, serial number, name, date of installation, technician ID, type of failure, date and time of failure, date and time of response to the site and date and time returned to service, preventive maintenance work, schedule work, work repair code, failure and repair history, Asset Residual Life, and statistical data on Mean time Between Failure (MTBF) and Mean Time to Repair (MTTR). Residual Life means the calculated duration that any Asset of the Project, subject to the type of routine maintenance of the Asset which is normally included as an annually recurring cost in highway maintenance and repair budgets, will continue to comply with any applicable Performance Requirement or standard after the end of the
Term, as per the terms of the Agreement, before Major Maintenance is required, determined through the application of Residual Life methodology and residual life inspections. The MMS shall be configured to report work by function code, Asset (or subcomponent), reference marker, crew and unit of measure.

C. Defects and responses to Defects shall be recorded on the MMS within seven days of them coming to the attention of the Concessionaire or action being taken. All other recording requirements shall be recorded on the MMS within 15 days of completion or occurrence of the relevant activity.

D. The Concessionaire shall ensure that the MMS is capable of generating the information required to demonstrate achievement of the Performance Requirements for each Asset.

E. The Concessionaire shall provide VDOT access to the MMS at all times for the purposes of auditing the accuracy of the Concessionaire’s O&M Records. Such access shall require advance notice from VDOT to the Concessionaire.

F. The MMS shall be kept updated and operational throughout the O&M Work.

G. The MMS data shall be provided to VDOT in a format (database type, level of detail, arrangements of data, etc.) agreed to amongst the parties. The data shall be updated and provided to VDOT on a quarterly basis. The Concessionaire shall provide information on specific queries within 3 business days when requested to do so by VDOT.

H. MMS data system shall be compatible with and interoperable with, VA Traffic, Work Order Requests, Asset Management System, etc.

4.3 Operations Requirements

4.3.1 General

The facilities will be supervised from a 24-hour manned operations control center located in the OCC, the precise location to be determined.

4.3.2 Data Collection

The Concessionaire shall provide traffic volume and classification data collected at the toll gantries in compatible format to VDOT’s data collection system.
4.3.3 Incident Management

A. The Concessionaire shall provide sufficient equipment and personnel to support incident and emergency management operations on the facility 24 hours a day, seven days a week, 52 weeks per year. The Concessionaire shall take necessary action using appropriate resources to handle any and all traffic control needs to ensure the safety of the incident scene and traveling public and to minimize the potential for pollution of watercourses or groundwater.

B. The Concessionaire shall coordinate with ERO TOC and other first responder community stakeholders in developing the incident management plans and when carrying out incident management operations.

C. Where structural damage to a structure in the facility is suspected, the extent of damage and condition of the structure shall be evaluated, documented, and reported by a bridge/structural engineer with the following qualifications:

1. A Professional Engineer, licensed in the Commonwealth of Virginia;

2. Meets the qualifications to be a “Team Leader” in accordance with the requirements of Article 650.307 of the National Bridge Inspections Standards, 23 CFR 650.3; and

3. Has extensive experience with in-service bridge inspection, emergency bridge inspection, maintenance, repair and rehabilitation of bridges, structural evaluations, and load ratings.

The above mentioned bridge/structural engineer shall be available to advise on temporary repairs and/or shoring that may be needed to provide safe clearance of the Incident or Emergency. Unless necessary to protect the safety of the public, the Concessionaire shall not remove any vehicle or other item that may assist the incident or emergency investigation until authorized to do so by the relevant law enforcement agencies.

D. The Concessionaire shall re-open the facility once appropriate safety and traffic management measures have been completed in accordance with Good Industry Practice and any issues related to Hazardous Substances have been mitigated in accordance with Good Industry Practice.
E. The Concessionaire must ensure that procedures are in place for public/agency notifications, incident management, ensuring the safety of motorists, handling of hazardous waste, and coordination with VDOT, police and other emergency personnel with respect to emergency Incidents and occurrences.

F. The Concessionaire shall identify a management-level, on-call “duty officer” consistent with VDOT’s Duty-Officer Policy.

4.3.4 Traffic Management – Identification of Incidents

Performance requirements for identification of Incidents are set out in Section 4.4.

4.3.5 Driver Information (Project)

The in-service availability (ISA) for T&DI for DMS (each sign) shall be as specified in Section 4.4. The ISA for traffic management DMS shall be as specified in Section 4.4.

