-- STATE OF NORTH CAROLINA--
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

BOOK 2, TECHNICAL PROVISIONS

TIP I-3311C, I-5405, I-4750AA

June 26, 2014

CONTRACT ID:	C 203406
WBS ELEMENT NO.	45454.3.P3S1
FEDERAL-AID NO.	NHPF-077-1(216)
COUNTY:	Mecklenburg and Iredell Counties
ROUTE NO.	I-77 and I-277
LOCATION:	I-77 from I-277 to Exit 36, and I-277 from I-77 to Exit 3A/B
TYPE OF WORK:	PUBLIC PRIVATE PARTNERSHIP FOR I-77 HOT LANES AS SPECIFIED IN THE CA DOCUMENTS

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1 GENERAL

As a part of the Strategic Highway Network, the I-77 corridor is critical to providing a network of high-speed, safe, reliable highways throughout North Carolina. The Project is to develop, design, build, finance, operate, and maintain HOT Lanes along a portion of the I-77 corridor and I-277 as described in this Section 1 of the Technical Provisions. The Project is generally located within an approximately 26 mile-long portion of the I-77 corridor and an approximately one and one-fourth mile portion of I-277 in the City of Charlotte, and in Mecklenburg and Iredell Counties, North Carolina. The Project generally involves:

- the conversion of the Existing HOV Lanes on I-77 within the Charlotte-Mecklenburg region, to HOT Lanes;
- the addition of a second HOT Lane adjacent to the converted Existing HOV Lane, and the addition and extension of the HOT Lanes in each direction for approximately ten miles to the north and approximately two miles to the south of the Existing HOV Lanes on I-77;
- the construction of one HOT Lane in each direction connecting directly I-77 and I-277 and continuing on I-277 for approximately one and one-fourth mile south of such direct connection (approximate MM 3.2);
- widening and rehabilitating both the Existing HOV Lanes and Existing General Purpose Lanes;
- providing new Structures;
- modifying, widening and/or rehabilitating or replacing existing Structures;
- providing Intelligent Transportation System (ITS), Electronic Toll Collection System (ETCS) infrastructure and systems to establish Open Road Tolling (ORT) with variable pricing operation on the HOT Lanes; and
- providing maintenance, operation and rehabilitation of certain Highway assets within the Project ROW for the Term as provided in the CA Documents.

1.1 Project Scope

The Project Scope in this Section 1 of the Technical Provisions is an overview of the Project and details of the Project are contained elsewhere in the Technical Provisions.

The Project is divided into three Project Sections as further described in Sections 1.1.1, 1.1.2, and 1.1.3 of the Technical Provisions: the North Section, the Central Section, and the South Section (see Figure 1).

The limits of the Project shall be defined by the Project Right of Way (ROW). For avoidance of doubt, the Project also includes any Elements installed by Developer outside the Project ROW.

The Project includes an ITS and an ETCS that support safe operations of the Project and ORT of the HOT Lanes and dynamic tolling, in accordance with the CA Documents and in particular Article 3 of the Agreement, Exhibit 4 and Exhibit 18 of the Agreement, Section 21 of the Technical Provisions, and Section 24 of the Technical Provisions. Developer shall maintain safe travel conditions while maximizing reliability and availability for the Users of the HOT Lanes and the traveling public on the General Purpose Lanes.

Developer shall not design, construct, or operate HOT Lane configurations with reversible flow.

Figure 1 Project Location

1.1.1 Central Section

The Central Section begins just north of the I-77/I-85 interchange (Exit 13) at approximately MM 13.8 and extends northward along I-77 to just north of Catawba Avenue (Exit 28) at approximately MM 28.7 with an approximate length of 15 miles. The exact length and location of start and end points shall be determined by Developer's Design Documents.

Developer shall undertake all Work in the Central Section necessary to:

- convert the NB Existing HOV Lane to a HOT Lane from approximately MM 13.8 to approximately MM 19.4 and extend this NB HOT Lane to approximately MM 28.7;
- construct an additional NB HOT Lane from approximately MM 13.8 to approximately MM 28.7;
- convert the SB Existing HOV Lane to a HOT Lane from approximately MM 13.8 to approximately MM 20.6 and extend this SB HOT Lane to approximately MM 28.7;
- construct an additional SB HOT Lane from approximately MM 13.8 to approximately MM 28.7;
- mill and pave the General Purpose Lanes as required in Section 11 of the Technical Provisions;
- construct box culverts and extend existing box culverts as required by Developer's design;
- modify or remove and replace Structures and access ramps and loops within the Project ROW to the extent required by Developer's Design Documents;
- provide at a minimum the number of ingress/egress locations in each direction as detailed below. Ingress and egress locations may be separated, but access both into and out of the HOT Lanes shall at a minimum be provided at the locations identified below. Developer at its discretion may propose alternate ingress or egress points other than those identified below as outlined in Section 10.2.2 of the Technical Provisions. Developer at its discretion may provide additional ingress or egress points or, to the extent permitted by Environmental Approvals, provide direct access ramps to/from the HOT Lanes.
- The exact locations of ingress and egress shall be determined by Developer, but shall be provided at a minimum as follows:
    - on I-77 between Exit 13 (I-85) and Exit 18 (WT Harris Blvd.);
    - on I-77 between Hambright Road and Exit 23 (Gilead Road);
    - on I-77, a southbound ingress and a northbound egress between Exit 25 (Sam Furr Road) and Westmoreland Road at a location sufficiently south to account for a future diverging diamond interchange located at Westmoreland Road or at a new alignment in the vicinity of Westmoreland within 2000 feet of the existing Westmoreland Road crossing of I-77; and
- provide all other Work required by the CA Documents.

1.1.2 North Section

The North Section begins just north of Catawba Avenue (Exit 28) at approximately MM 28.7 and extends northward along I-77 to north of NC 150 (Exit 36) at approximately MM 37.0 for a length of approximately eight miles, providing for a seamless, continuous HOT Lanes connection with

the Central Section. The exact length and location of start and end points shall be determined by Developer's Design Documents.

Developer shall undertake all Work in the North Section necessary to:

- construct one NB HOT Lane from approximately MM 28.7 to approximately MM 37.0;
- construct one SB HOT Lane from approximately MM 28.7 to approximately MM 36.5;
- mill and pave the General Purpose Lanes as required in Section 11 of the Technical Provisions;
- modify or remove and replace Structures and access ramps and loops within the Project ROW to the extent required by Developer's Design Documents;
- construct box culverts and extend existing box culverts as required by Developer's design;
- replace at a minimum Bridge No. 590364 – Griffith Street (SR 2158) over I-77;
- end the HOT Lane designation on NB I-77 south of the Brawley School Road (Exit 35) and construct transition widening, with elimination of the buffer, between the HOT and General Purpose lanes;
- provide a logical and safe terminus for the NB HOT Lane, a minimum of 3,000 feet beyond the termination of the NC 150 to I-77 NB on ramp, using a left lane drop;
- construct one SB median HOT Lane up to a maximum of one half mile north of NC 150;
- begin the SB HOT Lane designation on I-77 directly south of the Brawley School Road (Exit 35);
- provide at a minimum the number of ingress/egress locations in each direction as detailed below. The ingress and egress locations may be separated, but access both into and out of the HOT Lanes shall at a minimum be provided at the location identified below. Developer at its discretion may provide additional ingress or egress points or, to the extent permitted by Environmental Approvals, provide direct access ramps to/from the HOT Lanes. The exact locations shall be determined by Developer, but shall at a minimum, include a southbound ingress and a northbound egress between Exit 31 (Langtree Road) and Exit 33 (Williamson Road) on I-77. Developer at its discretion may propose alternate ingress or egress points other than those identified as outlined in Section 10.2.2 of the Technical Provisions. Developer at its discretion may provide additional ingress or egress points or, to the extent permitted by Environmental Approvals, provide direct access ramps to/from the HOT Lanes;
- provide all other Work required by the CA Documents.

1.1.3 South Section

On I-77, the South Section begins just north of the I-77/I-277 interchange (Exit 11) at approximately MM 11.2 and extends northward along I-77 for approximately two miles to just north of the I-77/I-85 interchange (Exit 13) at approximately MM 13.8, providing for a seamless, continuous HOT Lanes connection with the Central Section. On I-277, the South Section includes a seamless, continuous HOT Lanes connection in both directions from I-77 as described in this Section 1.1.3 of the Technical Provisions for approximately one-and-a-quarter (1.25) miles. The exact length and location of start and end points of the HOT lane designation and enforcement shall be determined by Developer's Design Documents; however, in both

directions, the HOT Lanes designation on I-277 will begin between N. Church Street and N. Tryon Street.

Developer shall undertake all Work in the South Section on I-77 necessary to:

- construct one NB HOT Lane on I-77 from approximately MM 11.2 to approximately MM 11.4 at the terminus of the direct connection HOT Lanes to the I-277 HOT Lanes;
- construct two NB HOT Lanes on I-77 from south of Oaklawn Avenue at approximately MM 11.4 to approximately MM 13.8;
- convert the SB Existing HOV Lane to a HOT Lane from approximately MM 11.4 at the terminus of the direct connection HOT Lanes to the I-277 HOT Lanes to approximately MM 13.8;
- construct one additional SB HOT Lane from approximately MM 11.2 to approximately MM 13.8;
- mill and pave the I-77 General Purpose Lanes as required in Section 11 of the Technical Provisions;
- modify or remove and replace Structures and access ramps and loops within the Project ROW to the extent required by Developer's Design Documents;
- replace at a minimum Bridge No. 590286 – Oaklawn Avenue over I-77;
- replace at a minimum Bridge No. 590153 – LaSalle Street over I-77;
- design and construct new bridges and widen and lengthen existing bridges in accordance with Alternate Technical Concept No. Cintra ATC-01 subject to the conditions outlined in the Department letter dated January 21, 2014. If the conditions of this letter cannot be met, then:
    1. replace at a minimum Bridge No. 590297 – I-77 SBL over I-77 NBL at the I-85 interchange;
    2. construct a new two lane NB HOT Lane Bridge over I-77 SB just north of I-85;
    3. construct a new two lane NB HOT Lane Bridge over I-85;
- remove the existing pedestrian Bridge (Bridge No. 590293) over I-77 located just north of LaSalle Street;
- shift the alignment of I-77 south of Lasalle Street to the East as further described in Section 10.2.1 of the Technical Provisions;
- construct box culverts and extend existing box culverts as required by Developer's design;
- begin and end the HOT Lane designation for the I-77 NB HOT Lane and SB HOT Lane, respectively, immediately south of the intersection with the direct connection HOT Lanes to the I-277 HOT Lanes; and
- provide all other Work required by the CA Documents.

Developer shall undertake all Work in the South Section on I-277 necessary to construct direct connection HOT Lanes between the I-77 HOT Lanes and I-277 with one HOT lane in each direction, as well as to:

- add one SB (inner) lane starting between Hamilton Street and NC Music Factory Boulevard;
- end the additional outside SB (inner) lane immediately prior to N. Brevard Street using a right lane drop providing a logical and safe terminus to the additional SB (inner) lane;
- add one additional NB (outer) lane starting at N. College Street, providing a logical and safe beginning for the lane;
- start the NB (outer) HOT Lane designation and end the SB (inner) HOT Lane designation between N. Church Street and N. Tryon Street;
- mill and pave the General Purpose Lanes as required in Section 11 of the Technical Provisions;
- modify or remove and replace Structures and access ramps within the Project ROW to the extent required by Developer's Design Documents; and
- provide all other Work required by the CA Documents.

To the extent permitted by Environmental Approvals, Developer may provide direct connections between the HOT Lanes and I-85, at Developer's discretion.

1.2 General Requirements

Developer's overall design of the Project shall take into consideration existing lane configurations, traffic flow patterns, grade separations, vertical and horizontal clearances, ROW, and access points to provide for a functional and safe system of HOT Lanes and GP Lanes meeting the requirements of the CA Documents.

Developer's Design Documents shall include all three Project Sections and shall accommodate Existing Assets that are to remain in place and Elements constructed by Developer including any improvements to ramps and cross streets, as specified under the CA Documents. Developer shall address all requirements identified in all Governmental Approvals including Environmental Approvals and otherwise meet all Environmental Commitments for the Project.

Developer shall design and construct all roadway Elements in accordance with the requirements of Section 10 of the Technical Provisions. Changes in alignments or other Elements proposed by Developer, to the extent that they require an evaluation for compliance with the NEPA Approvals, shall be as set forth in Section 6.2.6 of the Agreement and Section 4.2 of the Technical Provisions.

Prior to submitting any Conceptual Design Submittal, as detailed in Section 2.9 of the Technical Provisions and no later than 30 days following NTP1, Developer shall meet with NCDOT to review the design features of Developer's Technical Proposal. Developer shall have resolved all comments from NCDOT following this meeting as part of Developer's Conceptual Design Submittal.

Developer shall perform all Work for the Project in accordance with CA Documents, including Book 2 and Book 3, Good Industry Practice, Developer's Design Documents, Developer Management Plan, Environmental Approvals, NCDOT-Provided Approvals and other Governmental Approvals. Developer may incorporate existing physical infrastructure in the design, construction, and/or reconstruction of the assets for the Project, provided the Work meets the requirements of the CA Documents.

Developer shall perform all coordination and communication with NCDOT and all third parties and all Governmental Entities as may be necessary for the execution of the Work in accordance

with the CA Documents and as further specified in Section 3, Section 5, Section 6, and Section 16 of the Technical Provisions. In particular, Developer shall perform all coordination and communication with NCDOT and all third parties and all Governmental Entities as may be required during design development to determine the design criteria, standards, and specifications for the execution of the Work.

Any existing land, infrastructure, or other physical assets disturbed, impacted, or damaged, during the Work, whether inside or outside the Project ROW, and remaining in place after such Work is completed, shall be repaired or otherwise restored by Developer to its condition at NTP2 as soon as possible if such land, infrastructure, or assets are located outside of the Project ROW and immediately upon completion of such Work if such land, infrastructure, or assets are located within the Project ROW.

Develop shall protect NCDOT and third party assets within and outside the Project ROW from damages or impacts caused Developer's Work. Any such damage caused by Developer's Work shall be repaired promptly by Developer.

Except as expressly provided otherwise, the requirements in the Technical Provisions pertaining to Design Work and Construction Work performed during the period from NTP1 to Final Completion shall also apply to Renewal Work.

1.3 O&M Work and Handback Requirements

From March 31, 2015 until the end of the Term, Developer shall undertake its O&M Work within the Project Right of Way and the O&M Work for any additional Project Elements that may be installed, constructed, provided, or made available by Developer outside the Project Right of Way. Developer shall be responsible for all O&M Work within the Project ROW, with the exceptions noted in Section 23 of the Technical Provisions.

Developer shall establish a self-monitoring program to ensure a safe and reliable roadway system and operate and maintain the Project with the main objectives of maximizing public safety, reliability, and roadway availability and verify compliance with the CA Documents. Developer shall coordinate, plan, and perform its O&M Work required under the CA Documents in a manner that will provide safe conditions for the operations and maintenance staff, Emergency Response personnel, and the traveling public using the Project, while minimizing traffic disruptions.

The scope of the O&M Work to be provided by Developer is described in Section 23 of the Technical Provisions and shall include, but shall not be limited to, the following:

- providing for the operations and maintenance of the Project within the Project Right of Way for the duration of the Term;
- providing for the Renewal Work for certain Project Elements;
- providing Incident Response and Emergency Response and Emergency repair; and
- providing 24 hours per day, seven days per week monitoring of the Project.

Developer shall submit, 60 months prior to the end of the Term, a Handback Renewal Work Plan to NCDOT for approval in its good faith discretion that sets out Developer's proposed processes for:

- assessment of the condition, performance and Residual Life of the Project assets at the Termination Date;

- Renewal Work performed by Developer through maintenance, repair, reconstruction, rehabilitation, restoration, renewal or replacement of Project assets such that the assets comply with the acceptance criteria that measures the condition, performance, and specified life of the respective Project assets remaining at the end of the Term;
- plan for the transition of operation and maintenance responsibilities to NCDOT and acceptance of the Project assets and operation and maintenance responsibilities upon satisfaction of the acceptance criteria; and
- NCDOT staff training on all O&M manuals, systems, and procedures for the continued operation of the Project by NCDOT after the end of the Term.

Developer shall coordinate all aspects of the development of the Handback Renewal Work Plan and execution of the Work defined in the Handback Renewal Work Plan with NCDOT, including conducting operation and maintenance, independent or joint inspections of the assets and performance of the acceptance tests that measure the condition, performance, Residual Life of the respective Project assets remaining at the end of the Term, and to comply with all other requirements in the CA Documents respecting Handback.

1.4 ETCS Requirements

Developer shall design, develop, test, integrate, deploy and construct, operate, maintain, and upgrade from time to time an ETCS supporting ORT on the HOT Lanes in accordance with Section 24 of the Technical Provisions, applicable Law, and Good Industry Practice.

The ETCS shall accurately detect, identify, and classify (according to the User Classification) all vehicles using the HOT Lanes and calculate and assign the toll to Users for the use of the HOT Lanes as set forth in the Agreement and do so without stopping or slowing any vehicle.

The ETCS shall document and provide proof of use of the HOT Lanes for all Users, prevent data and/or images from being tampered with after the fact, protect Users' privacy, and ensure the traceability of all operations necessary for the accurate invoicing of tolls and Incidental Charges to Users.

Developer shall provide ETCS equipment, standards, requirements, protocols, and systems that are fully interoperable with the NCDOT, including NCTA, as of the first Substantial Completion Date and for the remainder of the Term as may change from time to time in accordance with the CA documents.

1.5 NTP1 Work

NTP1 Work shall be performed in accordance with the requirements of the CA Documents and NTP1 Work eligible for payment in accordance with the CA Documents shall include the following:

1. provision and approval of the Developer Management Plan (DMP) including all components required under Section 2.4 of the Technical Provisions;
2. submission of the protocols and procedures for public outreach, stakeholder relations, Emergency management, media, and marketing as required by Section 3.2 of the Technical Provisions;
3. provision and approval of a Communication, Public Outreach and Community Education Plan as required by Section 3.3 of the Technical Provisions;
4. appointment and retention of an ROW Appraiser for all ROW Work as required by Section 7 of the Technical Provisions;

5. provision and approval of the Project Baseline Schedule as required by Section 2.2.2 of the Technical Provisions;
6. provision and approval of the Schedule of Values for all activities as required by Section 2.2.2.3 of the Technical Provisions;
7. provision of the Progress Report as required by Section 2.2.2.4 of the Technical Provisions;
8. maintenance of a full and complete copy of all CA Documents as required by Section 2 of the Technical Provisions;
9. draft and final O&M Plan as required by Section 2.13.1 of the Technical Provisions;
10. provision of the Conceptual Traffic Management Plan as required by Section 22 of the Technical Provisions;
11. investigations, surveys, ROW Acquisition Services, Utility Work Plan, Utility Assembly, coordination activities associated with Utility Adjustment Work, railroad coordination activities, and permitting activities, in order to complete the Work, including preliminary Design Work associated with Utility Adjustment Work and railroad coordination but excluding any other Design Work;
12. any Design Work associated with Utility Adjustment Work and railroad coordination; and
13. any Design Work necessary, to complete the Work other than the Design Work associated with Utility Adjustment Work and railroad coordination.

Developer shall submit for review and comment or approval as the case may be the Submittals associated with the NTP1 Work in accordance with the CA Documents.

2 PROJECT MANAGEMENT

The requirements under this Section 2 of the Technical Provisions, including but not limited to the applicable provisions of Book 2 and Book 3, apply from the Effective Date until the end of the Term.

Developer shall maintain a full and complete copy of all CA Documents at Developer's office in close proximity to the Project during the period from NTP2 until the end of the Term.

Developer shall maintain a full and complete copy of all CA Documents at Developer's home office for the Project from NTP1 until the end of the Term.

2.1 General

Developer shall provide all Submittals to NCDOT for review and comment or approval as required by the CA Documents. If any such Submittal previously provided to NCDOT is amended or is identified to be outdated, incomplete, contain errors, or is no longer sufficient to cover Developer's Work previously covered by the Submittal, Developer shall revise the Submittal and provide to NCDOT for review and comment or approval as appropriate. In such cases, NCDOT reserves the right to stop all Work related to that Submittal until NCDOT completes review of the Submittal. Developer shall re-submit a Submittal until the Submittal complies with the requirements of the CA Documents.

NCDOT will, as soon as practicable, and in any event in accordance with the time periods set forth in the CA Documents, return one copy of the Submittal marked "Reviewed with No Comments" or "Reviewed with Comments", "Reviewed with Comments, Resubmit", "Approved", or "Revise and Resubmit".

For Submittals subject to review and comment:

- in the case of a Submittal endorsed "Reviewed with No Comments", Developer may proceed to implementation of the Submittal or further development of the design; and
- in the case of a Submittal endorsed "Reviewed with Comments", Developer shall be responsible for documenting all comments received from NCDOT and the corresponding resolutions. Developer may proceed to implementation, or further design development, after having amended the Submittal in accordance with such comments but need not provide such amended Submittal to NCDOT.

For Submittals subject to approval:

- in the case of a Submittal endorsed "Approved", Developer may proceed to implementation of the Submittal or further development of the design; and
- In the case of a Submittal endorsed "Reviewed with Comments, Resubmit", Developer shall be responsible for documenting all comments received from NCDOT and the corresponding resolutions. Developer shall not proceed to implementation of the Submittal or further design development. Developer shall amend the Submittal in accordance with such comments and resubmit to NCDOT for approval.

For all Submittals, in the case where a Submittal is inaccurate or incomplete such that NCDOT cannot perform an adequate and reasonable review of the Submittal, NCDOT will return the Submittal endorsed "Revise and Resubmit." The review period for such Submittals shall not begin until Developer provides NCDOT an accurate and complete Submittal.

Developer shall not issue Released for Construction Submittals to NCDOT until Developer has responded to all previous NCDOT comments in accordance with Section 6.3 of the Agreement.

2.2 Project Schedule

2.2.1 General Requirements

The Project Schedule shall be used by the Parties for planning and monitoring the progress of the Work.

The Preliminary Project Baseline Schedule shall, at a minimum:

- identify planned dates for start and completion of applicable Work activities contained in ITP, Exhibit D, Form N (Detailed Costing Form) Section I through Section III, at a minimum, for each Project Section;
- identify activities for Major Permits and FERC Permit; and
- identify NTP 1, NTP 2, and Milestones in Exhibit 7 of the Agreement.

Except for the Preliminary Project Baseline Schedule, all Project Schedules shall:

- be prepared and provided using Good industry Practice;
- include all Schedule Activities;
- identify planned dates for start and completion of any Schedule Activity;
- tie all phases of Work together logically to present a total Critical Path method schedule in one electronic file;
- include the Milestone Schedule Deadlines;
- cost load all Payment Activities;
- cost load any Schedule Activities that are required to provide an aggregate cost for associated Payment Activities; Payment Activities for mobilization shall be limited to Work necessary to establish and remove offices, plant, and facilities; and to move personnel, equipment, and supplies to and from the Project ROW to begin Work or complete Work;
- ensure that cost loaded activities are at a level of detail that allows assigned quantities to be commodity specific;
- constrain only the Schedule Activities that represent any Milestone Schedule Deadlines with a “start on or before” or “finish on or before” constraint; and
- include the components as described below:
    - activity identification – Developer shall use unique and consistent activity identification numbers, textual descriptions and codes in all Project Schedule Submittals. Each Schedule Activity shall have a detailed, concise description of the Work represented by the activity title. Descriptions will indicate definable items of Work typically starting with a verb. The activity identification numbers relating to a specific activity title or description shall remain unchanged and connected to the original activity title or description throughout the duration of the Work. Payment Activity identification numbering should contain one or more characters that uniquely identify them as Payment Activities. A Schedule Activity’s description may only be changed to clarify a Schedule Activity’s scope. The scope or purpose of a Schedule Activity shall not be changed except through a Change Order, or Compensation or Relief Event or as otherwise permitted by NCDOT; and

- early and late dates – early dates shall be based on proceeding with the Work as early as allowed in the CA Documents. Late dates shall be based on completing the Work required for each Substantial Completion and Final Acceptance of each applicable Project Section and Final Completion, even if Developer anticipates early achievement of each Substantial Completion and Final Acceptance of any applicable Project Section and Final Completion.

Except for the Preliminary Project Baseline Schedule, all Project Schedules shall be displayed per the following:

- Schedule Activities shall show their earliest and latest start and end dates;
- the Critical Path shall be highlighted in red on all schedules to distinguish critical Schedule Activities from other Schedule Activities and Float shown for all Schedule Activities;
- the Project Schedule shall be organized and consistent with the Work Breakdown Structure (WBS). Each Schedule Activity shall be mapped to one, and only one, of the WBS Elements. Developer shall further develop and detail the base WBS as provided by NCDOT for all Work to ensure a clear understanding of the Project and the CA Document requirements;
- the Project title and data date shall be displayed on all schedules, charts and diagrams;
- a legend shall be provided on all schedules, charts and diagrams, which indicate the various symbols used and their meanings;
- the Project Schedule shall show all non-workdays;
- the Project Schedule shall include allowance for Major Permits, other permits required for Developer's design and for NCDOT and third party processes, review processes, review and return of Submittals, samples, and drawings;
- the Project Schedule shall show all resource dependencies and each Schedule Activity shall show the planned resources allocated for undertaking the Work;
- Developer shall identify all Float; and
- no negative Float shall be included.

Except for the Preliminary Project Baseline Schedule, minimum areas of Work to be scheduled shall include, but not be limited to, those outlined in the Schedule of Values, WBS, and those listed below:

- additional activities as determined by Developer;
- As-Built Record Plans and supporting documentation;
- building construction;
- certification;
- clearing and grubbing;
- condition surveys;
- construction mobilization;
- contamination testing;

- design and checking each design Element;
- design reviews by NCDOT;
- design surveys;
- drainage construction;
- earthworks/geotechnical;
- equipment and systems purchase;
- environmental protection measures;
- design of Erosion and Sedimentation Control Plans;
- foundation construction;
- geotechnical investigation;
- hazardous material inspection and/or abatement by NCDOT,
- ITS and ETCS testing including factory acceptance testing, integration, installation, and construction and ETCS Demonstration Period;
- landscape construction;
- land surveying;
- lighting construction;
- materials quality tracking;
- mitigation and protection measures for historic buildings and artifacts;
- notices to proceed;
- O&M Plan;
- O&M ramp-up and training;
- Governmental Approvals, amendments or adjustments to NCDOT-Provided Approvals, and permits (including building permits);
- public information and communication;
- railroad Work and railroad coordination activities;
- roadway construction;
- paving Work;
- ROW acquisition;
- signal construction;
- signing and pavement markings;
- stakeholder and third party meetings;
- construction of Structures;
- all Developer Submittals;
- substructure construction;

- superstructure construction;
- testing and commissioning activities, including factory acceptance;
- third party agreements;
- traffic management identifying each phase;
- Utility Coordination, Utility Adjustment, Utility Adjustment Work; and
- wall construction.

With the exception of activities relating to Environmental Approvals by a Governmental Entity or activities associated with NCDOT and third party review, each activity (excluding continuous activities, waiting periods, and Governmental Approvals) depicting Developer's activities shall have duration of no more than 45 days. All activities shown in the schedule, with the exception of the first and last activities, shall have a minimum of one predecessor and a minimum of one successor activity.

The Project Baseline Schedule shall include a listing of all Submittals as required by the CA Documents. Submittal activity durations shall include specific durations for NCDOT review of Developer's Submittals, as called out in the CA Documents.

All submissions to NCDOT shall be in accordance with the Project Schedule. If submissions are not made in accordance with the Project Schedule, NCDOT has the right to extend the review period as permitted under the CA Documents.

2.2.2 Required Submittals

2.2.2.1 Project Baseline Schedule

The Preliminary Project Baseline Schedule shall be the Project Schedule until the Project Baseline Schedule is approved by NCDOT. The Project Baseline Schedule shall be a detailed Critical Path method schedule incorporating the Preliminary Project Baseline Schedule in Exhibit 8 of the Agreement. Developer shall submit the Project Baseline Schedule to NCDOT in accordance with requirements set forth in this Section 2.2.2 of the Technical Provisions no later than 30 days after NTP1. The Project Baseline Schedule shall be submitted to NCDOT for approval. Developer shall allow 20 Business Days for NCDOT to review the Submittal. In the event that NCDOT does not approve the Project Baseline Schedule, Developer shall revise and resubmit it with changes clearly identified. For each resubmission of the Project Baseline Schedule, NCDOT will review it within ten Business Days of resubmission. Developer shall submit the Project Baseline Schedule to NCDOT and obtain approval from NCDOT no later than 90 days after NTP1. If Developer does not obtain approval from NCDOT on the Project Baseline Schedule no later than 90 days after NTP1, Developer shall stop all Work except the Project Baseline Schedule, Schedule of Values, and the Developer Management Plan until it obtains such approval.

The Project Baseline Schedule shall include a separate narrative report which describes, in general fashion, Developer's proposed methods of operation for designing and constructing the Work required by the CA Documents. The schedule narrative shall describe the general sequence of design and construction, the proposed Critical Path of the Project, and all Milestone Schedule Deadlines.

Developer shall update the Project Baseline Schedule and submit the updated Project Baseline Schedule to NCDOT for approval no later than ten days following NCDOT's issuance of NTP2 under Article 7 of the Agreement. NCDOT will have ten Business Days to approve the updated schedule.

The Project Baseline Schedule approved by NCDOT can only be revised with NCDOT's approval of a proposed Revised Project Baseline Schedule. When summarized, the Project Baseline Schedule shall be such that the sum of Payment Activity prices therein equals the sum of Payment Activity prices in the Preliminary Project Baseline Schedule. NCDOT shall have ten Business Days to review and approve proposed Revised Project Baseline Schedule submitted by Developer.

Developer shall submit to NCDOT for approval a Revised Project Baseline Schedule within 14 days of execution of each Change Order, Relief Event, or Compensation Event. All approved Change Orders, Relief Events and Compensation Events shall be incorporated into the originally planned execution of the Work. NCDOT will confirm in writing the acceptance of each Revised Project Baseline Schedule. The approved Project Baseline Schedule or current approved Revised Project Baseline Schedule shall remain in force until a subsequent Revised Project Baseline Schedule is approved by NCDOT.

All Project Schedule Submittals shall utilize the default settings compatible with Primavera version 6.2 (or later comparable version used by NCDOT) default settings, except that the setting for "Critical Activities" shall be "Longest Path", for the schedule calculations options and automatic cost/resource calculations rules. All other software settings shall not be changed or modified without prior NCDOT Approval.

2.2.2.2 Project Status Schedule Updates

Developer shall submit to NCDOT for review and comment Project Status Schedule Updates to reflect the current status of the Project including recovery schedules, schedule revisions due to Relief Event Determinations, and approved Change Orders. The Project Status Schedule Update shall be submitted as part of the monthly Progress Report. Software settings shall not be changed or modified, for any schedule submissions, without prior NCDOT approval. The Project Status Schedule Updates shall be based upon the current approved Project Baseline Schedule or approved Revised Project Baseline Schedule, whichever is the most recently approved. The Project Status Schedule Update shall include a schedule narrative report which describes the status of the Project in detail.

The data date for use in calculating the Project Status Schedule Update shall be the first day of the following month. The Project Status Schedule Update shall accurately reflect updated progress to the status date, actual start and actual finish of completed Schedule Activities, forecast finish for in-progress Schedule Activities, and reforecast early dates and late dates for remaining Schedule Activities. If any actual dates are changed or corrected in any following month, a narrative shall be included providing explanation of the change.

2.2.2.3 Schedule of Values

Developer shall submit NTP1 Schedule of Values pursuant to Article 7 of the Agreement.

Concurrent with the Project Baseline Schedule, each resubmitted Project Baseline Schedule, and each revised Project Baseline Schedule, Developer shall submit to NCDOT a complete Schedule of Values for all activities as described below for NCDOT's approval. Developer shall allow 20 Business Days for NCDOT to review the Schedule of Values submitted with the Project Baseline Schedule. Developer shall obtain approval from NCDOT of the Schedule of Values submitted with the Project Baseline Schedule within 90 days after NTP1. Developer shall expand and revise as necessary the WBS shown in Exhibit 2-06 of the Technical Provisions to reflect Developer's break down of activities as well as approach and phasing of the Work and submit to NCDOT for approval concurrently with the submission of the Schedule of Values. If Developer does not obtain approval from NCDOT on the Schedule of Values within 90 days

after NTP1, Developer shall stop all Work except the Project Baseline Schedule, Schedule of Values, and the Developer Management Plan until it obtains such approval.

The following pertains to the presentation of the Schedule of Values:

- the activities shall be organized and grouped according to the approved WBS with subtotals for each WBS item at each WBS Level. There can be one or more activities for each of the lowest (terminal) WBS Elements in the WBS;
- the Schedule of Values shall contain for each activity from the Project Baseline Schedule, the activity unique identification number, the activity description, the WBS item to which it has been assigned, the quantity, the applicable unit, unit price and scheduled value; and
- Developer's project management, administration, design, quality control/quality assurance, contingencies and any allowance for inflation, profit and financing, as well as indirect Site costs such as Site cleanup and maintenance; temporary roads and access; off Site access roads; and security shall be prorated through all activities where there is no specific activity so that the sum of all the Schedule of Values line items equals to the Total Project Cost.

If it becomes necessary to add, combine, eliminate, or modify any Payment Activities due to a Change Order, a revised Schedule of Values derived from a Revised Project Baseline Schedule, a revised Schedule of Values shall be submitted within 14 days after the respective Change Order is executed, for approval by NCDOT.

2.2.2.4 Progress Report

Each month during the Construction Period, beginning with the first full month after NTP2, Developer shall submit to NCDOT for review and comment the Progress Report. Developer shall submit the Progress Report by close of business seven days following the prior month's end. One electronic copy of the entire Progress Report shall be submitted to NCDOT.

The Progress Report shall contain photographs and a narrative, which shall include at a minimum the following information:

- description of progress for each Element and the Project as a whole; including all phases of Work. Identification of start and completion dates of each Element and each Schedule Activity; and such information shall be grouped based on the WBS;
- summary of activities and findings conducted by Developer pursuant to Section 2.3 of the Technical Provision respecting the quality of the Work, including the number of Nonconforming Work reports raised and the number of Nonconforming Work reports cleared in the month;
- list of any Change Orders that were identified or executed during the period and their status;
- identification of any Relief Events or Compensation Events requested or accepted during the period;
- identification of Schedule Activities planned for the upcoming month;
- identification of problems and/or issues that arose during the period and issues that remain to be resolved;
- summary of resolution of problems and/or issues raised in previous Progress Reports or resolved during the period;

- identification of Critical Path issues and proposed resolutions;
- inclusion of a report on the Milestone Schedule Deadlines showing the schedule dates for the immediate prior month and current month;
- narrative explaining why the schedule dates for Milestone Schedule Deadlines have changed for variances greater than 30 days;
- inclusion of a monthly expenditure projection curve for the total Project;
- identification of requested and/or required NCDOT actions for the next month; and
- inclusion of digital progress photographs that accurately depict Project progress as outlined in the Progress Report narrative. Such photographs shall be provided on the basis that NCDOT is free to use the pictures as NCDOT determines without restriction or cost to NCDOT. Digital photographs shall be included in the Progress Report and provided as separate files with logical file names for easy access.

The Project Status Schedule Update shall be provided as part of the Progress Report and include the following:

- Gantt chart sorted by Work areas indicating the physical status of all Schedule Activities as of the date of the update and comparing Developer's progress to planned progress;
- Gantt chart showing all critical Schedule Activities, sorted by early start dates;
- 90 day look ahead Gantt chart showing all upcoming Submittals from Developer and approvals required by NCDOT or Governmental Entities;
- 90 day look ahead Gantt chart grouped by WBS and sorted by early start dates; and
- Gantt chart that clearly identifies the longest path sorted by early start dates.

If requested by NCDOT, Developer shall make all corrections to the monthly Progress Report and resubmit. If Developer does not agree with NCDOT's comments, Developer shall provide written notice of disagreement within seven days from the receipt of the comments.

2.2.2.5 As-Built Schedule

Within 14 days of completion of the Punch List, Developer shall submit to NCDOT for approval the latest Project Status Schedule Update identified as the "as-built schedule". The "as-built schedule" shall reflect the exact manner in which the Work up to each Final Acceptance, as described in the CA Documents, was actually performed (including start and completion dates, Schedule Activities, actual durations, sequences and logic). The "as-built schedule" shall be signed and certified by Developer's Project Manager and Developer's scheduler as being a true record of when the Work was actually performed.

2.2.2.6 Time Impact Analysis

As part of a Relief Request, as set forth in Article 13 of the Agreement, Developer shall submit to NCDOT a written Time Impact Analysis for approval illustrating the influence of each claimed Relief Event. Each Time Impact Analysis shall include a fragmentary network demonstrating how Developer proposes to incorporate the change, delay, or Developer request into the current Project Status Schedule Update.

The Time Impact Analysis shall demonstrate the time impact to each and every affected Schedule Activity in the current Project Status Schedule Update utilizing the most recent approved schedule update as the basis for the analysis.

The Time Impact Analysis Submittal shall include the details of the change, including added, changed, or deleted data for Schedule Activities and logic. If the current Project Status Schedule Update is revised subsequent to Submittal of a Time Impact Analysis but prior to its acceptance, Developer shall promptly indicate in writing to NCDOT the need for any modification to its Time Impact Analysis.

Delays shall not automatically mean that an extension of any milestone is warranted or due to Developer. Any Developer request for time extension associated with claimed Relief Events must include a demonstration as part of its Time Impact Analysis that the claimed Relief Event has impacted one or more Critical Path activities, and extended the duration of the Work required to achieve one or more Milestone Schedule Deadline(s).

Developer shall submit one electronic copy of the Gantt chart including all Schedule Activities affected by the Time Impact Analysis, grouped and sorted by WBS and compared to the current Project Baseline Schedule or Revised Project Baseline Schedule as well as comprehensive narrative for each Relief Request. In addition, Developer shall provide one electronic copy of the Project Schedule with the Time Impact Analysis and a comprehensive narrative for each Relief Request.

Developer shall incorporate the results of the Relief Event Determination from NCDOT into the Project Status Schedule Update for the next Progress Report.

2.2.2.7 Recovery Schedule

If the Work is delayed on any Critical Path item for a period which exceeds 90 days in the aggregate, the next Project Status Schedule Update submitted to NCDOT for review and comment shall include a recovery schedule demonstrating the proposed plan to regain lost Project Schedule progress and to achieve Final Acceptance for each Project Section, respectively, by the specified date.

2.3 Quality of the Work

2.3.1 General

Developer shall be responsible for the quality of all Work and all Project Elements. Developer shall develop and implement a Quality System by which Developer plans to ensure the quality of all aspects of the Work and the Project, including compliance with the CA Documents. The Quality System shall include quality control procedures to be utilized to verify, check, and review the quality of all Work and quality assurance procedures to confirm that the quality control procedures are being followed.

The Quality System shall comply with the requirements of ISO 9001 and ISO 14001. For avoidance of doubt, Developer and Developer-related entities are not required to be certified per ISO 9001 and ISO 14001.

There shall be only one Quality System for the Project covering Developer and all Developer-Related Entities. Individual quality systems for different Developer-Related Entities shall not be permitted.

Developer shall develop and submit to NCDOT for approval a comprehensive Quality Management Plan (QMP) in accordance with Section 2.4.2 of the Technical Provisions. The QMP shall form part of the Developer Management Plan.

The Quality System shall include procedures for Developer to report and for NCDOT to monitor the status of, and close out of, all Nonconforming Work and Noncompliance Events throughout the Term. The Quality System shall include procedures for investigations and surveys undertaken by Developer as part of the preparation and design of the Project.

Developer's Quality Manager and quality assurance staff shall have no responsibilities in the production of the Work. In particular, Developer's personnel assigned to perform inspection, testing, or monitoring shall not be those personnel performing or directly supervising Work being inspected, tested, or monitored. Developer's Quality Manager, quality assurance manager, and quality control manager(s) shall have the authority to stop Work for quality-related issues.

The Quality Manager and quality assurance staff shall prepare a monthly report of the quality reviews, inspections and tests performed, results of such reviews, inspections and tests, and occurrences and resolution of Nonconforming Work discoveries. Developer shall submit such quality report to NCDOT with each Progress Report during the Construction Period and with the O&M Monthly Report during the Operating Period.

During the period set forth in Section 9.3.1.1 of the Agreement, Developer shall correlate quality inspections and tests performed by CEI Firm in accordance with Section 2.3.3.2 of the Technical Provisions with quality control and quality assurance inspections and tests performed by Developer and Developer-Related Entities. Developer shall submit such correlation of quality inspections and tests for the preceding month with each Progress Report to NCDOT for review and comment during the Construction Period and with the O&M Monthly Report during the Operating Period.

Developer shall submit to NCDOT the results of all internal audits within seven days of undertaking the audit. When Developer becomes aware of any Nonconforming Work, Developer shall promptly issue a report of the Nonconforming Work (Nonconforming Work Report), which shall detail any corrective action plan prepared by Developer. Developer shall promptly issue a report upon the resolution of the Nonconforming Work (Nonconforming Work Resolution Report), detailing the corrective actions implemented by Developer.