4.3.6 Waste Disposal and Use of Hazardous Substances

The Concessionaire shall:

A. Dispose of, or cause the disposal of, all waste, residue, debris, materials and supplies (including paints, herbicides, and chemicals), grass and foliage clippings, dead animals, and all other waste materials produced or generated, in accordance with applicable regulatory requirements and Good Industry Practice;

B. Use, contain, store and dispose of all Hazardous Substances employed in connection with its activities during the performance of the O&M Work in accordance with the applicable requirements of the Agreement, including Good Industry Practice;

C. Assume responsibility, subject to direction from emergency responders taking responsible charge of an Incident, and in accordance with the applicable requirements of the Agreement, including applicable regulatory requirements and Good Industry Practice, for the cleanup, removal, transportation, storage, or disposal of any Hazardous Substances spills or releases;

D. Assume responsibility for the operations, maintenance, repairs and as necessary the replacement of all known underground and above ground...
storage tanks within the O&M Boundaries and shall re-register any regulated tanks with the Virginia Department of Environmental Quality with the Concessionaire identified as the tank “Operator”;

E. Assume responsibility as the permittee for compliance with the VPDES permit for the industrial minor discharge from tunnel washing/stormwater management and shall accept transfer of the permit from VDOT. The Concessionaire shall meet applicable VPDES MS-4 requirements; and

F. Develop an Operations Hazardous Materials Management Plan to address – at a minimum – the requirements under 4.3.6 A through F. The Plan shall also outline the process for the Environmental Inspections under 4.1.4 and standards for the management of hazardous materials records and other documentation.

4.4 Performance Requirements

4.4.1 General

A. The baseline Performance Requirements are set out in Attachment 4A.

B. All Incidents that occur within the facility are to be detected and classified within five minutes of occurrence.

C. Traffic management messages that contribute to the safety of motorists and road workers are to be applied within five minutes of the detection and classification of an Incident or the identification of deteriorated road conditions.

D. All incident information (including the character and severity of the Incident) is to be passed to VDOT within five minutes of the Concessionaire determining the incident classification.

E. The Concessionaire shall use the program of inspections supplemented by the Maintenance Management System to demonstrate compliance with the Performance Requirements Baseline Tables and shall report for each Asset, its performance in meeting all applicable criteria and Timeliness Requirements in the quarterly O&M report in a format to be agreed between the Concessionaire and VDOT prior to the commencement of O&M Services. Performance also shall be summarized in an end-of-year report, as outlined in Section 3.10.

F. The Concessionaire shall set forth as part of the O&M Plan, reviewed and updated as necessary, a document describing the means by which it
intends to demonstrate achievement of the Performance Requirements. This shall be consistent with Attachment 4A, the Performance Requirements Baseline Tables, and Good Industry Practice.

G. The Project shall be subject to VDOT’s Maintenance Rating Program (MRP), or subsequent updated or replacement program. The Concessionaire shall use the MRP to verify performance of each Asset against the criteria set out in the Performance Requirements Baseline Tables. The Concessionaire shall include in the end of year report outlined in Section 3.10, a summary of the results of annual assessments in a format to be agreed between the Concessionaire and VDOT.

4.5 Major Maintenance and Handback Requirements

4.5.1 Introduction and Handback Evaluation Plan

A. The purpose of this document is to set out Major Maintenance and Handback Requirements along with Residual Life Requirements for the Project.

B. This document describes the criteria to be used for handback from Concessionaire to VDOT at the end of the Term.

C. The Concessionaire shall handback all equipment, real estate, facilities, tools, computers, software, spares, office supplies, office equipment, furniture and vehicles that were purchased to support the direct O&M Work of the Project unless disposed of during Term as a function of the equipment’s useful life expiring. The Concessionaire shall submit to VDOT, a complete inventory listing all facilities, equipment, vehicles, tools, etc., that were purchased or leased to support the direct O&M Work. The inventory listing shall indicate whether each Asset is leased or purchased. The inventory listing should include the following:

1. Facilities: Date of Construction, Cost of Construction, Site Plans, Utility Plans, Maintenance Records and Supporting Service Contracts, and Condition Reports.

2. Equipment: Date of Purchase or Lease, Cost of Purchase or Lease, Procurement Source and Records to include any and all Warranties, if leased, actual Lease Agreement, and Maintenance Records.

3. Vehicles: Date of Purchase or Lease, Cost of Purchase or Lease, Procurement Source and Records to include any and all
Warranties, if purchased the Title, if leased, actual Lease Agreement, and Maintenance Records.

4. Real Estate: Date of Purchase, Cost of Purchase, any and all Deeds and all applicable records to include Surveys and Utility installations.

5. Tools and Spares: Date of Purchase, Cost of Purchase, Source and Records to include Warranties and, Maintenance Records.

6. Computers and Software: Date of Purchase, Cost of Purchase, Source, and all License Agreements.

7. Office Supplies, Office Equipment, Office Furniture: Date of Purchase, Cost of Purchase, Source, and Records.

D. The Concessionaire shall submit to VDOT 12 months prior to the date of transfer, a list of the current editions of all applicable fire life safety codes (NFPA, FHWA, etc.) standards that are in effect at that time. The Concessionaire shall also provide access to the facilities, reports on the conditions of the Assets and coordinate with VDOT such that VDOT can determine requirements to meet any applicable standards during the handback period.