Developer shall provide NCDOT with a copy of any or all quality records immediately upon NCDOT's request.

2.3.2 Quality of Design Work

As part of the Quality System, Developer shall be responsible for the quality of the Design Work throughout the Term, assure compliance of Design Documents with the CA Documents, Governmental Approvals, and applicable Law and develop and implement, at a minimum:

- design quality control process to include policy, procedures and specific roles and responsibilities;
- methods by which all Final Design Documents will be reviewed, verified for constructability, completeness, clarity, accuracy, and back-checked by a suitably experienced engineer not involved with the development of the Design Documents;
- procedures and responsibilities for preparing and checking the plans, drawings, specifications, estimates, calculations, computer application input data, notes, and other submittal items;
- procedures and responsibilities for verifying that Design Documents comply with the CA Documents, Governmental Approvals, applicable Law, design standards, and design criteria;
- procedure for submitting Design Documents;
- procedure for resolving and tracking resolution of NCDOT comments;
- process for stopping design Work or elevating an issue;

- Developer-Related Entities' review requirements and Developer's role in the review of Developer-Related Entities' Work;
- quality control requirements of Developer-Related Entities;
- procedures for documenting compliance with quality procedures;
- distribution of plan revisions, to include field personnel;
- scope and frequency of design, calculations, computer input assumptions, and design details audits;
- incorporation of past audit findings; and
- audit procedures and dissemination of audit results.

Such policy, procedures, methods, roles, and responsibilities shall be documented in the QMP.

2.3.3 Quality of Construction Work

As part of the Quality System, Developer shall be responsible for the quality of all Construction Work throughout the Term, including Renewal Work performed by Developer.

2.3.3.1 Developer Responsibilities

As part of the Quality System, Developer shall at a minimum:

- be responsible for all construction quality control, whether performed by Developer or Developer-Related Entities, including production of materials, placement of the material, and a quality management system for asphalt and rigid pavement;
- inspect materials or equipment at the source of supply, manufacture, and/or fabrication;
- perform construction inspection, sampling and testing to validate the quality control testing in accordance with the DMP;
- maintain a record of all Developer inspections, including but not limited to, date of inspection, sampling and testing undertaken, and the results of such sampling and testing;
- engage an independent engineering firm ("the CEI Firm") that is pre-qualified by NCDOT to perform construction, engineering and inspection ("CEI") services as per Section 9.3.1 of the Agreement prior to Construction Commencement Date;
- provide a draft Contract for CEI services to NCDOT pursuant to Section 9.3.1.2 of the Agreement;
- delegate to the CEI Firm unfettered rights and obligations to on-site inspection, sampling and testing of the Work for compliance with the requirements of the DMP and the CA Documents;
- provide all required training, accommodation, facilities and equipment necessary for the CEI Firm to fulfill the CEI Firm's obligations and duties under the CEI Firm contract;
- make allowance for the activities of the CEI Firm in schedules prepared by Developer under the CA Documents;
- provide the CEI Firm full access to any part of the Project or facilities where Work is being undertaken that will ultimately be incorporated into the Project, including such

locations and facilities where materials or equipment are sourced, manufactured, and/or fabricated;

- provide NCDOT with unrestricted entry at all times to such parts of the Project and facilities that concern the manufacture, fabrication, production, or testing upon reasonable notice from NCDOT;
- provide all Developer quality reports concurrently to NCDOT and the CEI Firm;
- ensure that Developer-Related Entities, including the CEI Firm, follow all parts of the DMP;
- suspend all Work when notified by NCDOT that the CEI Firm has failed to provide the services as required under the CA Documents or the CEI Contract; and
- suspend immediately Work that is not in compliance with the CA Documents, Governmental Approvals, or applicable Law.

Developer shall meet all such requirements for all its Construction Work and Renewal Work.

2.3.3.2 CEI Firm Responsibilities

The services of the CEI firm as per Section 9.3.1.1 of the Agreement shall be part of Developer's Quality System. CEI Firm shall:

- provide the CEI Services per Exhibit 2-07 of the Technical Provisions;
- provide reports concurrently to NCDOT and Developer;
- at Developer's option, perform quality control sampling and testing;
- at Developer's option, submit quality control samples to NCDOT for testing;
- provide to Developer CEI Firm's quality management plan, which addresses all inspection, sampling and testing activities to be performed by CEI Firm; and
- issue Nonconforming Work Reports and Nonconforming Work Resolution Reports to Developer and NCDOT concurrently for any Nonconforming Work.

2.3.3.3 NCDOT Responsibilities

NCDOT or NCDOT's agent will:

- perform independent quality assurance inspection at approximately 10% of the rate performed by the CEI Firm, or other such rate as deemed appropriate by NCDOT;
- at NCDOT sole discretion, inspect materials or equipment at the source of supply, manufacture, and/or fabrication;
- perform materials sampling and testing of precast concrete, steel manufacturing, high mast light poles, overhead sign assemblies, toll gantries and other fabricated Elements at facilities where the NCDOT Materials and Tests Unit routinely performs these functions;
- perform laboratory testing for all materials where NCDOT's Materials and Tests Unit routinely performs these functions;
- perform quality assurance testing of asphalt pavements as provided in Article 609-9 of the Standard Specification; however, such testing does not relieve Developer of its responsibility for the quality of materials and quality of the Work;

- at NCDOT's discretion, perform independent verification, assurance, audit, and testing of any and all materials testing or other construction inspections;
- perform off-site asphalt Quality Assurance sampling and testing; and
- perform all independent assurance activities as required by 23 CFR 637.

Performance by NCDOT of such quality assurance, inspection, verification, sampling, and testing does not relieve Developer of any of its responsibility under the CA Documents and in particular its responsibility for the quality of the Work.

2.4 Developer Management Plan

Developer shall develop and submit the Developer Management Plan (DMP) to NCDOT for approval in accordance with the requirements of the CA Documents. Thereafter Developer shall implement, manage, and operate and, as required, update the DMP as Developer or NCDOT determine is necessary to comply with the requirements of the CA Documents and Good Industry Practice.

The DMP shall include all of the following:

- Management & Staffing Plan;
- Quality Management Plan (QMP) ;
- Document and Data Management Plan;
- Public Information and Communication Plan;
- Submittal procedures and process;
- Erosion and Sedimentation Control Plan;
- Stormwater Management Plan;
- Disaster Recovery Plan (DRP);
- Hazardous Material Operations, Safety, and Health Plan;
- Comprehensive Environmental Protection Program;
- approach, procedures and methods for the management of the Electronic Toll Collection System to meet the requirements set forth in Section 24 of the Technical Provisions;
- all plans and processes required by the CA Documents to be included in the DMP; and
- all other plans and processes for the DMP to meet the requirement of a project management plan under TIFIA and generally satisfying all FHWA requirements.

The DMP is subject to approval by NCDOT in accordance with Article 7 of the Agreement.

Where one part of the DMP requires to be updated all of the DMP shall be updated and resubmitted for approval unless NCDOT agrees in its sole discretion to accept an update to an individual component of the DMP. Updates to the DMP shall be submitted to NCDOT as both clean and redline versions to facilitate NCDOT's review of the revised DMP.

Developer shall submit the DMP to NCDOT and obtain approval from NCDOT within 90 days of NTP1. If Developer does not obtain approval from NCDOT on the DMP within 90 days of NTP1, Developer shall stop any Work except the Project Baseline Schedule, Schedule of Values, and the DMP until it obtains such approval.

2.4.1 Management & Staffing Plan

As part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, update a Management & Staffing Plan in accordance with this Section 2.4.1 of the Technical Provisions. Developer shall include a Management & Staffing Plan, which identifies key individuals, as detailed in Section 2.14 of the Technical Provisions and as set forth in the Proposal, and sets out reporting lines, responsibilities, and authority. The plan shall also include details on how the various organizations within Developer and Developer-Related Entities will be interlinked and managed and shall demonstrate how the design, construction, operations and maintenance, and handback responsibilities will be integrated to achieve the whole life cost and construction assumptions. The plan shall also include details of management structures and management systems to be used for design management, construction management, and operations and maintenance management. The plan shall also include details of the interface protocols and systems Developer and Developer-Related Entities shall utilize for interaction with NCDOT, third parties, and the public.

2.4.2 Quality Management Plan

As part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, update a Quality Management Plan in accordance with this Section 2.4.2 of the Technical Provisions. The QMP shall set out how Developer shall fulfill its responsibility for the quality of the Work and the Project, including all actions necessary to ensure full compliance with the CA Documents and in particular the requirements under Section 2.3 of the Technical Provisions. The QMP shall set out all aspects of Developer's Quality System and cover all Work performed during the design, construction, operations and maintenance, and handback stages of the Project by Developer and all Developer-Related Entities and Contractors of all tiers. There shall be only one QMP for the Project covering Developer and all Developer-Related Entities. NCDOT will not approve any Developer Management Plan submitted by Developer that does not have a unified Quality System to be followed by all Developer-Related Entities.

The QMP shall describe the quality control procedures to be utilized to control, verify, check, and review the quality of all Work. In addition, the QMP shall include quality assurance procedures to confirm that the quality control procedures are being properly followed. Developer shall describe how quality control procedures and quality assurance procedures are to be documented and by whom to verify that the required procedures are followed.

The QMP shall contain detailed descriptions of the inspection and test plans, including the timing and frequency of testing, which Developer shall use to meet quality control and quality assurance requirements of the Work.

The QMP shall set out how Developer shall make available all quality records to NCDOT for review immediately upon request. The QMP shall include at a minimum all of the following components as further detailed in Section 2.4.2.1 through Section 2.4.2.8 of the Technical Provisions:

- Design Work;
- Construction Work;
- O&M Work performed by Developer;
- Erosion and Sedimentation Control;
- Quality Control Program Notification of Placing Order;
- Stormwater Management Program;

- Additional Quality Control Program Provisions;
- Quality System Operations and Maintenance Specific Requirements;
- Internal Audit;
- External Audit; and
- Quality Management Plan Review and Approval.

Developer's QMP shall include, but is not limited to, the following:

- quality assurance and quality control plans, processes, and procedures;
- document control procedures including control of quality records;
- management roles and responsibilities;
- resource management, training and certification;
- design review, verification and certification;
- construction inspection, verification, checking, control, and testing;
- materials inspection, verification, checking, control, and testing;
- design development review, control, checking, and certification;
- Developer's procedures to control quality of Work performed by Developer-Related Entities;
- arrangements for CEI Firm and NCDOT access to all material facilities in the quality control program;
- process for assuring that facilities supplying materials for the Work possess qualifications acceptable to NCDOT and has an approved quality control program;
- communication and interface protocols;
- reporting protocols; and
- Developer's internal and external audit frequency.

2.4.2.1 Erosion and Sedimentation Control

As part of the QMP, Developer shall develop, implement, manage, operate, and, as required, update processes and procedures to assure compliance with the Erosion and Sedimentation Control Plan required in Section 13 of the Technical Provisions.

2.4.2.2 Quality Control Program Notification of Placing Order

Developer and Developer-Related Entities shall order materials and equipment sufficiently in advance of their incorporation in the Work to allow time for sampling, testing and inspection. Developer shall provide notification to NCDOT prior to placing orders for materials and equipment and the procedure for placing such orders shall be detailed in the QMP.

Developer shall notify NCDOT at least 30 days before beginning any production and include a production and testing schedule in the QMP.

Developer shall provide and install ITS and ETCS, or any other item identified in the CA Documents, which are included in the NCDOT Qualified Products List. When the NCDOT

Qualified Products List does not include certain material required for the Work, Article 106-3 of the Standard Specifications shall be applicable.

2.4.2.3 Stormwater Management Plan

As part of the QMP, Developer shall develop, implement, manage, operate, and, as required, update processes and procedures to assure compliance with Stormwater Management Plan (SMP) requirements in Section 12 and Section 23 of the Technical Provisions.

2.4.2.4 Additional Quality Control Program Provisions

Developer shall ensure that the fabricators of steel and miscellaneous metal products who supply materials for the Work are qualified. Obtaining qualification requires an accepted quality control program. A current American Institute of Steel Construction, Inc. (AISC) certification and ASTM certification is a requirement for the quality control acceptance program of the steel and miscellaneous metal fabricators, provided that AISC and ASTM certification programs are available for the category of the fabrication products. The processes to be used by Developer to ensure these requirements are complied with shall be detailed in the QMP.

Developer shall provide procedures and sufficient information about fabrication and production facilities for the CEI Firm to perform its work, including issue Nonconforming Work reports, and for such work to be incorporated into Developer's Quality System.

2.4.2.5 Quality System Respecting O&M Work

The QMP shall set out Developer's self-monitoring process and shall be utilized to monitor the performance and quality of Developer's and Developer-Related Entities' O&M Work, as well as to verify conformance to procedures, plans and accuracy of monitoring, inspections, and reporting. The QMP shall detail the quality assurance systems and procedures provided for validating the accuracy of information and results in the O&M Monthly Reports, O&M Annual Reports and Renewal Work Reports. In particular, the QMP shall include at a minimum, procedures to validate the data, times, dates, other information such as Construction Noncompliance Events, O&M Noncompliance Events, Noncompliance Points, liquidated damages, and the calculations that form the basis of such.

2.4.2.6 Internal Audit

The QMP shall set out Developer's approach and schedule for internal audits. Developer shall undertake internal audits of Developer's and all Developer-Related Entities implementation and compliance with the DMP and CA Documents at least once every three months from the date the DMP is approved by NCDOT until Final Acceptance. Thereafter Developer shall undertake internal audits of Developer's and all Developer-Related Entities' implementation and compliance with the DMP and CA Documents at least once every six months until the end of Term. These audit requirements are the minimum that will be accepted by NCDOT in the QMP. If NCDOT through oversight of the Quality System determines that Developer audits are not ensuring compliance with the DMP and/or CA Documents, NCDOT shall have the right to require the audit frequency to be increased to a minimum of once every two weeks from approval of the DMP until Final Completion and to a minimum of once a month from Final Completion to end of Term.

2.4.2.7 External Audit

The QMP shall contain detailed procedures for Developer's quality control and quality assurance activities. Developer's quality process shall incorporate planned and systematic activities undertaken by an independent party, the frequency of such activities, method of

correlating such activities and how such activities will be used to improve internal processes and procedures.

2.4.2.8 Quality Management Plan Review and Approval

The QMP shall be revised when it is evident that Noncompliance with the CA Documents and/or the DMP is not being properly identified, recorded, and corrected. Until the revised QMP is approved by NCDOT, Developer will cease, at Developer's expense, all Work covered by the revised plan except for safety and environmental activities.

2.4.3 Document and Data Management Plan

As part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, update a Document and Data Management Plan (DDMP). The DDMP shall set out Developer's Document Management System for maintaining all records and documents associated with the Project. Developer shall establish and maintain an electronic document control system to store, catalog, and promptly and conveniently retrieve all Project-related documents.

Developer shall incorporate into the Document Management System any NCDOT data management system, which NCDOT may require, and shall train Developer personnel to operate any such data management system.

Developer's Document Management System shall be used by Developer and all Developer-Related Entities. Developer's Document Management System shall:

- use data systems, software, standards, procedures, and formats compatible with those employed by NCDOT and acceptable to NCDOT and implement any new operating practices required as a result of NCDOT's amendments to any such data systems, software, standards, procedures, and formats;
- provide for the secure transfer of data to NCDOT;
- provide a mechanism for the electronic transfer of all data along with the associated portable document format (PDF) images for uploading into an Electronic Document Management System (EDMS) employed by NCDOT;
- provide NCDOT with procedures and software for accessing Developer's Document Management System and all Project-related documents as a component of Developer's obligations under Article 9 of the Agreement as well as Developer's compliance with such system; and
- provide NCDOT staff with training in all systems used by Developer.

All Project-related documents shall be electronically searchable and legible. In the DDMP, Developer shall describe:

- methods by which all Project-related documents shall be uniquely coded, stored and retrieved. The retrieval system shall allow for prompt, convenient retrieval of any Project-related document in a user friendly format;
- the routing, filing, control and retrieval methods for all documents;
- methods to facilitate fast and convenient sharing of data including procedures and software for accessing all Project-related documents; and
- methods for production, checking, storage and retrieval of all documents and data that shall support records required to be submitted by Developer to NCDOT under the CA Documents or any other Project-related records that NCDOT requires.

To allow for disaster recovery, Developer shall store all Project-related data and documents in a manner consistent with Developer's DRP. Developer shall retain such records until five years after the end of Term. During such period, when requested by NCDOT Developer shall provide NCDOT copies of such records.

Unless otherwise directed by NCDOT, Patron Confidential Information obtained by Developer shall meet the requirements of Article 8 of the Agreement.

2.4.4 Public Information and Communication Plan

As part of the DMP, Developer shall develop, implement, manage, operate, and, as required, update a Public Information and Communication Management Plan in accordance with Section 3 of the Technical Provisions.

2.4.5 Erosion and Sedimentation Control Plan

As part of the DMP, Developer shall develop, implement, manage, operate, and, as required, update an Erosion and Sedimentation Control Plan in accordance with Section 13 of the Technical Provisions.

2.4.6 Stormwater Management Plan

As part of the DMP, Developer shall develop, implement, manage, operate, and, as required, update a Stormwater Management Plan (SMP) in accordance with Section 12 and Section 23 of the Technical Provisions.

2.4.7 Disaster Recovery Plan

As part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, update a Disaster Recovery Plan (DRP). The DRP shall set out Developer's systems and procedures for limiting disruption to the operation of the Project and protecting documents and data in case of disaster, and promptly restore operation of the Project post-disaster.

Developer's DRP shall:

- identify relevant systems and their level of criticality to continuing operation of the Project;
- categorize the different types of data according to their criticality;
- identify the levels of redundancy, security, verification and any other precautions required to protect and restore critical systems;
- describe the level of redundancy/backups required for each type of data including, but not limited to:
    - frequency/schedule;
    - retention periods;
    - location;
    - verification;
    - levels of physical and electronic security; and
- identify potential disaster and major hazards to the Project and Developer's actions and procedures in response to each to restore Project operation after such event.

Developer shall provide NCDOT staff with training in the relevant disaster recovery procedures and systems utilized by Developer.

2.4.8 Hazardous Material Operations, Safety and Health Plan

Developer shall be responsible for the safety of its personnel and of the general public affected by the Project.

As a part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, update a Hazardous Material Operations, Safety and Health Plan (HMOSHP) that complies with all applicable Law and Good Industry Practice. The plan shall cover all aspects of the Work and shall include details of the training to be provided by Developer or Developer-Related Entities for Developer, Developer-Related Entities and NCDOT staff and representatives and third parties (including but not limited to the CEI Firm staff) required by their duties to visit the Project or facilities to be used in connection with the Work and Project including, but not limited to, facilities for the production of materials or equipment.

The plan shall fully describe Developer's policies, plans, training programs, Work site controls, and Incident Response plans to ensure the health and safety of personnel involved in the Project and the general public affected by the Project during the Term.

Developer's HMOSHP shall address the management of hazardous material as required in Section 23 of the Technical Provisions.

2.4.9 Comprehensive Environmental Protection Program (CEPP)

As part of the DMP, Developer shall develop, implement, manage, operate, and, as required, update a CEPP, applicable throughout the Term to establish the approach, requirements, and procedures to be employed to protect the Environment. Developer shall incorporate the CEPP into the Developer Management Plan (DMP).

The CEPP shall be the overarching system by which Developer shall cause Environmental Commitments made during the Environmental Approval and permitting processes, and other Environmental Requirements to be carried forward and reflected, as appropriate, in the design and implemented throughout the Work. Developer shall utilize the CEPP to track on-going issues, identify environmental compliance, Noncompliance Events, and the identified actions required and taken to correct any such Noncompliance Event.

The CEPP shall describe the processes that Developer will follow during the course of the Work to comply with those Environmental Approvals, Environmental Commitments, and Laws. All component parts shall reflect in order of priority: impact avoidance, minimization and, as a last resort, mitigation. The CEPP shall satisfy applicable FHWA, NCDOT, and resource agency requirements, including those detailed as commitments in any Environmental Approvals or permits.

Developer shall set out in the CEPP how Developer shall ensure compliance with all Environmental Laws, Environmental Approvals, and Environmental Commitments. The CEPP shall also establish the processes to be implemented by Developer to record and document the measures Developer shall take during the performance of the Work to ensure protection for the Environment and avoid or minimize impacts on the Environment. The CEPP shall effectively demonstrate Developer's comprehensive knowledge of the environmental issues associated with all aspects of the Work, Developer's responsibilities respecting the Environment as set forth in the CA Documents, and shall describe the processes that Developer shall follow during the performance of the Work to comply with such responsibilities.