E. The Concessionaire shall prepare a Handback Evaluation Plan that will be used to determine the condition, performance and Residual Life of the Assets. The Plan shall be submitted to VDOT at a minimum of five (5) years prior to the end of the Term. The Plan shall identify the testing, evaluation, and calculation methods that are to be utilized during the condition assessment and the calculation of the Residual Life of all Assets. The Plan shall include all of the pertinent tests, inspections, processes, and evaluations required to verify and demonstrate to VDOT that all equipment and systems function as intended and meet the applicable codes and standards of the Technical Requirements and meets the Residual Life Requirements as specified in this document. The Concessionaire shall update the Plan as needed to reflect changes in condition of the Assets or evaluation methodology determined following an inspection of the Assets by VDOT.

F. The Concessionaire shall transfer the facility and equipment necessary for the operation of the facility to VDOT in a safe, fully functioning and operable condition that has been verified through demonstration testing conducted by the Concessionaire and witnessed by VDOT or its designee. The detailed requirements of the demonstration testing are included
herein. The determination of the Residual Life shall be determined through the use of the Concessionaire’s Plan that consists of thorough inspection and evaluation of the Project facilities, all of which are to be witnessed by VDOT or its designee.

4.5.2 Major Maintenance and Life Cycle Maintenance Plan

A. The Concessionaire shall perform Major Maintenance as and when necessary so that all Assets are capable of meeting the appropriate Performance Requirements when subject to ordinary maintenance and so that any Defects which may affect the long term performance of the Project are repaired to prevent undue deterioration of any Asset. Major Maintenance is defined as an activity intended to repair, restore or replace an Asset that no longer functions, is obsolete or does not conform to current federal or state mandates for performance. The Concessionaire’s Life Cycle Maintenance Plan, as approved by VDOT, shall define those project work elements considered as Preventive, Ordinary and Major Maintenance.

B. In order to properly identify and plan for Major Maintenance throughout the Term, the Agreement describes the requirements for a Life Cycle Maintenance Plan to be prepared by the Concessionaire to include a description of all Major Maintenance expected to be undertaken during the following five-year period.

C. In addition to the requirements set forth in the Agreement, the Concessionaire shall submit the following as components of the Life Cycle Maintenance Plan:

1. The Concessionaire’s proposals for Major Maintenance, including the estimated timing and nature of work that the Concessionaire proposes during each period and possible triggers that may initiate Major Maintenance.

2. The estimated service life of each Asset (being the expected period that each Asset is expected to meet the Performance Requirements when first constructed and installed, subject to normal wear and tear and subject to standard programs of ordinary maintenance)

3. The Residual Life of each Asset.

4. A brief description of any Major Maintenance anticipated to be performed before the end of the Asset’s service life, including reasons why this work should be performed at the proposed time,
methods, resources required, traffic management proposed and the impact on tunnel availability.

5. The team organization, key roles and responsibilities including details of contractors and suppliers, if available, needed to perform Major Maintenance.

6. How the Concessionaire will meet the Asset inventory requirements associated with Major Maintenance.

7. The Life Cycle Maintenance Plan should be updated annually to reflect current conditions of the Assets.

8. Provide an annual pavement deterioration assessment.

D. The Life Cycle Maintenance Plan updates during the last five years of the Term will be subject to additional oversight by VDOT. The Plan shall utilize the Residual Life Methodology and testing requirements set forth below.

4.5.3 Residual Life Methodology and Inspections

A. General Requirements

1. The Concessionaire shall prepare and submit to VDOT for approval, a Residual Life Methodology, five (5) years before the end of the Term. The inspection requirements and Residual Life Methodology requirements are identified below.

2. The Residual Life Methodology shall contain the evaluation and calculation criteria to be adopted for the calculation of the Residual Life of each Asset at the end of the Term. The scope of any Residual Life testing shall be included together with a list of all independent certified testing organizations used by the Concessionaire and approved by VDOT or its designee.

3. VDOT, or its designee, may verify the inspection results by attending the Concessionaire’s inspections, performing separate inspections, and/or conducting spot checks.

4. VDOT’s concurrence of the Residual Life Methodology, including the scope and schedule of inspections, shall be required before commencement of residual life inspections.
5. Appendix A is provided with this document identifying Residual Life Methodology and requirements for non-tunnel items associated with the tunnel construction.

B. The Residual Life Methodology and associated inspections shall have the following components:

1. Road Pavements;
   
a. Inspection Requirements - Pavement inspections shall be undertaken by independent testing organizations as mutually agreed by Concessionaire and VDOT. Inspections shall provide a continuous or near-continuous record of Residual Life in each lane. Where the inspection method does not provide a continuous record of Residual Life, the number of valid measurements in each 0.1 mile section shall be sufficient to give a statistically valid result. Inspections shall be repeatable to an agreed level of accuracy and inspection contracts shall include an agreed proportion of inspections to verify accuracy. Inspections shall include ride quality, skid resistance, crack analysis, index summary and rutting, and visual distresses as outlined in VDOT’s “A Guide to Evaluating Pavement Distress Through the Use of Digital Images”, dated April 2006.

b. Residual Life Methodology Requirements – The Residual Life Methodology for road pavements shall be capable of calculation of Residual Life for each 0.1 mile section.

2. Tunnel Structures – General;

   a. Inspection Requirements - Inspections of structures shall be undertaken by independent testing organizations as mutually agreed by Concessionaire and VDOT. Inspections shall follow the latest published inspection guidelines (as they apply at the relevant date that the testing is undertaken) recognized by VDOT. A close examination shall be made of each structure. Nondestructive tests shall be undertaken appropriate to the type of structure. These shall include the measurement of chloride and carbonation profiles from surface to reinforcement and/or tendon level, and the in-situ strength testing of concrete elements. Testing of steel structures shall include the depth of...
corrosion and/or the measurement of remaining structural thickness for hidden and exposed parts. Representative samples of weld shall be tested for cracking at key areas of structural steelwork. It is noted that not all parts of the tunnel structures are accessible for visual inspection. The Concessionaire shall propose selected intrusive surveys or removal of internal finishings such as cladding or fire protection materials, or propose alternative methods to obtain the required information for residual life evaluation.

b. Residual Life Methodology Requirements – The Residual Life Methodology for structures shall:

i. Draw on historical asset maintenance records, inspection and test histories for each structure;

ii. Take account of VDOT and FHWA records of other structures with similar characteristics;

iii. Include an assessment of load rating capacity of the road slab based on the original structural design calculations, the As-Built drawings and results of load deflection tests where appropriate; and

iv. Take account of any trends in asset deterioration to determine the rate of deterioration and to predict the future condition of individual elements and the entire structure.

3. Tunnel Structures – Specific;

a. Inspection Requirements:

i. If cover plates are used at immersion joints all plates shall be removed to enable visual inspection of the omega seals and clamping bars and bolts. Torque levels shall be tested at a representative number of bolts. If reinforced concrete infill panels are used at immersion joints, inspection shall be undertaken with remote camera equipment using access points provided in the concrete infill in order to make a visual inspection of the condition of omega seals, clamping bolts and bars;
ii. The Concessionaire shall check for the presence of water in immersion joints in the void between the omega-type seals and gina-type gaskets and in the void above the omega-type seal in the base of the tunnel. If water is detected it should be evacuated and the rate of refill determined. Inspection shall be carried out in winter months and shall therefore be planned in good time relative to the anticipated handback date. If leakage is detected the Concessionaire shall include remedial works in the Life Cycle Maintenance Plan to manage or rectify as appropriate;

iii. Chloride profiles shall be measured and plotted from the surface of the concrete to the reinforcement level at key areas of reinforced concrete and prestressed concrete. A representative number of measurements shall be taken along the length of the tunnel. The Concessionaire shall propose a program of testing for this purpose. For the new tunnel, embedded corrosion probes shall be used to validate this information;

iv. Representative samples of critical welds that are accessible shall be tested for cracking by non-destructive methods at key areas of structural steelwork;

v. All surfaces of the tunnel structure, including approach tunnels and ramp structures shall be subject to detailed examination for leakage, spalling, discoloring, rusting or staining. Such Defects shall be accurately recorded through surface mapping, including their position, measurements and characteristics;

vi. Inspection of surface Defects shall be carried out in sufficient time to enable repairs to be undertaken within the last five (5) years of the Term;

vii. The surface defect survey should review all previous Defects encountered during the initial construction of the new tunnel and as identified on taking over the existing tunnel. It shall also review all Defects that may have arisen throughout the concession period in either tunnel structure, whether repaired or not. The current condition of all such Defects shall be considered as part of the residual life assessment; and
viii. Bathymetric survey shall be used periodically to verify the rock protection cover to the tunnel has not been removed through scour.

b. Residual Life Methodology Requirements:

i. The Residual Life Methodology for the tunnel shall draw on historical asset maintenance records, inspection and test histories and life cycle and durability analysis;

ii. Protective coatings to inaccessible steelwork shall be assumed to have deteriorated based on accessible steelwork of a similar nature to estimate the Residual Life;

iii. The settlement behavior of the tunnel over the duration of the concession shall be considered and a future forecast of settlement be made to determine the impact on the tunnel structure and joint performance;

iv. If tension anchors are used in tunnel approaches the Concessionaire shall document the assumptions made on the performance of the corrosion systems applied. Reasonably accessible anchors shall be tested during the last year of the concession to establish their integrity and load carrying capacity; and

v. If cathodic protection systems are employed with consumable items such as sacrificial anodes, the rate of consumption shall be assessed and the need for replacement determined.

4. Buildings and Enclosed Facilities (Structural Elements);

a. Inspection Requirements - Inspections for buildings and enclosed facilities shall comply with Good Industry Practice. The inspection scope and depth shall be determined by the inspecting organization but as a minimum shall be based upon FHWA requirements.

b. Residual Life Methodology Requirements – The Residual Life Methodology for buildings shall draw on historical asset maintenance records, inspection and test histories and
life cycle and durability analysis for each building and maintenance facility.