Developer's CEPP shall identify and describe the processes to manage and comply with Environmental Permits, Issues, and Commitments consistent with the Environmental Approvals. The CEPP shall establish a goal of zero environmental violations during the performance of all

Work. The CEPP shall set forth detailed processes for rectifying violations in an appropriate and timely manner.

Developer's CEPP shall include the following component parts:

- Environmental Compliance and Mitigation Plan (ECMP);
- Environmental Protection Training Plan (EPTP); and
- Hazardous Materials Management Plan (HMMP).

2.4.9.1 Environmental Compliance and Mitigation Plan

As part of the CEPP, Developer shall prepare, implement, manage, operate, and, as required, update an ECMP, which shall document the detailed procedures and strategies that developer shall implement to comply with all Environmental Commitments. The ECMP shall establish and/or document schedules, protocols, and methods to be used in accomplishing Work, with an emphasis on monitoring, reporting, corrective actions, and adaptive management. In addition, the ECMP shall detail any mitigation required by Environmental Approvals and Developer's approach to satisfying any Environmental Commitments and mitigation requirements, including mitigation requirements identified after completion of the ECMP.

The ECMP shall include at a minimum the following components as per Sections 2.4.9.1.1 to Section 2.4.9.1.11 of the Technical Provisions:

- Compliance Action Plan (CAP);
- Environmental Permits, Issues, and Commitments (EPIC) Sheets;
- Clean Water Act - Sections 404 and 401: Waters and Wetlands of the United States;
- Clean Water Act - Sections 402: National Pollutant Discharge Elimination System (NPDES);
- State Listed Species and Unregulated Habitat;
- Endangered Species Act and Fish and Wildlife Coordination Act;
- noise;
- well impacts and requirements;
- cultural resource studies;
- floodplain requirements; and
- Developer's environmental operating procedures.

2.4.9.1.1 Compliance Action Plan

As part of ECMP, the CAP shall consist of a decision making matrix, which will define the triggers for initiating or re-initiating environmental compliance actions for construction and maintenance activities. The corrective action process shall include management involvement and be proactive and anticipatory instead of reactive in nature. It shall include procedures to identify and correct deficiencies to prevent future occurrences. For each trigger, the CAP will identify the appropriate type or level of environmental study or other compliance action necessary to ensure the ongoing validity of Project's Environmental Approvals and Environmental Commitments and how such action will be implemented.

2.4.9.1.2 Environmental Commitments

As part of ECMP, Developer shall prepare a listing of applicable permits and Environmental Commitments and shall update such listing as required and track compliance with the commitments throughout the Term.

2.4.9.1.3 Clean Water Act - Sections 404 and 401: Waters and Wetlands of the United States

As part of ECMP, Developer shall document how Developer shall comply with the terms and conditions for Section 404 permit(s) issued to NCDOT by the U.S. Army Corps of Engineers (USACE) and associated Section 401 State Water Quality Certification(s) as administered by the NC Department of Environment and Natural Resources, Division of Water Quality (NCDENR-DWQ) as well as any additional Section 404 permits and 401 certifications issued to Developer during the Term. This component of the ECMP shall include at a minimum:

- process for training personnel to recognize waters of the U.S. that fall under the jurisdiction of the USACE;
- process for communicating the terms and conditions of all USACE 404 permits and NCDENR-DWQ 401 certifications; and
- procedures for carrying out any required mitigation.

2.4.9.1.4 Clean Water Act - Section 402: National Pollutant Discharge Elimination System (NPDES)

As part of ECMP, Developer shall document how Developer will comply with Section 402 of the Clean Water Act. The documentation shall include that Developer has day-to-day operational control over activities necessary to ensure compliance with the Storm Water Pollution Prevention Plan (SWPPP) and has the sole responsibility for any potential Noncompliance issue. The documentation shall also include that Developer is responsible for submitting a Notice of Intent (NOI) to NCDENR-DWQ. This component of the ECMP shall include at a minimum:

- process for training personnel on the requirements and conditions of the North Carolina Construction General Permits (NCGO1) for Storm Water Discharges from Construction Sites (CGP);
- procedures for handling Noncompliance issues; and
- escalation procedures for SWPPP items.

2.4.9.1.5 State Listed Species and Unregulated Habitat

As part of ECMP, Developer shall document how they shall comply with the State Listed Species and Unregulated Habitat. This component of the ECMP shall include at a minimum:

- process for communicating any commitments regarding State listed species and unregulated habitat to Developer-related entities; and
- procedures for complying with any Environmental Commitments.

Developer shall implement mitigation measures in accordance with all Laws, regulations, permits, and Environmental Commitments.

2.4.9.1.6 Endangered Species Act and Fish and Wildlife Coordination Act

As part of ECMP, Developer shall document how they shall comply with the Endangered Species Act (ESA) and the Fish and Wildlife Coordination Act (FWCA). The documentation shall reflect that coordination with U.S. Fish and Wildlife Service (USFWS) was conducted by NCDOT. This component of the ECMP shall include at a minimum:

- process for training personnel on the requirements of the ESA and FWCA;
- process for communicating to Developer-related entities any commitments regarding ESA and FWCA; and
- procedures for complying with any commitments including mitigation.

2.4.9.1.7 Noise

As part of ECMP, Developer shall document how they will address traffic noise mitigation. This component of the ECMP shall include at a minimum:

- process for carrying out noise mitigation measures in accordance with the Environmental Approvals and Environmental Commitments;
- process for complying with requirements of the NCDOT Traffic Noise Abatement Policy and the *NCDOT Traffic Noise Analysis and Abatement Manual*;
- process for carrying out noise mitigation measures determined throughout the Term ; and
- process to handle changes that may occur to proposed permanent noise mitigation in the Environmental Approvals that meets the requirements of NCDOT.

2.4.9.1.8 Well Impacts and Requirements

As part of ECMP, Developer shall document how they will address wells (such as municipal, domestic, irrigation, or monitoring and observations wells) that may be impacted by the Work during the Term. This component of the ECMP shall include at a minimum:

- process for training personnel on recognition of wells;
- procedures for addressing concerns respecting wells;
- procedures for preventing contamination and for addressing contamination (including temporary measures and permanent measures to restore the well to its original state) of a well resulting from Developer's Work; and
- procedures to notify NCDOT and the appropriate regulatory agencies in case of contamination of a well.

2.4.9.1.9 Cultural Resource Studies

As part of ECMP, Developer shall be responsible for ensuring compliance with cultural resource Laws and regulations applicable to the Project through the Term. NCDOT shall perform consultation with the State Historic Preservation Office (SHPO), FHWA, and Advisory Council on Historic Preservation (ACHP) for the Project according to current procedures for implementing Section 106 of the National Historic Preservation Act prior to construction and document location of known cultural resources.

If evidence of a possible archaeology site is encountered Developer shall comply with 36 CFR Part 800.13 post-review discoveries. In such event, Developer shall immediately cease Work in

the immediate surrounding area and contact NCDOT to initiate post-review discovery procedures among NCDOT, SHPO, FHWA, and ACHP in accordance with the document titled "Programmatic Agreement (Environmental Impact and Related Procedures)" in Book 3. Developer shall undertake appropriate measures to protect the site from further intrusion to the extent feasible until an appropriate evaluation of the site can be made by a qualified representative. Work shall not be resumed in the area until Developer receives notification and approval from NCDOT.

2.4.9.1.10 National Flood Insurance Program Compliance

As part of ECMP, Developer shall prepare all documents necessary for NCDOT to obtain all necessary approvals for any regulated activity within floodplains. Developer shall obtain from the NC Floodplain Mapping Program (NCFMP) (http://www.ncfloodmaps.com/) the effective Flood Insurance Studies (FIS) for Iredell County and from Mecklenburg County web sites (http://mapserver.mecklenburgcountync.gov/3dfz/ and ftp://ftp1.co.mecklenburg.nc.us/luesa/stormwater/) the effective FIS for Mecklenburg County, and the effective Digital Flood Insurance Rate Maps (DFIRMs) that cover the Project. Developer shall determine the extent to which the proposed activities encroach into a Special Flood Hazard Area (SFHA), Floodway (for streams studied with Detailed Methods), a Non-Encroachment Area (for streams studied with Limited Detailed Methods), or FEMA Buyout Properties. Developer shall be responsible for the following:

- when an activity is proposed within a floodway or Non-Encroachment Area as defined by NCFMP (including Bridges and culverts), Developer shall determine if the proposed activity will result in an increase in the Base Flood Elevation (BFE) as defined by NCFMP;
- if a BFE increase will occur to the extent that a Conditional Letter of Map Revision (CLOMR) is required, Developer shall be responsible for preparing and providing all documentation necessary for NCDOT to obtain a CLOMR prior to construction of the regulated activities. Developer shall prepare all documents necessary for NCDOT to obtain approval from NCFMP in accordance with the conditions outlined in the Memorandum of Agreement (MOA) entered into on April 22, 2013 between NCFMP and NCDOT. NCDOT shall provide all fees in accordance with such MOA. Within 60 days of Substantial Completion of all Project Sections, Developer shall prepare and submit to NCDOT the As-Built Record Plans for Work within the regulated areas necessary for NCDOT to obtain a Letters of Map Revision (LOMR). NCDOT shall provide all fees associated with obtaining CLOMRs and LOMRs; and
- when an activity is proposed within an SFHA, but outside of a floodway or Non-Encroachment Area, Developer shall obtain any necessary local Floodplain Development Permit, as required, from Mecklenburg County or Iredell County Floodplain Administrators (FPA).

For clarity, Developer is not responsible for impacts due to a rise in water surface elevation that results from the conversion of the effective FEMA model run to the corrected effective FEMA model run.

Construction access to the 1014 Andrill Terrace property owned by Mecklenburg County is permitted provided that the nature and duration of the work is submitted to and approved by Mecklenburg County and, if necessary, FEMA.

Terms in this Section 2.4.9.1.10 of the Technical Provisions that are not defined in Exhibit 1 of the Agreement shall have the meaning as defined by FEMA for the National Flood Insurance Program, 44 CFR Parts 60-65.

2.4.9.1.11 ECMP Standard Operating Procedures

As part of ECMP, Developer shall develop standard operating procedures for the following activities:

- controlling dust during construction;
- mitigating vibration during construction; and
- mitigating light intrusion on adjacent properties.

2.4.9.2 Environmental Protection Training Plan

As part of the DMP, Developer shall develop, implement, and, as required, implement, and, as required, update an Environmental Protection Training Program that shall meet the minimum requirements set forth herein. The EPTP shall include methods and procedures documented in the ECMP to educate and train every non-administrative worker to:

- recognize and respect the Project's Environmental Commitments;
- recognize the overall importance of environmental issues to constructing, operating and maintaining the Project;
- appreciate the various environmental sensitivities of the Project;
- recognize environmentally sensitive resources that may be encountered during the Work;
- avoid or take appropriate action to minimize environmental impacts arising from the Work;
- know the required actions, practices, and procedures regarding regulated resources;
- foster Developer's management and supervisory personnel's attitude of commitment to the Project's environmental quality;
- convey to all workers, Developer's management commitment to the Project's environmental quality; and
- convey to all employees of Developer and Developer-Related Entities, NCDOT's and Developer's commitment to zero tolerance for violations.

2.4.9.3 Hazardous Materials Management Plan

As a part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, a HMMP detailing the procedures and measures for the safe handling, storage, treatment and/or disposal of Hazardous Materials, whether encountered at or brought onto the Project ROW by Developer, or by a third party, during the Term of the Agreement, in compliance with Environmental Law and Environmental Commitments.

The HMPP shall include, at a minimum:

- for all chemicals to be used on the Project, procedures for how Developer shall keep and update Material Safety Data Sheets (MSDS), per OSHA requirements, for the Term of the Agreement;

- identification and contact information for designated individuals responsible for implementation of the HMPP;
- procedures for identifying and documenting potential contaminated sites which might impact Project development;
- procedures for mitigation of known contaminated sites anticipated to impact construction;
- procedures for mitigation of unknown or unanticipated contaminated sites encountered during the Construction Period;
- procedures for mitigation of contamination during the Operating Period;
- procedures for developing a detailed Hazardous Materials spill response plan for the Term;
- process for training personnel for responding to and mitigating Incidents involving Hazardous Materials;
- provisions for appropriate storage and disposal of all Hazardous Materials encountered or generated within the Project ROW;
- provision for a Hazardous Materials training module as a component of the EPTP; and
- procedures for preparing an Investigative Work Plan (IWP) and Site Investigative Report (SIR) in the event that Hazardous Materials are discovered during the Work.

The HMMP shall include provisions for making all workers on the Site aware of the potential Hazardous Materials to which they may be exposed, limiting Developer-Related Entities and other Site workers' exposure to Hazardous Materials and providing all necessary personal protection equipment to protect workers from exposure. The HMMP shall require Developer to provide any non-Developer personnel who visit the Site with the appropriate personal protection equipment.

The HMMP shall require that all personnel of Developer-Related Entities handling Hazardous Materials be trained and certified at least to the minimum requirements established under the current guidelines of OSHA 1910.120 (HAZWOPER Training).

Further, the HMMP shall include procedures for ensuring that all applicable certifications, licenses, authorizations, and Governmental Approvals for Developer personnel handling Hazardous Materials are current and valid through the duration of the Work.

2.5 Additional Required Schedules, Reports, and Submittals

2.5.1 Weekly Planning Schedule

No later than the weekly meeting required in Section 2.6, Developer shall submit to NCDOT a “look ahead” planning schedule showing the items of Work planned for the next two weeks.

2.5.2 Land Survey Records and Reports

A survey report shall be submitted to NCDOT for review and comment within 60 days of the completion of each survey regardless of the type of survey performed. The report shall be in a hardcopy format and also in electronic file format when possible. The report shall include survey records, information related to the source data used, the calculations performed, and the data produced as part of the survey process. At the request of Developer, NCDOT will provide the format specifications that are acceptable to NCDOT for each report type. Each report shall be reviewed and signed by the Survey Manager.

2.5.3 Utility Work Plan

Developer shall submit in accordance with Section 6 of the Technical Provisions a Utility Work Plan that sets forth Developer's plan to coordinate all Utility Adjustment Work for the Project.

2.6 Meetings

Developer and Developer-Related Entities shall attend periodic meetings with NCDOT personnel and other agencies as required for resolution of design, construction, operations and maintenance, and/or handback issues. These meetings may include but are not limited to:

- partnering meetings;
- NCDOT technical issue resolution meetings;
- design workshops;
- permit/resource agency coordination;
- local government agency coordination;
- scoping meetings;
- monthly progress meetings;
- utility meetings;
- drainage meetings; and
- public information meetings.

Commencing at NTP1 and until Final Acceptance of all Sections, Developer shall meet with NCDOT at a minimum on a monthly basis and, prior to each monthly progress meeting, provide a monthly look ahead of the activities to be completed during the upcoming month including details of planned traffic management measures and lane Closures. Developer shall be ready to discuss Progress Reports in accordance with Section 2.2.2.4 of the Technical Provisions or any other topic as required by NCDOT. Developer and other appropriate Developer-Related Entities as may be requested by NCDOT shall attend such meetings.

Before Developer or Developer-Related Entities begins Construction Work, NCDOT will call a preconstruction meeting to review construction and operations and maintenance aspects of the Project. Developer and other appropriate Developer-Related Entities shall attend this meeting, along with NCDOT and other involved parties and stakeholders as deemed necessary.

Between NTP2 and Substantial Completion, in addition to the required monthly progress meetings, Developer shall meet with NCDOT on a weekly basis.

Developer shall be responsible for preparing and distributing meeting minutes for attendees and NCDOT if not an attendee, for review and comment for all meetings within three Business Days of the meeting.

Commencing at NTP1 and until the end of the Term, Developer shall meet with NCDOT as required under Section 2.13.3 of the Technical Provisions.

2.7 Materials

2.7.1 Material Standards

Developer shall provide material meeting, at a minimum, the requirements of Division 10 of the 2012 NCDOT Standard Specifications for Roads and Structures.

2.7.2 Use of Materials

2.7.2.1 Removal and Disposal of Structures and Obstructions

Existing Highway facilities that are within the Project Right of Way, that are to be removed, shall become the property of Developer, except where excluded by the CA Documents, and shall be removed and suitably disposed of by Developer.

2.7.2.2 Salvaged Material

Developer shall maintain adequate property control records for materials or equipment specified in the CA Documents to be salvaged for NCDOT or other designated parties. At a minimum, Developer shall salvage metal Bridge rail and deliver same to 109 S. Sutherland Avenue, Monroe, NC. Developer shall be responsible for the handling, storage, transportation, delivery, removal, and protection of salvaged materials and equipment.

2.7.2.3 Temporary and Interim Structures, Facilities, and Systems

Developer shall provide and maintain all temporary Structures, facilities, and systems required for the Project, which may include, but will not be limited to, interim water supply, interim power, and lighting. Developer shall operate and maintain such temporary Structures, facilities, and systems as detailed in the CA Documents

2.7.2.4 Maintenance of Site and Adjacent Properties

The Project is to be constructed and operated with live traffic on or adjacent to the Site. Developer shall use Good Industry Practice in caring for the workforce, the traveling public, adjacent properties and their occupants, and Users.

2.7.3 Control of Materials

2.7.3.1 Defective Materials and Equipment

Developer shall not incorporate defective materials or equipment within the Work.

2.7.3.2 Certificates of Compliance

A Certificate of Compliance shall be furnished prior to the use of any materials for which the CA Documents require such a certificate.

A Certificate of Compliance as required by Article 106-3 of the Standard Specifications shall be furnished with each lot of material delivered to the Project and the lot so certified shall be clearly identified in the certificate. The fact that material is used on the basis of a Certificate of Compliance shall not relieve Developer of responsibility for incorporating material in the Work which conforms to the requirements of the CA Documents.

2.8 Environmental Work Restrictions and Requirements

2.8.1 Noise Control

Developer shall comply with all requirements of the NCDOT Traffic Noise Abatement Policy and the NCDOT Traffic Noise Analysis and Abatement Manual.

2.8.2 Vibration Monitoring

Developer shall comply with the requirement of the NCDOT Standard Specifications for Roads and Structures for vibration monitoring.

2.8.3 Burning Restrictions

Open burning is not permitted on any portion of the Project ROW. Developer shall not burn the clearing, grubbing or demolition debris designated for disposal and generated from the Project within the Project ROW, outside of the Project ROW, or at any waste or borrow sites in Mecklenburg or Iredell Counties. Developer shall dispose of the clearing, grubbing and demolition debris by means other than burning and in accordance with the Law.

2.8.4 Nonroad Construction Equipment

During the Construction Period, within 60 days after the end of each calendar year, Developer shall submit to NCDOT a list of nonroad construction equipment that was used for the Construction Work for greater than 40 hours during that calendar year. Such list shall be submitted each year through Final Completion of the Project. The submitted list shall include the following information for each applicable piece of non-road construction equipment:

- equipment type and manufacturer;
- engine manufacturer and model;
- engine model number;
- engine family name and model year;
- engine horsepower or kilowatts;
- engine serial number; and
- engine EPA Tier number.

The Submittal shall also include the Tier (1, 2, 3 or 4) Nonroad Exhaust Emission Standard that the equipment's engine currently satisfies in accordance with EPA current standards.

This list shall be updated and submitted annually. The Submittal shall include a description of how Developer shall meet a goal of increasing the number of nonroad construction equipment engines employed during each subsequent year that meet Tier 3 or higher by 5 to 10% in each subsequent year through Final Completion of the Project. In the event that such goal is not attained, Developer shall provide in the Submittal the reasons why the goal was not attained and Developer's approach to attaining the following year's goal.

2.9 Design Documents

All Design Documents, other than for Temporary Work, shall be prepared by or under the direct supervision of the Lead Design Firm. All Design Documents shall be signed and sealed by Professional Engineers who are registered in the State of North Carolina.

2.9.1 Design Exceptions

Developer's Design Documents shall be in accordance with the CA Documents unless Deviation from such requirements has been approved by NCDOT and as necessary by FHWA.

If Developer is seeking Design Exceptions, Developer shall prepare Design Exceptions for NCDOT and FHWA approval and explain proposed mitigation measures. Developer shall coordinate all requests for Design Exceptions with NCDOT and shall provide NCDOT with copies of all documentation associated with Design Exceptions prepared ten Business Days

prior to NCDOT submitting such information to FHWA. Developer shall not have any direct communications with FHWA regarding Design Exceptions.

Developer shall be solely responsible for obtaining NCDOT and FHWA approval of Design Exceptions, unless otherwise stated in these Technical Provisions.

Design Exceptions previously approved by NCDOT and FHWA are summarized in Exhibit 2-03 to the Technical Provisions. If Developer's Design Documents require changes to previously-approved Design Exceptions, Developer shall be solely responsible for obtaining NCDOT and FHWA approval of such modification to the previously-approved Design Exceptions.