5. Building Mechanical Equipment (Plumbing and HVAC);
   
a. Inspection Requirements - Inspection scope and depth shall be determined by the inspecting organization but as a minimum shall be based upon FHWA requirements and manufacturer's inspection requirements.

b. Residual Life Methodology – Shall draw on historical inspection, maintenance and rehabilitation records for system components, including life cycle and durability analysis.

6. Building Mechanical Equipment (fire systems);
   
a. Inspection Requirements - Inspection scope and depth shall be determined by the inspecting organization but as a minimum shall be based upon FHWA requirements, manufacturer's inspection requirements and applicable NFPA Standards. Inspection shall be undertaken by a qualified Fire Protection Engineer or person(s) having a National Institute for Certification in Engineering Technologies (NICET) Level III certification.

b. Residual Life Methodology – Shall draw on historical inspection, maintenance and rehabilitation records for system components, including life cycle and durability analysis.

7. Building Electrical Systems;
   
a. Inspection Requirements - Inspection scope and depth shall be determined by the inspecting organization but as a minimum shall be based upon FHWA requirements, manufacturer's inspection requirements and applicable NFPA Standards. Inspection of electrical systems shall be undertaken by qualified individuals (InterNational Electrical Testing Association (NETA) or equivalent for electrical, NICET for fire alarm, other) and performed in accordance with NFPA 70B, as a minimum.
b. Residual Life Methodology - Shall draw on historical inspection, maintenance and rehabilitation records for system components, including life cycle and durability analysis.

8. Drainage;

a. Inspection Requirements - Inspection of storm sewer systems shall include CCTV inspection of all buried pipe work and cast-in pipe work, gullies, and sumps within the tunnel. Groundwater level monitoring at selected locations may be required to provide assurance for groundwater interceptor drains. Inspection of stormwater management systems to include ditches, stormwater basins, etc.

b. Residual Life Methodology - shall draw on historical asset maintenance records, inspection and test histories for each element of the drainage system. The Concessionaire shall include a methodology to determine the Residual Life of filter drains designed to intercept groundwater.

9. Earthwork Slopes;

a. Inspection Requirements - For embankment and cut slopes a risk based inspection procedure shall be adopted following Good Industry Practice. Deformation monitoring will be required to provide assurance of the required Residual Life.

b. The Residual Life Methodology shall draw on historical asset maintenance records, inspection and test histories for each element.

10. Ancillary items (beams, barriers, signals, fences, curbs, gutters)

a. Inspections of all ancillary items shall be undertaken by personnel having adequate training on modes of failure, risk assessment and observational skills.

b. The Residual Life Methodology shall draw on historical asset maintenance records, inspection and test histories for each ancillary element.

4.5.4 Major Maintenance for Handback
The Concessionaire shall prepare enhanced annual updates to the Life Cycle Maintenance Plan during the last five (5) years of the Term taking into account the results of the Residual Life Methodology and associated inspections and testing described above.

The results of the annual inspection of each Asset during the final five (5) years of the Term shall be submitted to VDOT for review by the Concessionaire. The Concessionaire shall provide an interpretation of these results and a predicted Residual Life of each component of the Project as set forth in Attachment 4B. The test results and interpretations shall be used by the Concessionaire to update the Life Cycle Maintenance Plan so that it contains an accurate description of the Major Maintenance necessary to meet the specified Residual Life Requirements.

The Concessionaire shall estimate the Residual Life of each Asset based on:

1. The Concessionaire’s reasonable expectations respecting the manner of use, levels of traffic, and wear and tear.
2. The results of the Project inspections described above.
3. The assumption that the Asset will continue to be subject to ordinary maintenance conforming to the Performance Requirements throughout its service life.

The Life Cycle Maintenance Plan for each of the five (5) years before the end of the Term shall include, in addition to any other requirements specified in the Agreement:

1. The Concessionaire’s calculation of Residual Life for each Operations and Maintenance Project Asset calculated in accordance with the Residual Life Methodology and taking into account the results of the inspections set forth above.
2. The estimated cost of the Major Maintenance needed for each component of the Project so that, at the end of the Term, each component will achieve its specified Residual Life.

In addition to the annual inspection, the Concessionaire shall undertake a specific handback inspection to verify that all maintenance activities identified as required to meet the Residual Life Requirements have been
satisfactorily undertaken. The timing and coverage of this inspection shall be set out in the Life Cycle Maintenance Plan.

F. Confirmation shall be obtained from the Concessionaire, at handback, that all record drawings, operating and maintenance manuals, data sheets and inspection and maintenance records are complete and up-to-date.

G. Confirmation shall also be obtained that the stock of spare parts is complete, in good condition and up-to-date in accordance with the inventory contained in the Operations and Maintenance Manual.