Developer shall provide such required information relating to Design Exceptions as part of the Design Document process detailed in Section 2.9 of the Technical Provisions. Once approval of Design Exceptions is obtained, Developer shall be responsible for the final development of the Design Document, which may include the approved Design Exceptions.

2.9.2 Design Documents Submittals

All Design Documents, including those under NTP1 Work, shall be submitted to NCDOT as part of Developer's Conceptual or Preliminary Design Submittals, Intermediate Design Submittals, Final Design Submittals, or Released for Construction Submittals, as the case may be, for NCDOT review and comment, unless otherwise specified. Developer shall cause all draft, revised and final submittals to be accurate, complete and in a form and level of detail that satisfies Exhibit 2-09 of the Technical Provisions titled "Design Documents Submittal Guidelines." In addition to the electronic files required by Exhibit 2-09 of the Technical Provisions, Developer shall provide NCDOT electronic files with any Design Documents when requested by NCDOT. Such files shall be in a format acceptable to NCDOT. Design Documents Submittals, including those under NTP1 Work, shall be provided in accordance with the CA Documents, the Project Baseline Schedule, the Developer Management Plan, and in a format compatible with NCDOT's systems and software. Design Document Submittals shall be provided in accordance with Exhibit 2-09 and Exhibit 2-10 of the Technical Provisions, and Good Industry Practice.

When Developer provides a Submittal for NCDOT review and comment that is inaccurate or incomplete, NCDOT reserves the right to return the Submittal to Developer for revision without NCDOT review and comment.

Design Documents Submittals shall be complete for the corresponding level of design and include all information material to the evaluation of the Submittal, including survey data required by Section 9 of the Technical Provisions, along with all supporting information necessary for NCDOT to conduct a review. Developer may submit Design Documents and proceed with construction of an Element or collection of Elements for portions of the Project smaller than a Project Section. Developer shall bear the risk of any required modifications to such Elements construction due to subsequent design changes as the result of further design development or design development of other portions of the Project.

2.9.2.1 Conceptual or Preliminary Design Submittal

The intent of the Conceptual or Preliminary Design Submittal is to provide a formal opportunity for NCDOT, Developer, various design disciplines, and other Project stakeholders to review and comment upon the plans in order to ensure that the design is progressing appropriately. The Conceptual or Preliminary Design Submittal shall be prepared and submitted to NCDOT for review and comment when the design for a given Element, collection of Elements, or area of the Project is approximately 25% to 30% complete and shall reflect Developer's requirements for construction and comply with the requirements of the CA Documents. The content of the

Conceptual or Preliminary Design Submittal for each discipline shall be in accordance with Exhibit 2-09 of the Technical Provisions as applicable and other items as reasonably required by NCDOT.

2.9.2.2 Intermediate Design Submittal

The Intermediate Design Submittal as defined below shall include the following packages and shall be prepared and submitted to NCDOT for review and comment when the design for a given Element, collection of Elements, or area of the Project is approximately 50% to 60% complete, unless otherwise specified in Exhibit 2-09 of the Technical Provisions, and shall reflect Developer's requirements for construction and comply with the requirements of the CA Documents. The Intermediate Design Submittal shall include plan sheets, specifications, technical memos, reports, studies, calculations, and other pertinent data, as applicable. The Intermediate Design Submittal shall include details of how Developer has responded to NCDOT's comments resulting from the Conceptual Design. The contents of the Intermediate Design Submittal for each discipline shall be in accordance with Exhibit 2-09 of the Technical Provisions, as applicable and other items as reasonably required by NCDOT.

2.9.2.3 Final Design Submittal

The Final Design Submittal as defined herein shall include the following packages and shall be prepared and submitted to NCDOT for review and comment when the design for a given Element, collection of Elements, or area of the Project is 100% complete and shall reflect Developer's requirements for construction and comply with the requirements of the CA Documents. The Final Design Submittal shall include plan sheets, specifications, technical memos, reports, studies, calculations, and other pertinent data, as applicable. The Final Design Submittal shall include details of how Developer has responded to NCDOT's comments resulting from the Intermediate Design Submittal. The contents of the Final Design Submittal for each discipline shall be in accordance with Exhibit 2-09 of the Technical Provisions, as applicable and other items as reasonably required by NCDOT.

2.9.2.4 Released for Construction Submittals

After all comments from the Final Design Submittal have been addressed and appropriately incorporated, Developer shall submit Released for Construction Submittals to NCDOT a minimum of three Business Days prior to construction of the corresponding Project Elements and all final submissions shall be signed and sealed by Developer's Engineer of Record.

2.9.3 Temporary Work

Developer shall submit Temporary Work Design Documents to NCDOT for review and comment in accordance with Exhibit 2-10 of the Technical Provisions.

2.9.4 Final Right of Way Plans

Developer shall provide Final Right of Way Plans in hard and electronic format complying with the requirements of GS §136-19.4, Exhibit 2-09 and Section 7.2 of the Technical Provisions. When revisions are made to the Final Right of Way Plans, Developer shall submit to NCDOT within 30 days of Substantial Completion of all Project Sections complete sets of revised Final Right of Way Plans complying with the requirements of the CA Documents.

2.9.5 As-Built Record Plans and Supporting Documentation

2.9.5.1 Contents

Developer shall produce As-Built Record Plans and supporting reports documenting the location of the as-built alignments and profiles of each permanent Element of the Project built, installed,

or relocated by Developer including but not limited to roadway, Structures, utilities, drainage, signage, ITS, ETCS and survey control monument placement. The supporting reports shall include descriptive statements for the survey methods used to determine the as-built location of the feature being surveyed, as well as the coordinate types (x, y, and/or z) and feature codes in the same format that the preliminary construction data was generated.

The As-Built Record Plans and supporting documentation shall include design certificates, design calculations, quality records, specifications and Punch Lists and shall constitute an organized, complete record of plans and supporting calculations and details that accurately represent and describe each Project Element as designed and constructed by Developer and shall include an index of all plans and documents.

The As-Built Record Plans shall be separated so that NCDOT Retained Elements and other Elements of the Project to be returned to third parties prior to the end of Term are included in separate reports and plans from those Elements of the Project to be maintained by Developer.

The As-Built Record Plans shall be consistent with guidance issued by the North Carolina Board of Examiners for Engineers and Surveyors regarding issuing and certifying record drawings.

2.9.5.2 Submittal Requirements

With respect to the format of Design Documents Submittals, format shall be in accordance with the Exhibit 2-09 and Exhibit 2-10 of the Technical Provisions.

Developer shall submit to NCDOT the number of copies of each Submittal as prescribed in the Exhibit 2-09 and Exhibit 2-10 of the Technical Provisions. Submittals of RFC plans shall also be made in electronic format in PDF Version 1.7 or later. Design files, calculations, reports, documentation, etc. associated with the RFC plans shall be submitted in their original file formats and in PDF format.

Developer shall submit for review and comment As-Built Record Plans for the Project in accordance with the NCDOT's procedures. Developer shall furnish two electronic copies in PDF Version 1.7 or later and two copies in a format compatible with NCDOT's then current drafting package on CD or DVD of the following to NCDOT:

- 24" x 36" As-Built Record Plans;
- signed and sealed as-built Bridge load rating;
- final documentation (if different from final component Submittal);
- notice of completion for permits; and
- quality assurance/quality control certification statement.

The As-Built Record Plans required by Section 2.9.5.2 of the Technical Provisions shall be submitted as a composite set of plans for the Project. All documents shall be signed, sealed and certified by Developer's Engineer of Record.

No later than 10 Business Days after the completion of the Punch List for each Project Section, Developer shall submit to NCDOT for review and comment a complete set of draft As-Built Record Plans for the applicable Project Section.

Prior to Final Completion, Developer shall incorporate NCDOT comments and make any amendments necessary to the draft As-Built Record Plans and documentation and submit the final As-Built Record Plans and documentation to NCDOT.

Developer shall ensure that the As-Built Record Plans and documentation reflect the actual, true, and accurate conditions of the constructed Work and geometry of the Project and incorporate all comments made by NCDOT.

2.10 FHWA Reporting Requirements

Developer shall submit to NCDOT any information required by FHWA regarding the completed Work, including but not limited to, the quantity and cost of individual Elements of Work within 60 days of NCDOT's request for such information.

2.11 Certification

Developer shall control through the Quality System a technical approval and certification system. At a minimum the certification shall include the following:

- Final Design Certificate Exhibit 2-01
- Released for Construction (RFC) Certificate Exhibit 2-02

Developer shall ensure that all certificates required by the CA Documents are prepared, signed by all required parties, and submitted to NCDOT.

Submittals for Final Design and Released for Construction Documents shall include exactly one certificate per Submittal for the corresponding level of development of the Design Documents certifying all the Elements of the Project covered in the Submittal. The certificates shall be placed immediately after the cover page of each Submittal.

Developer shall issue a Final Design Certificate for each Submittal to NCDOT as part of the Final Design Submittal. Developer shall issue a RFC Certificate for each Submittal to NCDOT before releasing the Design Documents for construction.

The formats of the required certificates under this Section 2.11 of the Technical Provisions are set out in Exhibit 2-01 and Exhibit 2-02 the Technical Provisions.

2.12 [RESERVED]

2.13 Operations and Maintenance

2.13.1 Operations and Maintenance Plan

Developer shall develop and submit to NCDOT for approval an O&M Plan in accordance with Section 23.1.4 of the Technical Provisions. Developer shall submit to NCDOT for approval six copies of the O&M Plan on CD or by other methods approved by NCDOT for each of the following Submittals:

- draft O&M Plan;
- final O&M Plan; and
- annual O&M Plan updates.

Developer shall operate and maintain the Project in full compliance with the procedures and standards outlined in the O&M Plan and in the CA Documents.

2.13.2 NCDOT Inspection and Testing

NCDOT, at NCDOT's discretion, may perform periodic inspections and testing of Developer's or Developer-Related Entities' O&M Work to verify that the O&M Work performed by Developer meets the minimum Performance Requirements specified in the CA Documents. NCDOT will

exercise any rights and remedies under the CA Documents if the minimum Performance Requirements are not being met.

2.13.3 O&M Meetings

Developer and O&M Contractor shall have quarterly meetings with NCDOT to discuss the O&M Work performed by Developer. The items to be discussed shall include, but not be limited to:

- O&M Work performed by Developer for the previous quarter, including Incidents/Emergencies and Incident Response coordination, Closures and Permitted Closures;
- Construction Noncompliance Events, O&M Noncompliance Events, Closures, Nonconforming Work, and assessment of Noncompliance Points and, liquidated damages, and any other pertinent information related to payment adjustments and Noncompliance Points calculation per the CA Documents;
- anticipated O&M Work to be performed by Developer for the next quarter, including but not limited to Planned Maintenance, Renew Work and Permitted Closures; and
- any safety and traffic operations issues or requests on the Project.

NCDOT may request a meeting at any time to discuss O&M Work-related issues, accidents and other operations and maintenance aspects of the Project. Developer shall be required to actively participate in such and any other meetings as directed by NCDOT. Developer shall conduct Incident debriefings to review lessons learned and best practices.

2.14 Personnel

2.14.1 Developer's Supervisory Personnel

Developer shall maintain a competent Project Manager or one of its NCDOT-approved designees at the Site at all times while Work is in progress to act on behalf of Developer. Such supervisory personnel shall be thoroughly experienced in the type of Work being performed. Such supervisory personnel shall have the full authority to receive instructions from NCDOT and to execute the orders or directions of NCDOT and direct any Developer or Developer-Related Entity activity necessary to comply with the CA Documents. Developer's supervisory personnel detailed in the CA Documents shall all be appointed and where required approved prior to any Work being undertaken for which they are responsible. All the positions listed in this Section 2.14.1 of the Technical Provisions are Key Personnel for the Project.

2.14.1.1 Project Executive

The Project Executive shall be the individual designated and engaged by Developer and approved in writing by NCDOT in the position to take overall responsibility for the Project and who shall act as a primary point of contact on all matters on behalf of Developer. The Project Executive shall have at a minimum 5 years continuous experience or 15 years overall experience in a senior management position within a developer organization on at least one tolled Highway project that was in the operations phase with a minimum length of 20 miles or an initial capital construction budget in excess of $500 million or a comparable combination thereof, at NCDOT discretion.

2.14.1.2 Project Manager

The Project Manager shall be the individual designated by Developer and approved in writing by NCDOT in the position to take full responsibility for the execution of the Work. The Project Manager shall have at a minimum 15 years experience in a senior position within an

organization where they had responsibility for integrating design, construction and operations on at least one tolled Highway that was in the operations phase. Between the Project Manager and the Deputy Project Manager, the Project shall be staffed full time during the Construction Period.

2.14.1.3 Deputy Project Manager

The Deputy Project Manager shall be the individual designated by Developer and approved in writing by NCDOT in the position to take full responsibility for the execution of the Work in the absence of the Project Manager. The Deputy Project Manager shall have at least 10 years experience or have worked in a management capacity on a project where the capital expenditure budget was in excess of $300 million or a comparable combination thereof, at NCDOT discretion.

2.14.1.4 Public Communication Manager

The Public Communication Manager shall be the individual designated by Developer and approved in writing by NCDOT in the position to take full responsibility for all communications, public outreach, media relations, public information, third party, and stakeholder communication and marketing. The Public Communication Manager shall have undertaken this role on at least one project of comparable size or complexity.

2.14.1.5 Design Manager

The Design Manager shall be the individual retained by Developer to manage the Project's design on an operational level. The Design Manager shall have experience on at least one Highway design-build project with a capital expenditure in excess of $100 million or 20 years experience in design of freeway projects or a comparable combination thereof, at NCDOT discretion.

2.14.1.6 Quality Manager

The Quality Manager (QM) shall be the individual retained by Developer with the authority and responsibility for quality management, Quality System -related activities for all Work, including the establishment and maintenance of, and compliance with the QMP. The QM shall report and coordinate all quality issues directly with NCDOT and Developer's Project Manager. The QM shall have defined authority for ensuring the establishment and maintenance of the Developer Management Plan and reporting to NCDOT on the performance of the Developer Management Plan. The Quality Manager shall have no Project responsibilities other than quality assurance and quality management and control of the Project per the QMP and shall be independent from staff and duties associated with the execution/production of the Work. The QM shall be working full time and exclusively for the Project during the Construction Period.

2.14.1.7 Engineer of Record

Each Engineer of Record (EOR) shall be a Professional Engineer registered in the State of North Carolina retained by Developer or Developer-Related Entities that performs the design and analysis, and shall be in "responsible charge" in accordance with NC General Statutes Chapter 89C on behalf of Developer for the preparation of the Design Documents.

2.14.1.8 Environmental Compliance Manager

Developer shall designate an Environmental Compliance Manager (ECM) to ensure compliance with all Environmental Commitments to prevent any violation or failure to comply with the Environmental Approvals. The ECM shall be responsible for reporting any violation or failure to comply with requirements together with planned corrective actions to NCDOT as soon as such

violation or failure to comply is identified and to then regularly update NCDOT on the progress of corrective actions.

The ECM shall report and coordinate all environmental compliance issues directly with NCDOT and Developer's Project Manager. The ECM shall direct the environmental activities and shall monitor, document, and report environmental compliance for the Work.

The ECM shall coordinate with NCDOT, Developer, and appropriate Governmental Entities. The ECM shall submit all necessary environmental documentation and monitoring reports to the appropriate Governmental Entities and when applicable, through NCDOT, to the extent necessary to maintain compliance with applicable Environmental Approvals.

The ECM shall have a minimum of 15 years experience working on Highway projects, one of which must have been in North Carolina. The ECM shall hold an appropriate professional qualification for the role of the ECM. Professional qualification for the ECM shall be at a minimum equal to a Certified Foremen in accordance with Exhibit 13-02 of the Technical Provisions or comparable education and experience, at NCDOT discretion.

The ECM shall be working full time and exclusively for the Project from the Construction Commencement Date to the Final Acceptance of the last Project Section.

2.14.1.9 Operations and Maintenance (O&M) Manager

The O&M Manager shall be the individual retained by Developer with at least 15 years experience in the management of toll highway operations and maintenance, including ETCS and ITS, on projects of comparable scope and complexity, and under similar contracting terms. The O&M Manager shall take full responsibility for Developer for the execution of all O&M Work performed by Developer during O&M During Construction and O&M After Construction, and shall be the key point of contact with NCDOT for all issues related to O&M Work, as well as coordination between Developer and NCDOT throughout the Term as it relates to O&M Work. The O&M Manager shall be working full time and exclusively for the Project from March 31, 2015 to the end of the Term.

2.14.1.10 Construction Manager

The Construction Manager shall be an individual with experience as a project manager on at least two Highway transportation projects. At least one project shall have been undertaken as a design build or P3 project and at least one project shall have had a construction value more than $300 million. The Construction Manager shall be working full time and exclusively for the Project from the Construction Commencement Date to the Final Acceptance of the last Project Section.

2.14.2 Developer's Lead Functional Personnel

2.14.2.1 Quality System Specialist

The Quality System Specialist (QSS) shall have the responsibility for developing Developer's Quality System and verifying that all Developer's processes conform to the Quality System. The QSS shall have experience in a similar position on at least two Highways projects during design and construction phases undertaken using ISO 9001.

2.14.2.2 [RESERVED]

2.14.2.3 Pavement Designer

The Pavement Designer shall be a Professional Engineer registered in the State of North Carolina knowledgeable in the design of Highway pavements and who has undertaken specific training in the design of Highway pavements. The Pavement Designer shall have undertaken

the design of the pavement on at least three similar projects and a minimum of five years experience in Highway pavement design using the NCDOT Pavement Design Procedure; the Mechanistic-Empirical Pavement Design Guide, Pavement ME Design or the 1993 AASHTO Guide for Design of Pavement Structures. This position is a Key Personnel for the Project.

2.14.2.4 Geotechnical Engineer

Developer's Geotechnical Engineer shall be a Professional Engineer registered in the State of North Carolina who has completed a minimum of three geotechnical design projects of similar scope and construction methodology. In this capacity, different Geotechnical Engineers/firms can be used for different Project Elements. The Geotechnical Engineer shall demonstrate proficiency and experience with LRFD practices and shall have at least one of the three similar projects listed above performed using LRFD methods. Developer's Geotechnical Engineer for the Project shall be prequalified to perform Geotechnical Engineering Work by NCDOT.

2.14.2.5 Survey Manager

The Survey Manager shall be a licensed Professional Land Surveyor in the State of North Carolina. The Survey Manager shall manage all Developer survey activities associated with the Project and shall be responsible for directing and reviewing all Developer survey Work and be the point of contact for all survey activities.

2.14.2.6 Utility Coordination Manager

Developer shall engage a Utility Coordination Manager for the duration of all Utility Adjustment activities to provide utility coordination expertise. The Utility Coordination Manager shall be knowledgeable of NCDOT procedures for accommodating and relocating utilities. The Utility Coordination Manager shall manage all utility coordination and utility design activities, including the activities performed by the Utility Design Coordinator, with the overall Project design during the planning, design, and construction phases of the Work.

2.14.2.7 Toll System Integrator Manager

Developer shall engage a senior functional lead who organizes, schedules, and integrates all the individual Elements of the Electronic Tolling Collection System and ITS Elements of the Project before Final Completion including complete program analysis and design, management, fabrication, construction, deployment, development of business rules and operating procedures, and testing and commissioning, as well as auditing and reporting, system maintenance and upgrades throughout the Project life cycle. The Toll System Integrator Manager shall have undertaken this role on at least three all electronic ORT projects. This position is a Key Personnel for the Project.

2.14.2.8 Commissioning Agent

Developer shall retain an independent Commissioning Agent to perform the testing and commissioning activities required in Section 24 of the Technical Provisions. Developer's Commissioning Agent shall not be an employee of Developer or any Developer-Related Entity. The Commissioning Agent shall be independent of the installing personnel or equipment suppliers for the Project. The Commissioning Agent shall maintain an unbiased approach to problem solving and conflict resolution. The Commissioning Agent shall have undertaken this role on at least two all electronic ORT projects.

Developer shall furnish a copy of the Commissioning Agent's certifications to NCDOT for approval no less than 90 days prior to scheduled testing and commissioning required by Section 24.6 of the Technical Provisions.

2.14.2.9 Emergency Supervisor

The Emergency Supervisor or designated alternate shall be available at, or reasonably near, the Site on a 24 hour basis, seven days a week, 52 weeks a year. Developer shall designate this Person as the point of contact for Emergencies and in cases that require immediate action to maintain traffic or to resolve any other problem that might arise. Developer shall identify an alternate to the Emergency Supervisor when the Emergency Supervisor is not available as required in this Section 2.14.2.9 of the Technical Provisions. Prior to NTP2, Developer shall also submit, by certified mail, the telephone numbers and names of personnel designated to be contacted in cases of Emergencies, along with a description of the Project location, to NCDOT, North Carolina State Highway Patrol and all other local law enforcement agencies. Within seven days of any change that results in the previously provided telephone numbers and names of personnel designated to be contacted in cases of Emergencies being inaccurate or incomplete, Developer shall also submit, by certified mail, corrected telephone numbers and names of personnel designated to be contacted in cases of Emergencies, along with a description of the Project location, to NCDOT, North Carolina State Highway Patrol and all other local law enforcement agencies.

2.14.2.10 Project Water Quality Specialist

The ECM shall designate a Water Quality Specialist to provide expertise in permitting delineation, stormwater pollution prevention, and the protection of jurisdictional waters during the course of the Work.

The Water Quality Specialist shall have verifiable experience implementing storm water pollution prevention plans in the State of North Carolina and be able to demonstrate a working knowledge of National Pollutant Discharge Elimination System (NPDES) requirements applicable to the Project.

2.14.2.11 Hazardous Materials Manager

The ECM shall designate a Hazardous Materials Manager to provide expertise in the safe handling of Hazardous Materials required to perform the Work and those that may be discovered/impacted during the Term. The Hazardous Materials Manager shall conduct appropriate activities such as the following:

- schedule and/or conduct training for Developer's employee;
- verify all employee certifications required for any handling of Hazardous Materials prior to employee handling such material;
- maintain records of all Incidents involving Hazardous Materials and notify the ECM, NCDOT and appropriate authorities in writing of any such Incidents;
- be experienced in developing Investigative Work Plans (IWPs), and remedial action plans or equivalent reports necessary and acceptable to the NCDENR-DWQ in material discovery and remediation efforts of Hazardous Materials; and
- be experienced in NCDENR-DWQ guidance for the investigation and remediation of Hazardous Materials under the NCDENR-DWQ Voluntary Cleanup Program and North Carolina Risk Reduction Program Rules.

2.14.2.12 Certified Erosion Control Manager

The Certified Erosion Control Manager is responsible for preparation and compliance with the appropriate permits, and oversees the installation and maintenance of all temporary and permanent erosion and sediment control during the Term of the Project, and also prepares

erosion control inspection reports. This Person shall be a Certified Professional in Erosion and Sediment Control (CPESC) except as otherwise provided in this Section 2.14.2.12 of the Technical Provisions. This Person shall also be or shall provide staff that is a Certified Supervisor as provided in Exhibit 13-02 of the Technical Provisions certified by NCDOT through NCSU, has knowledge of applicable permit requirements, and has experience with application processes, design standards, specifications, and special provisions for storm water facilities, and the selection, design, and implementation of temporary and permanent Best Management Practices.

After Substantial Completion of all Project Sections, the Certified Erosion Control Manager shall be a Certified Professional in Erosion and Sediment Control (CPESC) or shall provide staff that is CPESC.

Erosion and Sediment Control/Stormwater Certification requirements are shown in Exhibit 13-02 of the Technical Provisions.

2.14.2.13 Traffic Control Supervisor

Developer shall furnish a Traffic Control Supervisor for the Project who is knowledgeable of traffic control plan design, devices and application, and has full authority to ensure traffic is maintained in accordance with the CA Documents. Developer's Traffic Control Supervisor shall fulfill the functions described in Section 22.3.2 of the Technical Provisions. The Traffic Control Supervisor shall be certified by NCDOT as a Qualified Work Zone Supervisor prior to NTP 2 and shall have a minimum of 10 years experience in a similar role. This position is a Key Personnel for the Project.

2.14.2.14 Travel Demand Manager

Developer shall furnish a Travel Demand Manager for the Project who is knowledgeable of traffic management and operations and has full authority to ensure mobility and safety within the work zone and the surrounding network that is affected by the presence of the work zone. Developer's Travel Demand Manager shall fulfill the functions described in Section 22.3.3 of the Technical Provisions.

2.14.3 ISO 9001 Training Requirements

The following Developer personnel shall have undertaken training in the use and application of Quality Systems including the application of ISO 9001 no later than 90 days after NCDOT issues NTP1:

- Project Executive;
- Project Manager; and
- Design Manager.

The Quality Manager shall have undertaken training in the use and application of Quality Systems including the application of ISO 9001 and ISO 14001 and shall have undertaken training as an ISO 9001 auditor no later than 90 days after NCDOT issues NTP1.

The following Developer personnel shall have undertaken training in the use and application of Quality Systems including the application of ISO 9001 no later than 90 days prior to the date on which NCDOT intends to issue NTP2:

- Construction Manager; and
- O&M Manager.

If at any time any of the Key Personnel listed in this Section 2.14.3 of the Technical Provisions needs to be changed following the requirements of the CA Documents, the Key Personnel shall have undertaken training in the use and application of Quality Systems including the application of ISO 9001 no later than 30 days after NCDOT approval.

2.15 NCDOT Facilities and Space Requirements

Developer shall provide, no less than 30 days prior to the Construction Commencement Date, and maintain workspace for one NCDOT staff member at the Project ROW. This space can be a separate facility or part of Developer's facility. The workspace provided shall be adequately lighted and shall include at a minimum, one desk, one office chair, one telephone (a separate line from Developer), and Internet access. Developer shall provide floor plan and location of proposed workspace to NCDOT for approval no less than 60 days prior to the Construction Commencement Date. If requested, Developer shall provide NCDOT access to the proposed workspace for inspection prior to approval.

2.16 Federal Energy Regulatory Commission (FERC) Approval

The roadway typical section on the causeways at Lake Norman shall be designed and constructed in accordance with Section 10 of the Technical Provisions.

Construction Work within the Duke Energy hydroelectric project boundary area, including but not limited to widening of the existing Bridges over Lake Norman requires a FERC permit. Developer shall not begin Construction Work on any portion of Developer's Design that requires the approval of Duke Energy Corporation and FERC, until such permits and approvals are obtained from Duke Energy Corporation and FERC. Upon receipt of Developer's RFC plans for Construction Work within the Duke Energy hydroelectric boundary area or any other portion of Developer's Design that requires the approval of Duke Energy Corporation and FERC, and approved Major Permits, NCDOT will prepare and submit Duke Energy Conveyance Permit and application for FERC approval. Upon receipt of Developer's RFC plans for Construction Work within the Duke Energy hydroelectric boundary area and approved Major Permits, Developer should allow 8 months for Duke Energy Conveyance Permit approval and FERC approval.

2.17 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with Section 2 of the Technical Provisions:

- Project Baseline Schedule for approval no later than 30 days after NTP1 (and if resubmitted, approved no later than 90 days after NTP1);
- Project Baseline Schedule narrative report for approval as part of the Project Baseline Schedule;
- updated Project Baseline Schedule for approval within ten days of NTP2;
- Revised Project Baseline Schedule for approval within 14 days of each Change Order, Relief Event or Compensation Event;
- Project Status Schedule updates for review and comment as part of the monthly Progress Report;
- Project Status Schedule updates narrative report for review and comment as part of the Project Baseline Schedule updates;
- Schedule of Values for approval concurrent with the Project Baseline Schedule;

- revised Schedule of Values for approval within 14 days of the execution of Change Order;
- Progress Report for review and comment within seven days of month end after NTP1;
- As-built Schedule for approval within 14 days of completion of the Punch List;
- Recovery Schedule for approval as part of the Project Status Schedule updates;
- Developer Management Plan for approval within 90 days of NTP1;
- internal audits every three months after DMP approval and results within seven days;
- Nonconforming Work reports upon issuance and upon resolution with corrective action plan or corrective action;
- quality report for review and comment within seven days of month end;
- draft Contract for CEI services for review and comment prior to entering Contract;
- WBS for approval before or concurrently with the submission of the Schedule of Values;
- weekly planning schedule (two-week look ahead) no later than weekly meeting;
- land survey records and reports for review and comment within 60 days of survey;
- monthly look ahead of the activities prior to monthly progress meeting after NTP1;
- meeting minutes for review and comment commencing within three days;
- Certificate of Compliance prior to the use of any materials;
- Final ROW Plans prior to ROW Acquisition Services;
- revised Final ROW Plans within 30 days of Substantial Completion of all Project Sections;
- draft As-Built Records Plans for review and comment within 90 days of Substantial Completion of each Project Section;
- amended As-Built Records Plans for review and comment within 45 days of Final Acceptance;
- Commissioning Agent's Certificates for approval 90 days prior to scheduled testing and commissioning;
- Emergency contact name and telephone numbers prior to NTP2;
- corrected names and telephone numbers of Emergency contacts within seven days of change; and
- proposed workspace floor plan and location for approval 60 days prior to Construction Commencement Date.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

3 PUBLIC INFORMATION AND COMMUNICATION

3.1 General

Developer shall perform all public information, communities and public outreach, media relations and Project marketing Work in accordance with the requirements of this Section 3 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

3.2 Public Information and Communication Plan

As part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, update a Public Information and Communication Plan (PICP) in accordance with this Section 3.2 of the Technical Provisions. The PICP shall include, at a minimum, protocols required by Section 3.2.1 of the Technical Provisions, the Communication, Public Outreach and Community Education Plan (CPOCEP), the process and procedure for stakeholder outreach, distribution of information stakeholders, and the Public Education and Awareness Program (PEAP) to be consistent with the CA Documents and Good Industry Practice.

3.2.1 Interface and Liaison with NCDOT

Developer shall provide a Public Communication Team lead by a Public Communication Manager to implement the requirements of the Public Information and Communication Plan. The Public Communication Team shall manage all communications, public outreach, media relations, public information, third party and stakeholder communication and marketing. Developer shall include public information and communication protocols for coordination between Developer and NCDOT, third party stakeholders and the general public including the traveling public and the Users in the PICP. These protocols shall detail:

- public outreach – processes and responsibility for public outreach materials, communication and information sharing with the surrounding public and potential users of the facility;
- stakeholder relations – processes and responsibility for briefing and/or providing information to parties identified by Developer that have an interest in the Project. Developer shall also include any stakeholders identified to Developer by NCDOT;
- procedure for NCDOT review of information required by Public Information Plan and Communication Plan;
- Incident and Emergency management - processes and responsibility for managing communication with surrounding emergency management and recovery operations and authorities;
- media – processes for providing information to NCDOT for media relations and response to comments on particular aspects or phases of the Project; and
- marketing - process and responsibility for marketing facility and Transponder.

Developer shall ensure that a representative of NCDOT is invited to all meetings related to the Project to which community groups have been invited. Developer shall ensure that the opportunity for public involvement is provided in accordance with this Section 3 of the Technical Provisions. The term "public information" is all-encompassing including those instances where a public notice is justified.

Developer shall submit all communications and marketing strategies to NCDOT for approval at least 30 days before implementation of such strategies except as otherwise provided in the

Public Information and Communication Plan and the Technical Provisions. Developer shall provide NCDOT with advance copies of all communications materials for their approval at least 30 days prior to dissemination. Communication in response to an Incident or Emergency shall be submitted by Developer to NCDOT for approval in accordance with the approved Public Information and Communication Plan.

Developer shall not use NCDOT's logos and brands (including NCTA's logo and brands) on any communication without the prior written approval of NCDOT except as provided in Section VIII of Exhibit 18 of the Agreement. The Project 'brand' material shall be submitted to NCDOT for approval no less than 30 days prior to the initial use.

3.3 Communities and Public Outreach

Developer shall maintain an open dialogue with the communities immediately surrounding the Project with the objective of building a long-term relationship based on trust and respect.

Developer shall develop and implement a Communication, Public Outreach and Community Education Plan consistent with this Section 3 of the Technical Provisions and the approved Public Information and Communication Plan. Developer's Communication, Public Outreach and Community Education Plan will form the basis for all communication activities during the Term.

The CPOCEP shall:

- provide an effective framework for communication between Developer and stakeholders;
- effectively engage the community in the design, construction and operation of the Project;
- build a strong and enduring relationship with stakeholders and the community within the Project catchments over the life of the Project;
- develop a strong and enduring brand relationship between the community, Project drivers and the owners and operators of the Project;
- maximize public awareness of the benefits of the Project;
- educate the public on the use of the Project, including toll payment options; and
- make use of current media, such as social media, and a Project website.

Developer's CPOCEP 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 listed above. The plan shall also include the development of a crisis communications plan and procedures, addressing coordination with NCDOT and responsiveness to the media as well as provide the public with a point of contact and a telephone number for questions and concerns during the Project.

Developer shall update the Communication, Public Outreach and Community Education Plan annually and submit such plan to NCDOT for approval no less than thirty days prior to the anniversary of the approval of the approved Communication, Public Outreach and Community Education Plan.

3.3.1 Stakeholder Outreach and Information

Developer shall undertake the Work to ensure Developer builds and maintains an effective working relationship with all stakeholders in the Project. Developer shall establish procedures to assure that stakeholders are provided thorough and accurate information about the Project in a timely manner.

Developer shall:

- maintain a comprehensive stakeholder database to track and manage stakeholder communication;
- develop and implement a proactive program of stakeholder engagement to brief local stakeholders on the Project's progress, features and benefits;
- where possible, afford stakeholders the opportunity to provide input to Project planning and development;
- develop tailored marketing and communication material for relevant stakeholder groups;
- establish ongoing mechanisms for stakeholder information and input during the Project's operational phase, including communications surrounding enforcement technologies and strategies; and
- establish partnerships with local groups and organizations where there is mutual benefit in supporting the Project.

3.3.2 Project Operations - Public Education and Awareness Program

Developer shall develop a PEAP, to fit within the CPOCEP. Developer's Public Education and Awareness Program will address:

- plans for the opening of the HOT Lanes to traffic and communications that will facilitate smooth ongoing operations;
- interface with NC Quick Pass marketing and communications to facilitate distribution of Transponders;
- provision of information to motorists and stakeholders to facilitate the maintenance of traffic (MOT) during ongoing maintenance activities. This will include:
    - packaging of all MOT information, such as anticipated delays and lane Closures, for provision to the Public Communication Team on a regular basis, to facilitate communication to the media, stakeholders and the broader community; and
    - communication with residents and property owners impacted by MOT activities.
- communication with elected officials and other key stakeholders, as needed, based on the intensity of maintenance activities;
- coordination with local agencies; and
- notification program to inform motorists and the broader community about expected traffic changes and/or delays.

3.3.3 Project website

Developer shall develop and maintain a Project website that reflects the current status of the Project and shall be accessible for the general public starting 30 days before NTP2 through the Term. Developer shall provide website copy to NCDOT for review and comment a minimum of seven days prior to posting new information except in Emergency situations or to accommodate the communication of live traffic conditions to the public. The website shall at a minimum contain a graphical Project overview and description, contact information, plan of Work for the coming months, overall Project Schedule (on a quarterly level at a minimum), frequently asked questions and responses, and updated Project photos. The website shall reflect Best Industry

Practices and be at a minimum, updated weekly throughout the duration of the Construction Period.

No less than 120 days prior to Substantial Completion of the first Project Section and for the remainder of the Term, Developer's website shall include information in accordance with Developer's Public Education and Awareness Program, information regarding the Toll Rate Schedule and other toll-related information as required by Exhibit 4 and Exhibit 18 to the Agreement and Section 24 of the Technical Provisions, up-to-date information on Closures and detours, and other information as required by the CA Documents.

3.3.4 New media

Developer may use new media, such as Twitter and Facebook among others, to distribute information and provide updates at least at the same frequency as the Project website is updated. If Developer uses new media, Developer shall include the procedure for coordination of communication with NCDOT in the Communication, Public Outreach and Community Education Plan required in Section 3.3 of the Technical Provisions. Developer shall follow State records retention and IT security policies and applicable Law.

3.4 Media Relations

Developer shall act in the best interests of the Project, its Customers and motorists in building and maintaining relationships with the media. The Public Communication Team shall put processes in place to ensure compliance with the CA Documents and close coordination with NCDOT on media outreach activities, issues and responses and promote consistency with the Communications, Public Outreach and Community Education Plan.

Developer shall:

- include in Communication, Public Outreach and Community Education Plan 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;
- proactively build and maintain relationships with local media;
- provide relevant Project information and press releases to the media in a timely fashion after approval is obtained from NCDOT;
- monitor all media coverage of the Project; and
- provide copies of all press releases or other media materials, to NCDOT for approval in advance of distribution in accordance with the Public Information and Communication Plan and this Section 3.4 of the Technical Provisions.

3.5 Project Marketing

3.5.1 Project Branding

Developer shall develop and provide to NCDOT for approval communication templates for the Project including but not limited to templates for written communication, presentations and other handout materials that shall be part of the uniform Project 'brand'.

3.5.2 Marketing Activities

Developer shall design communication, marketing and public outreach activities to respond to the issues, attitudes and attributes of the communities and market segments relevant to the Project.

Developer shall solicit comments from NCDOT when developing, producing and disseminating paper and electronic media to educate the region on tolling and to introduce the Project opening. This marketing shall target the core Project corridor motorists to include local residents and businesses, tourists, and rental agencies.

Developer shall solicit comments from NCDOT when selecting and conducting meetings at public venues related to marketing and toll education, which may include a variety of meeting sites such as local festivals, community meetings, and public locations (malls, shopping centers, etc.).

Developer shall not assume that NCDOT will perform any portion of the Work and NCDOT does not commit to perform any portion of the Work required by this Section 3.5.2 of the Technical Provisions.

3.6 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 3 of the Technical Provisions:

- protocols and procedures for public outreach, stakeholder relations, Emergency management, media, and marketing for review and comment within 90 days after NTP1;
- all communications and marketing strategies for approval at least 30 days before implementation of such strategies;
- all communications materials for approval at least 30 days, or as otherwise approved, prior to dissemination;
- Updated Communication, Public Outreach and Community Education Plan annually for review and comment 30 days prior to Plan anniversary;
- website copy for review and comment a minimum of seven days prior to posting; and
- Project “brand” material for approval 30 days prior to the initial use.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

4 ENVIRONMENTAL MANAGEMENT

4.1 General

Developer shall perform all environmental compliance, protection, mitigation and management Work in accordance with the requirements of this Section 4 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

Developer shall comply with all Environmental Laws, Environmental Approvals, and Environmental Commitments.

Developer shall develop and submit to NCDOT a Comprehensive Environmental Protection Program (CEPP) in accordance with Section 2.4.9 of the Technical Provisions.

4.2 Environmental Approvals

4.2.1 New Environmental Approvals and Amended NCDOT-Provided Approvals

NCDOT-Provided Approvals are based on the Project Scope contained in the Technical Provisions. Such approvals may require re-evaluation, or amendment, or to be supplemented as the Work progresses to accommodate Developer's design, or incorporation of Additional Properties into the Project, or to accommodate actions not identified in NCDOT-Provided Approvals or covered specifically by existing resource agency coordination.

Developer shall coordinate with NCDOT, FHWA, and other Governmental Entities as necessary and prepare all required analyses, information and documentation including undertaking all inspections, surveys, analyses and studies necessary or required to obtain all Environmental Approvals or amendments to NCDOT-Provided Approvals except where NCDOT has agreements with Governmental Entities to perform such coordination. In cases where NCDOT has such agreements, Developer remains responsible for all Work associated with obtaining any new Environmental Approvals or amendment to NCDOT-Provided Approvals.

4.2.2 Developer Submittals

Developer shall be required to submit all documentation for environmental compliance, including permit applications, in accordance with the Environmental Compliance and Mitigation Plan as described in Section 2.4.9.1 of the Technical Provisions. Any action by NCDOT, including submission of a permit application to Governmental Entities, does not assure approval by the other Governmental Entities.

4.2.3 Environmental Permits

4.2.3.1 General

Developer shall prepare all documents and analyses necessary for NCDOT to obtain the environmental permits for the Project. Environmental permit applications shall be required for the US Army Corps of Engineers (USACE) Section 404 Permit and the North Carolina Department of Environmental and Natural Resources (NCDENR) Division of Water Quality (DWQ) Section 401 Water Quality Certification. Developer shall not begin ground-disturbing activities, including utility relocation, in jurisdictional water (including wetlands) until the environmental permits have been issued. Investigative borings covered under Nationwide Permit # 6 are excluded from this requirement.

Developer may begin utility relocation work prior to obtaining the aforementioned permits provided that (1) the Department is notified in writing prior to these activities; (2) such activities are outside jurisdictional resources; (3) a meeting is held with the NCDOT and permitting

agencies prior to beginning work; and (4) Developer submits a preconstruction notification for the Department to forward to the permitting agencies.

Developer shall not have direct contact with representatives of the permitting agencies, either by phone, e-mail or in person, without representatives of NCDOT present.

NCDOT will schedule meetings with the permitting agencies prior to Developer preparing permit applications (Pre-Application Meetings). Developer shall clearly identify in the Project Schedule when Developer wishes NCDOT to schedule these meetings. Failure on the part of Developer to meet these dates shall place all responsibility for delays resulting from missing these dates solely on Developer.