H. Prior to handback, all mechanical and electrical systems and equipment shall be subjected to thorough visual inspection of all accessible parts and performance testing to assess the following:

1. That the systems are complete and free from material Defects.

2. That the systems and equipment are performing in accordance with the design requirements, or as subsequently agreed with VDOT.

3. The estimated Residual Life before replacement is necessary.

I. If the Residual Life cannot be determined by inspection or testing, then other methods may be used as proposed by the Concessionaire and accepted by VDOT or its designee.

J. The inspection and testing shall take place sufficiently in advance of the handback date for any remedial action, necessary to achieve compliance with the Agreement, to be complete prior to handback.

4.5.5 Residual Life Requirements at Handback

Minimum Residual Life Requirements at Handback are specified in Attachment 4B Residual Life Table.

4.6 Tolling Requirements

4.6.1 General

The tolling system shall be operated and maintained by the Concessionaire to fulfill its obligations under the Agreement and in a manner such that ensures Performance Requirements are met. Prior to the end of the Term, the Concessionaire shall provide training to VDOT on the operation of the tolling system.
4.6.2 Performance Requirements

A. Roadside equipment shall have an ISA as specified in Section 4.4. This shall exclude scheduled downtime and loss of power outside the Concessionaire’s control.

B. The tolling system shall have an ISA as specified in Section 4.4, excluding scheduled downtime and loss of power.

C. The accuracy of transponder records shall be as specified in Section 4.4; i.e., the data supplied are complete and relate correctly to the transponder detected for properly fitted and operating transponders, and excluding non-normal operation due to signal attenuation from a metallic wind screen or similar.

D. The accuracy of payment claim records shall be as specified in Section 4.4; i.e., the data supplied are complete and relate correctly to the payment due for the trip, the displayed prices, and the transponder to which it relates.

E. Records shall be transmitted to VDOT in the IAG specification format, or as otherwise agreed between VDOT and the Concessionaire, except where VES manual quality control checks have not been completed.

F. Tag status files are to be loaded and distributed through the system and utilized for each tag transaction to ensure images are recorded for the correct vehicles. This should be completed within one hour of receipt from VDOT, (in accordance with the ETC Agreement) 99% of the time, subject to receipt of a confirmed accurate tag status file from VDOT.

G. The tag number captured from a tag shall be recorded with accuracy as specified in Section 4.4. This is subject to the transponder supplier Performance Requirements.

H. The Concessionaire shall maintain a regular policy and reporting procedure for tracking, cataloging and addressing customer complaints regarding improper or incorrect charges generated by the toll system. The policies and procedures shall contain an agreed method by which the Concessionaire and VDOT can determine whether any error in question occurred in the toll system or at VDOT’s CSC. Any unusual increase or anomaly in the number or type of complaints shall be investigated within 7 days after the end-of-month report and the results reported to VDOT.
including the results of toll system maintenance checks and corrective actions.

I. Accuracy for correctly assigning the transponder to the correct vehicle and therefore license plate, to be as specified in Section 4.4 for properly fitted and operating transponders, and excluding non-normal operation due to signal attenuation from to a metallic wind screen or similar.

4.6.3 Transactions

A. The Concessionaire shall ensure that, at all times, variable message signs along the facility display accurate information about toll rates and other travel information. Upon notification of the display of an incorrect toll amount, the Concessionaire shall reconcile or audit the data transmission within one business day to identify any and all other customer accounts that may have been impacted by the incorrect signage.

B. The Concessionaire shall comply with standards applicable to the retention of and use of customer records pursuant to Applicable Law, including § 33.1-56.4 of the Code of Virginia.

4.6.4 Roadside Tolling Equipment Support and Maintenance

The Concessionaire shall support and maintain all roadside tolling equipment and infrastructure installed related to the facility operations.

4.6.5 Information Technology Support and Maintenance

The Concessionaire shall carry out information technology service management in accordance with the Agreement, including Good Industry Practice.

4.6.6 Anti–virus Scanning and Protection

A. The Concessionaire shall maintain a constantly updated anti-virus and protection procedure to protect the tolling system from viruses and other destructive devices, and to manage the impact of virus attacks including transmission to the ERO ATMS or other VDOT or third-party systems.

B. The Concessionaire shall immediately notify VDOT of any infection by computer virus or similar destructive devices upon identification.

4.6.7 Interfaces

The Concessionaire shall continuously monitor all interfaces for the tolling system. The monitoring should include availability, throughput, performance,
buffer usage, queue lengths, hardware status, system alarms and warnings, and any other diagnostic data provided by the Concessionaire’s implementation of the interfaces.