Unless otherwise specified in the CA Documents, Developer is bound by the terms of all signed planning documents and approved minutes and commitments of all NEPA "concurrence meetings" and is held accountable for meeting all permit conditions. Developer shall be required to staff any personnel necessary to provide permit compliance.

4.2.3.2 Major Permit Application Process

With respect to Major Permit applications, Developer shall follow the process described in this Section 4.2.3.2 of the Technical Provisions.

Developer shall acquire information and prepare analysis and permit drawings that reflect the impacts and mitigation and minimization efforts as required by the permitting agencies. Further, Developer shall provide these permit impact sheets (drawings) depicting the design and construction details to NCDOT as part of the permit application. Developer shall develop the permit application for all impacts in jurisdictional areas, including all Utility Adjustments. The permit application shall consist, at a minimum, of the following:

- cover letter;
- minutes from Pre-Application Meetings;
- permit drawings;
- half-size (11" x 17") plans; and
- completed forms appropriate for impacts.

NCDOT will re-verify and update, as needed, the required environmental data that expires prior to the completion of the activity causing the impact in the jurisdictional areas. These include, but are not limited to, federally protected species, re-verification of wetland jurisdictional areas, historic and archaeological sites, and 303d (impaired) streams.

Developer shall submit one permit application for the entire Project. However, Developer may elect to pursue one permit application for each Project Section. Developer shall not further split the permit applications to develop a "staged permitting" process to expedite construction activities in a phased fashion. If Developer elects to submit a permit application for an individual Project Section, that permit application shall also contain preliminary impacts and drawings for the remainder of the Project so as to obtain a final permit for that Project Section and a preliminary permit for the remainder of the project. Developer shall then submit a permit modification for each remaining Project Section to include final impacts and permit drawings.

Direct coordination between Developer, NCDOT's Transportation Program Management Director, Resident Engineer, Division Environmental Officer (DEO) and the Project Development and Environmental Analysis Branch (PDEA) - Natural Environment Unit (NEU) shall be necessary to ensure proper permit application and/or modification development. Upon

completion of the permit application package, Developer shall concurrently forward the package to NCDOT staff identified above for review and comment. After all revisions are complete, NCDOT will subsequently forward the package to the appropriate agencies to have the permit application placed on public notice.

Any temporary construction measures, including de-watering, construction access, etc. shall be addressed in the permit application. Impacts that result from so-called temporary measures may not be judged to be temporary impacts by the agencies. These issues shall be addressed and resolved with the agencies during the Pre-Application Meetings.

Developer shall clearly indicate the location of Developer's Temporary Work and Utility Adjustment in jurisdictional areas. Developer shall also identify all proposed borrow and waste sites. Further, Developer shall describe the methods of construction of all applicable Structures. The description of the temporary impacts shall include restoration plans, schedules, and disposal plans. This information shall be included in the permit application and/or modification. This information shall also be part of the data presented at the Pre-Application Meetings.

All fill material shall be immediately stabilized and maintained to prevent sediment from entering adjacent waters or wetlands. Developer shall ensure that the design and construction of the Project will not impair the movement of aquatic life.

Requests by Developer for modifications to the permits obtained are strongly discouraged and will be allowed only if NCDOT determines, at its sole discretion, it to be in the best interest of NCDOT. Developer shall not take an iterative approach to hydraulic design issues but rather have all hydraulic design features identified and designed prior to permit application.

4.2.3.3 Individual Permit Timeframe

Developer shall allow no less than 11 months after NTP1 to accurately and adequately complete all designs necessary for permit applications, submit applications to NCDOT, and obtain approval for the permits from the permitting agencies. Developer shall allow 30 days for NCDOT and additionally, approximately 120 days for the permitting agency to review each permit application from receipt of a complete and accurate permit application acceptable to NCDOT and the permitting agency in compliance with Section 4.2.3.2 of the Technical Provisions. With the exception of survey Work, Utility Adjustment outside jurisdictional areas of the permitting agencies, and investigative borings permitted under a Nationwide Permit 6, no mobilization of men, materials, or equipment for Site investigation or construction of the Project shall occur prior to obtaining the permits (either within the 11-month period or beyond the 11-month period).

The timeframes listed above for review by permitting agencies including PDEA, North Carolina Division of Water Quality (NCDWQ), and the USACE to review any permit applications and/or modifications shall begin only after a fully complete and 100% accurate Submittal is received by NCDOT from Developer.

4.2.3.4 Mitigation Responsibilities of Developer

Developer is responsible for compensatory mitigation for all impacts to wetlands and surface waters due to Work performed through the Term. Any changes proposed by Developer to any design or construction details provided by NCDOT shall be approved by NCDOT prior to being submitted to the resource agencies for their approval. Construction of any on-site mitigation shall be performed by a Contractor that has successfully constructed similar on-site mitigation. In the absence of suitable on-site mitigation, Developer shall acquire mitigation for impacts to wetlands and surface waters from the North Carolina Ecosystem Enhancement Program.

Developer shall analyze all new areas to be impacted that have not been analyzed during the NEPA process and preparation of permit applications or any staging areas that are located outside the Project Right-of-Way shall be analyzed. This analysis shall include performing all environmental assessments. These assessments require Developer to engage the services of a competent environmental consultant to conduct a full environmental investigation to include, but not be limited to, Federally listed Threatened and Endangered Species, wetlands, streams, avoidance and minimization in jurisdictional areas, compensatory mitigation, FEMA compliance, and historical, archaeological, and cultural resources surveys in these areas. The environmental consultant shall obtain approval through PDEA-NEU and from the United States Fish and Wildlife Service to document compliance with Section 7 of the *Endangered Species Act* for those species requiring such approval. In addition, Developer shall identify additional mitigation required and the fulfillment of any other requirements that may be imposed by the permitting agencies to obtain the permit.

4.2.3.5 Commitments

Developer's Work must be accomplished in strict compliance with the plans submitted with the Section 404, and 401 permit applications and in compliance with all conditions of the permits and certifications issued by the permitting agencies. Developer shall provide all Developer Related Entities with a copy of the permits.

If Developer discovers any previously unknown historic or archaeological remains while accomplishing the authorized Work, Developer shall immediately notify NCDOT, and NCDOT will initiate the required State/Federal coordination. Developer shall suspend Work in such area in accordance with the Standard Specifications.

4.3 Construction Requirements

When Developer performs scarification, hydrodemolition or grinding of concrete, Developer shall submit a Concrete Waste Management Plan (CWMP) that describes the collection, treatment, and disposal of run-off water and concrete slurry generated by such Work to NCDOT for review and approval no less than 30 days prior to beginning such Work. Developer shall implement, manage, operate, and, as required, update the CWMP.

Developer's disposal of run-off water and concrete slurry from concrete scarification, hydrodemolition and grinding shall comply with Permit No. WQ0035749 issued by DENR to NCDOT for Diamond Grind/Hydrodemolition Land Application of Diamond Grinding and Hydrodemolition Operation Slurry, the CWMP, and all other regulations.

4.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 4 of the Technical Provisions:

- documentation for environmental compliance, including permit applications, in accordance with the Environmental Compliance and Mitigation Plan; and Exhibit 2-09 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

5 THIRD PARTY AGREEMENTS AND COORDINATION

5.1 General

Developer shall perform all third party coordination Work in accordance with the requirements of this Section 5 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3. NCDOT currently has agreements with third parties that may affect Developer's Work.

Developer shall coordinate the Work with all affected third parties, whether NCDOT has explicit agreements with such third parties or not.

For any component of Work, which potentially or actually impacts the assets of any Governmental Entity or third party entity, Developer's Work shall conform to the design and construction requirements of such entity.

5.2 Existing Third Party Agreements

NCDOT currently has agreements with third parties that may affect Developer's Work. Developer's Work shall comply with the terms of such third party agreements. In particular, Developer's Design Documents for the Project shall comply with the terms of the third party agreements.

Before initiating communications with third parties with whom NCDOT has third party agreements, as may be necessary to perform the Work, Developer shall seek and obtain approval from NCDOT with respect to communication protocol with such third parties. NCDOT will approve Developer's communication protocol with such third parties within five Business Days of Developer's request.

In accordance with NCDOT's approval of such communication protocol, Developer shall contact each third party with whom NCDOT has third party agreements, provide information regarding the proposed Work as may be required for coordination with such third party and solicit input from such third party regarding the impact of the Work on the terms of their agreement with NCDOT. Developer shall provide NCDOT five Business Days notice of meetings with third parties related to such agreements.

In accordance with NCDOT's approval of communication protocol, Developer shall initiate third party reviews of Developer's Design Documents, plans, processes, procedures and methodologies whether for permanent Work or Temporary Work and Developer shall incorporate and make such amendments to such designs, plans, processes, procedures, and methodologies as required to address third party comments.

When Developer provides NCDOT Submittals, Developer shall include with each Design Document Submittal a report identifying the impact of the Work on third parties under each third party agreement. The report shall include details of the impact, the mitigation and the terms and conditions in the third party agreement covering the Work proposed by Developer including any financial implications and arrangements. The report shall also include copies of any correspondence between Developer and the third party including minutes of any meetings between Developer and the third party. This Submittal shall be in addition to the Submittal requirements elsewhere in the Technical Provisions. If Developer's design affects the terms of existing agreements with third parties, NCDOT may, at NCDOT's sole discretion, enter into revised agreements with the third parties as necessary to effect the change.

When Developer's design requires modification of existing agreements NCDOT has with a third party and NCDOT elects to enter into revised agreements with such third party, Developer shall prepare such revised agreements with such third party using NCDOT standard format and

submit the completed agreement to NCDOT for approval and execution 90 days prior to performing Work that affects the terms of an existing third party agreement. NCDOT will assist Developer in determining the format of such agreements on a case by case basis. NCDOT will make a representative available to provide limited technical guidance to Developer on procedures for preparation of such agreements. Upon notification by Developer, NCDOT will provide such assistance to Developer within seven days. Developer shall not assume that NCDOT will provide more than four hours per month technical guidance. Developer shall not perform any Work affected by such revised agreements prior to approval and execution of the revised agreement by NCDOT. NCDOT will execute the revised third party agreement with the affected third parties within 60 days after all parties have agreed on the scope, terms and conditions of the agreement, and the third party has signed the agreement for execution by the Department.

5.3 Other Third Party Agreements

When there is no existing third party agreement and the Work potentially or actually impacts the assets of any Governmental Entity or third party entity, Developer shall inform NCDOT as soon as such potential or actual impacts are known to Developer. NCDOT may, at NCDOT's sole discretion, enter into agreements with such impacted third parties.

When NCDOT elects to enter into such an agreement with a third party, Developer shall prepare said agreements using NCDOT standard format and submit the completed agreement to NCDOT for approval and execution 90 days prior to performing Work that potentially or actually impacts the assets of the third party. NCDOT will assist Developer in determining the format of such agreements on a case by case basis. NCDOT will make a representative available to provide limited technical guidance to Developer on procedures for preparation of such agreements. Upon notification by Developer, NCDOT will provide such assistance to Developer within seven days. Developer shall not assume that NCDOT will provide more than four hours per month technical guidance. Developer shall not perform any Work affected by such agreements prior to approval and execution of the revised agreement by NCDOT. NCDOT will execute the revised third party agreement with the affected third parties within 60 days after all parties have agreed on the scope, terms and conditions of the agreement, and the third party has signed the agreement for execution by the Department.

5.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 5 of the Technical Provisions:

- plans identifying the effect of the Work on agreements NCDOT has with the third parties for review and comment with plans as specified in Section 5 of the Technical Provisions;
- revised third party agreements for NCDOT approval and execution 90 days prior to performing Work that affects the terms of an existing third party agreement; and
- new third party agreements for NCDOT approval and execution 90 days prior to performing Work that affects the assets of a third party with which NCDOT did not have an existing third party agreement.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

6 UTILITY COORDINATION AND ADJUSTMENTS

6.1 General

Developer shall perform all Work necessary to effect Utility Adjustment and coordinate with appropriate Utility Owners for all Utility Adjustments in accordance with the requirements of this Section 6 of the Technical Provisions and other CA Documents. Developer shall coordinate all necessary Utility Adjustments using established NCDOT processes and procedures whenever possible with regard to the administration of all utility related Work, and shall use standard NCDOT Utility Agreement forms including the exhibits referenced in this Section 6 of the Technical Provisions, as may be amended or modified by NCDOT, in its sole discretion. In some instances, Developer will perform the Utility Adjustment Work, and in other instances, Developer will manage Elements of the Utility Adjustment process, as described in further detail in this Section 6 of the Technical Provisions. Developer shall include all Utility Adjustment in the permit application required by Section 4.2.3.2 of the Technical Provisions.

Developer shall submit a Utility Work Plan complying with Section 2.5.3 of the Technical Provisions to NCDOT for review and comment prior to submitting any Utility Analysis and Preliminary Routing (UAPR) submittals and a minimum of 90 days prior to commencing any Utility Adjustment. The Utility Work Plan shall establish Developer's procedures and processes for Adjusting utilities including coordination with Utility Owners and administration of all the Work associated with the Utility Adjustments. Developer shall undertake all Utility Adjustment Work in accordance with the Utility Work Plan. Developer's Utility Work Plan shall include, but is not limited to, the following requirements:

- a detailed description of Developer's plan to identify and locate utilities;
- a detailed description of Developer's plan to coordinate activities with each Utility Owner;
- a detailed description of Developer's plan to coordinate activities with the Utility Owners on unknown or newly discovered utilities; and
- a detailed description of how Developer shall either relocate or replace all affected utilities.

Developer shall prepare and negotiate all Utility Agreements necessary to execute the Utility Adjustment in accordance with *NCDOT Policies and Procedure for Accommodating Utilities on Highway Right of Way*.

6.2 Coordination Requirements

Developer shall retain a Utility Coordination Manager in accordance with Section 2.14.2.6 of the Technical Provisions. The Utility Coordination Manager shall be responsible for all Utility Adjustment activities, including the activities performed by the Utility Design Coordinator.

6.3 Utility Analysis and Utility Adjustment

Developer shall initiate early coordination and meet with the Utility Owners with regard to all utilities affected by the Work. Developer shall work to give Utility Owners an understanding of how and where the Project may affect their utility facilities. Using information obtained from Utility Owners, and otherwise as necessary, Developer shall identify and verify location of all utilities, identify the utility type and corresponding Utility Owner. For all identified utilities, Developer shall work with the Utility Owners to make an initial determination of whether 1) the utility is in conflict with other Project Work, and needs to be relocated, 2) the utility is not in conflict with other Project Work and can remain in place but requiring Protection in Place, or 3) the utility is not in conflict with other Project Work and can remain in place without requiring

Protection in Place. Service connections are addressed separately in Section 6.9 of the Technical Provisions.

For all utilities requiring relocation, Developer shall conduct the following Utility Adjustment processes:

- conduct the Utility Analysis and Preliminary Routing (UAPR) processes listed in Section 6.4 of the Technical Provisions and make all required Submittals to NCDOT;
- prepare applicable Utility Agreements for execution by the Utility Owner and, and after execution by Utility Owner, provide such Utility Agreements to NCDOT for approval and execution;
- provide Utility Assemblies for each Utility Adjustment to NCDOT for review and approval 45 days prior to beginning such Utility Adjustment. Developer shall coordinate with the respective Utility Owner to prepare all components of each Utility Assembly. The Utility Assembly shall include the components identified in Section 6.5 of the Technical Provisions, and a completed checklist in accordance with the Utility Assembly Checklist, Exhibit 6-04 of the Technical Provisions, and include all applicable documents shown on the checklist. The completed Utility Assembly prepared by Developer shall contain sufficient detail to allow the Utility Owners to perform any Utility Adjustments necessary;
- provide NCDOT with any evidence of a Compensable Interest received from Utility Owners in forms identified in Section 7.4.4.2 of the Agreement, and request approval from NCDOT that the Utility Owner has a Compensable Interest for the Utility Adjustment 45 days prior to any Utility Adjustment; and
- shall submit five copies of the Utility Assembly to NCDOT, including Utility Assembly Checklists in the form of Exhibit 6-04 of the Technical Provisions, detailed Utility Adjustment cost estimate when Utility Owner has Compensable Interest, Utility Adjustment Plans, applicable Utility Agreement, and Developer Utility Adjustment Agreement when Developer performs the Utility Adjustment Work. NCDOT will return to Developer, and provide a copy to the Utility Owner, Utility Adjustment Plans with any comments together with approved Utility Agreement and, if applicable, Utility Adjustment cost estimate. When Utility Adjustment Plans are returned with comments, Developer shall address such comments and coordinate any Utility Adjustment Plans changes with the Utility Owner.

For all Utilities where Developer has determined (based on input from Utility Owners and if needed, NCDOT) that one or more utilities owned by a Utility Owner may remain in-place without Protection in Place, Developer shall submit a letter to the NCDOT indicating that no relocation or Protection in Place will be required five business days prior to performing construction at the location of the existing utility. The letter shall identify the Utility Owner, the utility type, and provide a brief description of the basis for the determination that the utility or utilities may remain in-place without Protection in Place. The letter shall also state the names of the Utility Owner representatives with whom Developer representatives have worked to verify that the utility or utilities may remain in-place without Protection in Place, list the dates for any related meetings, and include copies of any supporting documents. In instances where a Utility Owner has both utilities that can remain in place without Protection in Place, and utilities that will need either relocation or Protection in Place, the letter shall indicate the approximate location of the utilities that can remain in place without Protection in Place, by reference to mile markers, or interchange locations, or otherwise as appropriate to identify the approximate location of such Utility.

6.4 Utility Analysis and Preliminary Routing (UAPR)

Developer shall submit the Final Utility Analysis & Preliminary Routing report to NCDOT for review and comment prior to submittal of the Utility Assembly. The Utility Analysis and Preliminary Routing shall include the following steps for each utility conflict:

- draft analysis of potential utility conflicts;
- collect data from Utility Owners;
- coordinate possible conflict resolution with Highway design;
- identify and perform necessary Subsurface Utility Engineering;
- develop a preliminary routing of relocations;
- coordination with construction stages;
- preliminary cost estimate;
- conduct a Final Design field inspection with the Utility Owners submit request letters to Utility Owners for plans and estimates following the meetings and provide copies to NCDOT;
- Utility Owner concurs with UAPR;
- develop schedule for utility design & relocation;
- incorporate all Elements of the Utility Adjustment process in the Project Schedule Status Update in accordance with Section 2.2.2.2 of the Technical Provisions;
- provide Intermediate Roadway Plans to NCDOT; and
- submit Final Utility Analysis & Preliminary Routing Report.

6.5 Required Items in Utility Assemblies

Each Utility Assembly shall include the following:

- transmittal that briefly explains the need for the Adjustment(s) requesting approval and detailing any unique characteristics or information pertaining to the subject Utility Adjustment;
- Utility Adjustment Plans (in paper format) with all information necessary, and in proper format, which:
    - show plan and profiles of the existing Utility facilities and proposed Adjustments;
    - show any existing Highway ROW lines, the Project ROW lines and control of access lines;
    - show the proposed roadway features of the Project and other Utilities in the vicinity;
    - show the final Project grade in order to determine if clearance requirements are met;
    - show an offset distance from the Project ROW line to the proposed Utility facility, for each Utility which will parallel (and be within) the proposed Project ROW lines (whether proposed to remain in place or be reinstalled in a new location);
    - show dimensions to Utility facilities with station and offset in relation to the

Project ROW line;

- show symbols and major material items;
- include the Utility Owner's specifications for the Adjustment;
- present sufficient information to enable NCDOT to verify compliance with the Technical Provisions (including depth of cover, casing requirements, vent locations, etc.);
- are color coded on at least one of the three original Utility Assemblies for each Utility or group of Utilities;
- are no larger than 11" x 17" folded to 8.5" x 11" size (oversize plans are not permitted with the Utility Assembly, and plans shall be folded so as to be able to pull the plans out of the Assembly, sheet by sheet);
- clearly identify any Betterments;
- clearly identify any Elements of the Utility Adjustment that are required solely to accommodate Developer's means and methods of construction or operations; and
- are signed and sealed by a Registered Professional Engineer, whether provided by Developer or the Utility Owner, unless waived at NCDOT's sole discretion.

- estimate(s) detailing all Utility Adjustment costs within the cost categories established in 23 CFR 645.117;
- proposed Utility Agreement executed by the Utility Owner, if required (two originals for each affected Utility in each original Utility Assembly);
- statement(s) for design and/or Construction Work; and
- affidavit(s) of Property Interest executed by the Utility Owner,

6.6 Design Plans Prepared by Developer

Where Developer and Utility Owner have agreed that Developer shall perform Utility Adjustments on behalf of the Utility Owner, Developer shall design, permit, furnish, install, inspect, and coordinate the certification of the facility in accordance with requirements of the Utility Agreements and the CA Documents. Developer shall be responsible for obtaining all Governmental Approvals required for the Work.