4.6.8 System Back-up and Recovery

A. The Concessionaire shall provide data security for the tolling system. Data security shall include the following:

1. Backup of all software and configuration following each release of, or change to, the system, including any disaster recovery site;

2. Daily back-up of all new/changed data held on the tolling system;

3. Removal of the media used for the daily back-up to a secure offsite location within 24 hours (or other agreed timeframe); and

4. Storage of one month of the data back-ups in a secure offsite location.

B. Backups shall not affect the tolling system’s ability to capture, store or process detection data.

4.6.9 System Failure

A. The Concessionaire shall notify VDOT immediately on becoming aware of any event or the likely event of any system failure that results in a critical element of the tolling system not functioning, or that results in or is likely to result in an unacceptable impact on the public, VDOT, or a third party.

B. VDOT will notify the Concessionaire immediately of any event or the likely event of any system failure that results in a critical element of the ERO ATMS not functioning, or that results in or is likely to result in an unacceptable impact on the public, the Concessionaire, or a third party.

C. Where the relevant system failure affects or may affect a third party, VDOT, or its agents, the Concessionaire shall provide VDOT with all necessary assistance in resolving the relevant system failure by cooperating fully and expeditiously with the third party, VDOT, or its agents, as appropriate.

D. Where the relevant system failure was caused by VDOT or its agents, VDOT will provide the Concessionaire with all necessary assistance co-
operation in resolving the relevant system failure, by cooperating fully and expeditiously with the third party or Concessionaire, as appropriate.

4.6.10 Reporting

The Concessionaire shall report on the performance achieved against each of the Performance Requirements in each reporting period, in accordance with Section 3.10 (Reporting).

END OF THE TECHNICAL REQUIREMENTS
DOWNTOWN TUNNEL/MIDTOWN TUNNEL/MLK EXTENSION PROJECT

The Technical Requirements

Comprehensive Agreement Exhibit C

Attachment 1A

Basis of Design MLK
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1  General

The purpose of the documentation provided herein is to establish the Basis of Design for the New MLK Extension (MLK) component of the Project. The information provided herein serves as documentation of the starting assumptions in developing the design for the Project, so that assumptions of each discipline are coordinated and interface properly. Relevant codes and standards specific to the MLK and used to develop the Design Criteria may be included. The Basis of Design is a “living document” that may evolve as necessary to meet specific needs of the Project and the specific desires and needs of the Contractor.

The Final Basis of Design is issued as Revision 0. Any subsequent modifications to the Final Basis of Design will be submitted to SKW for review and approval, and issued with the subsequent Revision Number.

Consultant - Shall be defined as PB Americas, Inc. and all subconsultants and vendors under direct contract to PB Americas, Inc., necessary for design of the project.

Contractor - Shall be defined as a joint venture consisting of Skanska USA Civil Southeast, Inc.; Kiewit Construction Company; and, Weeks Marine, Inc.

The MLK Design Criteria and Basis of Design cover the MLK extension from London Boulevard south to the I-264 Interchange, and along I-264 from the western end of the project to approximately 500 feet east of Des Moines Avenue.

All relevant codes and procedures as stated in the Design Criteria will be followed for each discipline. The codes and procedures will be applied to carry forward the chosen alignment (Alternate E, Option 4) as defined in the Interchange Justification Report (IJ R), and modified as listed in Section 9.2 of this Basis of Design. The Level of Service (LOS) to be provided will be in accordance with the IJR.

Codes and order of precedence for roadway design:

High  Design Criteria
     ↓  VDOT 2007 Road and Bridge Specifications
     ↓  VDOT Instructional and Informational Memoranda current on January 7, 2010.
     ↓  VDOT 2005 Road Design Manual
     ↓  VDOT Drainage Manual, rev 4/10
     ↓  VDOT 2008 Road and Bridge Standards
     ↓  AASHTO Green Book, 5th ed.
     ↓  FHWA 2009 MUTCD
Low   VDOT 2005 Work Area Protection Manual

Codes and order of precedence for bridge design:

The goal for the operational levels of service for the design year will be LOS D for freeways and signalized intersections within the project limits.

2 Not Used

3 Civil

MLK Extension Preliminary ROW Plans

Phase 2 Design will update the information developed in the existing right-of-way plans to a level of effort sufficient to establish a final construction cost. The alignment has been defined in the Interchange Justification Report as Alternate E, Option 4. Option 4 provides a flyover ramp at Frederick Boulevard and eliminates the Des Moines Avenue Interchange. South Street access to I-264 WB is also eliminated.

3.1 Survey

a. The survey data will include all primary stormwater outfall locations from existing facilities within the Project area.

b. The survey has been completed in accordance with VDOT’s Survey Manual and reference documents.

3.2 Utilities

a. Utility Relocations will be designed to minimize the acquisition of property and to avoid conflicts with existing storm drainage systems and other existing utilities.

b. Existing utility data (type, size, & location) will be presented on the Project base mapping. In addition, utility easements will be identified and presented on the Project base mapping.

3.3 Stormwater and Drainage

a. The Consultant will develop preliminary hydrologic and hydraulic (H&H) plans and reports covering the area along I-264 from the Ramp EN terminus west of Frederick Boulevard to the east side of Des Moines Avenue and along the MLK Extension from I-264 to the south side of London Boulevard.
b. The hydraulic design will be developed in sufficient detail to determine the need, location and sizing of stormwater detention facilities and the location of all primary stormwater outfall locations from proposed facilities.

c. The Consultant will establish contact with VDOT’s Hydraulics Section and the City of Portsmouth to coordinate the location of any such detention facilities and determine permitting requirements.

d. Design will be in accordance with VDOT’s April 2010 Drainage Manual.

e. Design will be coordinated with information provided to the Consultant under Item 3.2 above.

f. It is assumed that the project does not include any drainage design facilities having $Q_{100} > 500$ cfs.

g. No Conditional Letter of Map Revisions (CLOMRs) for modification to any floodway boundary are expected to be needed on this project.

### 3.4 Right-of-way Plans

a. Plans will delineate the right of way and right-of-way acquisition areas, temporary construction easements, utility easements, limited access, permanent drainage easements, other permanent easements, etc.

b. The Consultant will coordinate this effort with VDOT, the City of Portsmouth and Project surveyor.

c. Geometric design will be in accordance with the recommendations in the [2007] Interchange Justification Report and VDOT’s current design standards as specified in the Project Design Criteria. See Section 1 for list of applicable codes and order of precedence.

d. Draft Sequence of Construction (SOC) plans will be prepared by the Consultant as part of Item 3.4. The SOC Plans will be developed in accordance with VDOT Work Area Protection Manual, dated 2005 and FHWA’s 2009 Manual on Uniform Traffic Control Devices, and VDOT IIM LD-241.4.

### 3.5 Roadway Lighting System

The exterior roadway lighting system design shall comply with the latest applicable codes, regulations, and standards. All roadway lighting fixtures and pole placements, along with elevations, must account for light trespass.

#### 3.5.1 Lamps and Ballasts
In general, high pressure sodium lamps will be used for mainline roadways and multi-lane ramps. Lower wattage lamps shall be used where mounting heights are severely restricted such as on local streets or ramps. As a rule, the design is to utilize the fewest lamp types possible throughout the Project.

### 3.5.2 Luminaires - IESNA Distribution Types

Luminaires with IES Type I, II, III or IV, and full cut-off classifications for lateral and vertical light distribution/control shall be used for this Project. Additional shielding may be required to control light trespass where main line roadways parallel or cross multi-level ramps are located close to the right of way.

#### 4 Geotechnical

See 9.6

#### 5 Not Used

#### 6 Not Used

#### 7 Not Used

#### 8 Not Used

#### 9 MLK Structures

**MLK Bridges - Main Line and Ramps**

Phase 2 Design will carry forward the information developed in the existing Stage I plans to a level of effort sufficient for the Contractor to establish preliminary quantities for a construction cost estimate. The alignment has been defined in the Interchange Justification Report as Alternate E, Option 4. Option 4 provides a flyover ramp at Frederick Boulevard and eliminates the Des Moines Avenue Interchange. South Street access to I-264 WB is also eliminated.

#### 9.1 Design Criteria (Loads, Forces, Materials)

a. Loads, Forces and Material properties are defined in the Design Criteria Document.

#### 9.2 Alignment

a. Alignment is defined as Alternate E, Option 4 with the following exceptions:
• Minor adjustments to the horizontal alignment will be made to accommodate the newly discovered cemetery near the I-264 Interchange.

• Additional minor adjustments will be made to accommodate utilities, clearance criteria and CSX Railroad.

• A design exception will be required at London Boulevard to accommodate the substandard ramp geometry. Design will proceed with existing ramp geometry.

• The proposed SPUI Interchange at High Street will not be advanced.

9.3 Bridges

9.3.1 Span Arrangements

a. Spans will be made continuous where practical to eliminate expansion joints on the bridge.

b. Continuous span units will be limited to a practical length to use strip seal expansion joints. Long expansion movements will be avoided to avoid the use of finger joints.

c. Joints will be armored due to a high design volume of truck traffic.

9.3.2 Superstructures

a. VDOT’s Prestressed Bulb-Tee (PCBT) sections will be used where practical for the entire alignment.

b. Concrete girders, when used, will be placed on short chords when used on a curved alignment. The span lengths will be set based on a minimum overhang on the inside of the curve and a maximum allowed overhang on the outside of the curve. See Design Criteria Section 9.3 for maximum and minimum limits for deck overhangs.

c. Steel girders will be investigated when spans longer than 130 ft. are required or when complex framing is required to accommodate on and off ramps to mainline. Details for girders will be in conformance with VDOT Standard Practice and the “Guidelines for Design Details” published by AASHTO/NSBA Steel Bridge Collaboration. A span unit comprised of multiple continuous spans will not contain both steel and concrete girders.

d. Bridge decks will consist of reinforced concrete slabs with stay-in-place metal forms.

9.3.3 Substructures

a. Pier types will either be hammerhead or multi-column bents founded on footings with prestressed concrete piles.