When Developer performs Utility Adjustment on behalf of the Utility Owner, to the extent practicable, Developer shall utilize brands and models of material consistent with that used by the respective Utility Owner, however, the materials shall meet the requirements of the Adjustment Standards and Division 10 of the Standard Specification for Roads and Structures.

6.7 Design Plans Prepared by the Utility Owner

For all Utility Adjustment Plans to be furnished by a Utility Owner, Developer shall coordinate with the Utility Owner. The Adjustment Plans shall be attached to the applicable Utility Assembly and submitted to NCDOT for review and approval.

6.8 Construction Requirements

Utility Assembly required by Section 6.3 of the Technical Provisions subject to NCDOT approval shall be approved before Developer begins construction for the affected Utility Adjustment Work.

Developer shall be responsible for any interruptions of service including coordinating all utility service interruptions with the appropriate Utility Owner and be responsible for ensuring that such interruptions are minimized.

Developer shall ensure that Utility Adjustment Work is conducted in accordance with all the relevant agreements and all permits. When Developer is responsible for performance of the Utility Adjustment Work, Developer shall identify and acquire the ROW designated as permanent utility easement (PUE), as provided in Chapter 7 of the NCDOT *Right of Way Manual*, required to accommodate the relocated utility. Developer shall be responsible for ensuring the appropriate abandonment or removal of all abandoned utilities within the Project Right of Way.

Developer shall be the responsible Party to NCDOT for timely performance of all Utility Adjustment Work according to the Project Schedule.

The exhibits under this Section 6 of the Technical Provisions are set out in the exhibits attached to these Technical Provisions.

Utility Relocation Agreement	Exhibit 6-01
Encroachment Agreement	Exhibit 6-02
Utility Assembly Checklist	Exhibit 6-04

6.9 Utility Service Connections

Developer shall provide separate utility service connections to Elements for which Developer is responsible for the cost of Utility services in accordance with Section 8.2.5 of the Agreement. Prior to establishing the location for new utility service connections, Developer shall coordinate with the Utility Owner concerning accessibility of the service connection and safety in maintenance and service of the connection. Developer shall be responsible for all coordination activities required for the Utility Owner to provide utility service connections necessary to perform the Work. Prior to Developer developing the associated Design Documents and/or instructing the Utility Owner to install the utility service connection, Developer shall submit plans for the utility service connection to NCDOT for review and approval.

6.10 As-Built Record Plans

Developer shall provide Utility As-Built Record Plans to NCDOT for all Utility Adjustments including location of all utilities identified and any other final plans or records as may be required by the Utility Owner within 30 days of completion of the Utility Adjustment. The As-Built Record Plans shall show the location and type of all utility and corresponding Utility Owner within the Project ROW, whether such utilities have been Adjusted or not. Developer shall also be responsible for providing to NCDOT the As-Built Record Plans upon completion of Utility Adjustment performed by the Utility Owner.

6.11 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 6 of the Technical Provisions:

- Utility Work Plan for review and comment 30 Days prior to commencing Utility Adjustment Plans;
- Utility Assemblies for review and comment 45 days prior to Adjustment;
- Evidence of Utility Compensable Interest for approval 45 days prior to Adjustment;
- Letter regarding Utilities that can remain without Protection in Place five business days prior to construction Work at the location of such Utilities;
- Final Utility Analysis & Preliminary Routing Report with Intermediate Roadway Plans for review and comment prior to submission of the Utility Assembly;
- Utility Service Connections Plans for approval prior to utility service connection installation;
- Utility As-Built Record Plans required by Section 6.10 of the Technical Provisions within 30 days of completion of the Utility Adjustment;

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

7 RIGHT OF WAY

7.1 General

Developer, acting as an agent on behalf of the State of North Carolina, shall perform Right of Way Acquisition Services and Work for the Project in accordance with the requirements of this Section 7 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

Developer shall provide, through qualified, competent personnel employed by firms approved by the NCDOT Right of Way Branch, all Right of Way Acquisition Services, including but not limited to, appraisal, negotiation and relocation services required for all Proposed Right of Way and Additional Properties and easements, including but not limited to permanent utility easements, necessary for completion of the Project in accordance with G.S. 136-28.1 of the General Statutes of North Carolina, as amended, and in accordance with the requirements set forth in the *Uniform Appraisal Standards and General Legal Principles for Highway Right of Way*, the *NCDOT Right of Way Manual*, the *North Carolina Department of Transportation's Rules and Regulations for the Use of Right of Way Consultants*, the Code of Federal Regulations, and Chapter 133 of the General Statutes of North Carolina from Section 133-5 through 133-18, hereby incorporated by reference, including the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Developer shall deliver Final Right of Way Plans to NCDOT in accordance with Section 2.9 of the Technical Provisions prior to beginning Right of Way Acquisition Services.

Developer shall perform the services as set forth herein and furnish and deliver to NCDOT reports accompanied by all documents necessary for the settlement of claims and the recordation of deeds within 14 days of recordation of deeds, or necessary for condemnation proceedings covering said properties when requesting that NCDOT file condemnation.

Developer's ROW Appraiser shall be on the NCDOT State certified Right of Way Appraiser list. For a list of firms currently approved, Developer should contact Mr. Neal Strickland, in the NCDOT Right of Way Branch, at 919-707-4364. If Developer's ROW Appraiser is not on the NCDOT State certified ROW Appraiser list then Developer may request they be added to the NCDOT State certified Right of Way Appraiser list, subject to approval by the State Right of Way Appraiser. NCDOT does not warrant or guarantee that Developer's ROW Appraiser will be added to the list and in such an event Developer shall employ another ROW Appraiser that is on the list or will be accepted onto the list.

NCDOT approval or disapproval of an acquisition or compensation does not relieve Developer of any of Developer's responsibilities for Proposed Right of Way, Additional Properties, and Project Specific Locations as set out in the CA Documents.

7.2 Developer Responsibilities

Developer shall prepare Right of Way Plans as part of the roadway plans Intermediate Design Submittals and submit to NCDOT for review and comment in accordance with Section 2.9.4 of the Technical Provisions, Exhibit 2-09 of the Technical Provisions, and the CA Documents. Such plans shall delineate and clearly identify the Project Right of Way, including Existing Right of Way, Additional Properties, and Proposed Right of Way. Developer shall respond to all comments by NCDOT, if any, regarding the Submittal and provide to NCDOT Final Right of Way Plans as required by Section 2.9.4 of the Technical Provisions. When the previously submitted Final Right of Way Plans are revised, Developer shall provide NCDOT a listing of the plan changes and a listing of the affected parcels with descriptions and explanations for the changes.

Developer shall:

- at locations where properties are to be acquired, perform land surveys to verify and precisely delineate Existing Right of Way as well as land surveys to verify and precisely delineate Proposed Right of Way and Additional Properties at locations where properties are to be acquired;
- perform land surveys to verify and precisely delineate Existing Right of Way adjacent to the Oaklawn Park neighborhood and at any location that Developer's design requires Work in close proximity to the Existing Right of Way prior to performing Work at such location;
- perform all staking associated with and necessary for acquisition of Proposed Right of Way, Project Specific Locations and Additional Properties;
- submit a Project ROW tracking report to NCDOT every month by the 7th day of each month after Developer commences ROW acquisition. The report shall contain details regarding each parcel, ROW and easement area, property improvements, occupancy, progress with the ROW acquisition process and scheduled completion of all activities for all parcels;
- use NCDOT standard forms and documents contained in the NCDOT Right of Way Manual, Appendix B;
- prepare appraisals in accordance with the NCDOT's *Uniform Appraisal Standards and General Legal Principles for Highway Right of Way Acquisitions*;
- obtain NCDOT approval of appraisal(s) prior to making a settlement offer;
- ensure that any appraisal over $1,000,000.00 has a second appraisal;
- prepare appraisals for all property acquisitions in accordance with the NCDOT Right of Way Manual except that a Right of Way Claim Report shall not be used;
- provide a current title certificate for each parcel as of the date of closing or as of the date of filing of condemnation, unless required otherwise in NCDOT's Right of Way Manual;
- arrange for and administer all necessary closings;
- prepare, execute and record documents conveying title to acquired properties to NCDOT with the Register of Deeds for the county in which the property is acquired;
- deliver all executed and recorded deeds and easements to NCDOT;
- prepare all condemnation packages to include applicable items identified in the Checklist for Condemnation Package, Exhibit 7-01 of the Technical Provisions, as may be amended or modified by NCDOT, in its sole discretion;
- cooperate and provide all reasonable assistance associated with condemnation proceedings;
- provide relocation assistance; and
- provide to NCDOT a certification that the property has been acquired and vacated (Parcel Certification) prior to entering the property.

For all properties purchased in connection with the Project, title shall be acquired in fee simple or easement and shall be conveyed to "The North Carolina Department of Transportation", free and clear of all liens and encumbrances, except permitted encumbrances.

Developer shall not request that NCDOT institute condemnation on a claim until the property owner has been made an offer of just compensation based on an appraisal per this Section 7 of the Technical Provisions and has allowed the property owner a period of no less than 30 days in which to consider the offer except as otherwise provided in the NCDOT *Right of Way Manual*. When Developer requests condemnation in accordance with the CA Documents, Developer shall submit a Condemnation Review Form (FRM10-F) to NCDOT for approval.

7.3 NCDOT Responsibilities

NCDOT will make a representative available to provide limited technical guidance to Developer on ROW acquisition and relocation procedures. Developer shall provide five (5) days notice of any meetings required. Developer shall not assume that NCDOT will be able to provide more than ten (10) hours per month technical guidance support.

NCDOT, or its agent, will perform appraisal reviews complying with NCDOT's *Uniform Appraisal Standards and General Legal Principles for Highway Right of Way Acquisitions*. The appraisal review will evaluate whether the appraisal submitted by Developer meets the Department's guidelines and requirements, conforms to acceptable appraisal standards and techniques, does not include any non-compensable items or exclude any compensable items and that the value conclusions are reasonable and based on facts presented in the appraisal. Within 10 Business Days of receipt of an appraisal from Developer, NCDOT or its agent will return the appraisal to Developer with the following action:

- approval of appraisal as submitted;
- approval of appraisal as adjusted;
- request that Developer resubmit the appraisal with additional information;
- request that Developer correct and resubmit the appraisal; or
- reject the appraisal and request that Developer provide another appraisal.

NCDOT will institute condemnation and handle the condemnations proceeding in accordance with General Statue 136-103. Developer shall allow 60 days for NCDOT to file the condemnation after Developer has provided all documents required by the CA Documents. Developer shall provide all necessary support required by NCDOT in respect of processing the condemnation process.

When Developer's ROW plans in accordance with Section 7.2 of the Technical Provisions require that a grave to be relocated, Developer shall inform NCDOT and Developer shall provide all support required to enable NCDOT to relocate the grave. Developer shall provide all pertinent information required by NCDOT to enable NCDOT to undertake the steps necessary for relocation of the graves. Developer shall be responsible for the identification of relatives; however NCDOT will be responsible for discussions with relatives and Developer shall not contact the relatives. Developer shall allow 180 days for the relocation process upon submission of full and complete details to NCDOT.

If Developer acquires Proposed Right of Way or Additional Properties with improvements NCDOT will perform asbestos services; including inspection of the improvements for the presence of asbestos and, when asbestos is present, may exercise its rights under Section 7.8.2 of the Agreement, and perform asbestos abatement on the improvements. For abatement within Proposed Right of Way, NCDOT will exercise its right under Section 7.8.2 of the Agreement. Developer shall allow 60 days for NCDOT to perform asbestos services after Developer notifies NCDOT after the acquisition of any Proposed Right of Way or Additional Properties acquisition and that all improvements are vacant.

If the Hazardous Materials Report referenced in the definition of Pre-existing Hazardous Materials in Exhibit 1 to the Agreement indicates the likely presence of the Hazardous Materials in, on or under the Proposed Right of Way or Additional Properties, NCDOT will perform Hazardous Material inspection of property prior to acquisition of such Proposed Right of Way or Additional Properties.

The performance by NCDOT of its responsibilities as provided in this Section 7.3 of the Technical Provisions does not relieve Developer of Developer's responsibilities and obligations with respect to acquisition of the Proposed Right of Way and Additional Properties pursuant to the CA Documents.

7.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 7 of the Technical Provisions:

- documents necessary for the settlement of claims and recordation of deeds, including recorded deeds and easements, within 14 days of recordation;
- condemnation package, including Condemnation Review Form FRM10-F, when requesting NCDOT file condemnation as needed;
- ROW tracking report by the 7th day of each month following the month Developer commences Right of Way services;
- appraisal for NCDOT approval prior to making settlement offer;
- Right of Way Parcel Certification prior to entering the property;
- specified information for grave relocation 180 days prior to NCDOT performing relocation;

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

8 GEOTECHNICAL ENGINEERING

8.1 General

Developer shall perform geotechnical investigations, analyses, design, oversight, construction, maintenance, monitoring and reporting in accordance with this Section 8 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

8.2 Design Requirements

8.2.1 Subsurface and Laboratory Geotechnical Investigation

Developer shall perform subsurface investigation and laboratory testing in accordance with the then current NCDOT Geotechnical Engineering Unit *Guidelines and Procedures Manual for Subsurface Investigations*. Developer shall determine the specific locations, frequency, and scope of any and all subsurface and/or laboratory geotechnical investigations, testing, research, and analysis Developer considers necessary to support the design, construction, operation, and maintenance for the Project. It should be noted that the site variability and extent of geotechnical investigation could influence the geotechnical resistance factors, as specified in the AASHTO LRFD Bridge Design Specifications.

In addition, for Structure foundations where drilled piers are to be implemented, Developer shall perform additional investigations such that a soil boring with Standard Penetration Test (SPT) has been performed within 15 feet of any drilled pier. The depth of these explorations shall be at least ten feet below the depth required for the proposed foundation Element to obtain the bearing resistance of the factored axial load from the structure design loads.

For all other foundation types, Developer shall perform at least one soil boring with SPT test beneath each substructure unit. The depth of these borings for driven pile foundations shall be at least ten feet below the depth required for the proposed foundation Element to obtain the bearing resistance of the factored axial load from the structure design loads. The depth of these explorations for shallow foundations shall be at least two times the base diameter below the invert of foundation.

8.2.2 Geotechnical Reports and Design Memoranda

Developer Geotechnical Design Reports, including geotechnical foundation reports and/or design memoranda shall document the results and interpretation of applicable subsurface and laboratory investigations and shall summarize any subsequent design and analysis performed in support of the corresponding Design Document Submittal. Details of the Submittal are presented in Section 8.3 of the Technical Provisions.

8.2.3 Structure Foundations

Developer's foundation systems shall accommodate the site constraints and shall accommodate both temporary and permanent configurations. Developer shall confirm that the strength and serviceability requirements of the foundation are satisfied through engineering analyses and testing. The performance of the foundation (i.e., settlement, lateral movement and any end-condition restraints) shall be acceptable to the superstructure and shall not adversely impact any existing Structure.

Developer shall design Bridge foundations to settle no more than one inch after construction and shall exhibit less than ½ inch of differential settlement at any point throughout the Structure. Developer's safety factors and resistance factors shall adhere to the applicable AASHTO

standard, considering, among other things, the type and amount of geotechnical information available, the variability of the subsurface, and the type of load testing to be performed.

For driven piles, Developer's testing shall consist of Pile Driving Analyzer (PDA) with CAPWAP (Case Pile Wave Analysis Program) or Static Load Testing with grouping of pile tests only allowed at each Bridge site. A minimum of one PDA or Static Load Test is required per combination of pile size, pile type (material or shape), and pile driving hammer at each bridge using driven piles. For drilled piers, Developer's testing shall consist of Crosshole Sonic Logging (CSL) Testing or alternative testing procedure approved by NCDOT. For shallow foundations, Developer's testing shall consist of plate load testing or full scale load tests.

Timber piles shall not be used for any Structure foundation.

Foundation designs shall consider and document the scour elevations approved by the NCDOT Hydraulics Unit and shall consider the effects of the extreme event earthquake for the local vicinity.

8.2.4 Roadway Foundations, Slopes, Retaining Walls and Earth Embankments

Developer shall design and construct Travelway and Shoulder foundations such that the post-construction settlement for the Term is less than two inches from the profile grade line at any point along the alignment and the Travelway and Shoulder surface shall not settle differentially more than one inch over any 100-foot length along the alignment or one inch over the transverse direction.

If more than four inches of total embankment settlement is expected after initial placement, Developer shall perform settlement monitoring to illustrate the settlement has slowed to a negligible rate and where the post-construction settlement is expected to be less than the settlement specified above in this Section 8.2.4 of the Technical Provisions. Developer shall provide a Bridge approach slab in accordance with Section 14 of the Technical Provisions regardless of the anticipated settlement.

For slopes over ten feet in height; slopes over soft soils; slopes placed over material that is classified as A-7, A-6, A-5 or A-4; and slopes over water (i.e. causeways), Developer shall design and document in the Geotechnical Design Reports. Developer shall design permanent slopes for a minimum safety factor of 1.5 in the static condition and 1.2 in the dynamic (earthquake) condition in accordance with AASHTO LRFD Bridge Design Specifications. Soil improvement for the purpose of steepening slopes will be allowed if detailed design calculations prove a suitable long-term and short-term factor of safety is achieved.

Developer's scour design shall conform to the requirements of Section 12 of the Technical Provisions.

Developer shall design and construct retaining walls for the performance requirements of the retained earth and shall not be used as final support for any Bridge superstructure. The face of Mechanically Stabilized Earth (MSE) walls and other retaining walls shall be vertical and plumb at completion of construction and shall not deviate from vertical by more than ½-inch laterally over 20 feet. See Section 14 of the Technical Provisions for additional requirements.

In addition to the compaction testing requirements contained in the Standard Specifications, Developer shall construct and test the top three feet of any embankment and the top one foot of subgrade for the Project in accordance with the requirements in this Section 8.2.4 of the Technical Provisions. Developer shall either (1) conduct proofrolling in accordance with the Standard Specifications; or (2) construct and conduct DCP testing in accordance with the following:

- construct embankments between one foot below the subgrade and three feet below the subgrade to have a minimum DCP penetration rate of 20 blows in two feet;
- construct the top one foot of subgrade (cut or fill) to have a minimum DCP penetration rate of 15 blows per foot; and
- verify the requirements are satisfied utilizing DCP testing at intervals of no greater than 100 feet for each constructed lane and Shoulder. The DCP testing shall meet requirement of ASTM D 6951 for the DCP with the 17.6 pound hammer.

At locations where the subgrade is chemical stabilized, Developer shall construct and test the subgrade in accordance with the requirements of the provision titled "Cement and Lime Stabilization of Sub-Grade Soils" in Book 3 and other CA Documents. Pavement design shall be performed by Developer as per Section 11 of the Technical Provisions.

8.2.5 Construction Requirements

Developer shall design Temporary Work, defined as all aspects required for the construction of any part of the Project but not required for the service of the facilities, in accordance with all applicable codes and shall not adversely impact existing facilities, including settlement/ground movement induced damage, vibration damage and other damage due to immediate construction activity or time-dependent earth/structure movement. Developer shall repair any damage to existing facilities due to the construction. Developer shall prepare and submit specifications and special provisions for geotechnical Project Elements in accordance with the CA Documents.

Developer shall improve pavement subgrade as needed to meet the subgrade conditions assumed in Developer's Pavement Design Report and to provide a stable base for pavement construction.

All load testing data, pile driving records, CBR testing, subgrade inspection reports, settlement monitoring reports, foundation construction, retaining wall construction, and any foundation integrity testing shall be performed with advisement from Developer's Geotechnical Engineer and shall be certified for their accuracy, validity, and correctness by Developer's Geotechnical Engineer or CEI Firm, as applicable.

Developer shall notify the NCDOT at least ten Business Days prior to performing any pre-production foundation installation or testing and prior to performing any production foundation installation activities.

8.3 Design Documents

All Geotechnical Design Reports and Foundation Design Reports shall be submitted in accordance with the CA Documents. Developer shall include the relevant Geotechnical Design Report or Foundation Design Report with the Structure design or roadway Design Document Submittal.

8.3.1 Geotechnical Design Report

Developer's Geotechnical Engineer shall prepare a Geotechnical Design Report for each Element of the Project where applicable. The Geotechnical Design Report shall define the geotechnical conditions as evaluated from field and laboratory test data and used in the development of the geotechnical design. The Geotechnical Design Report shall address design recommendations and construction considerations for site specific topics, including, but not limited to, site specific seismic design criteria, seismic site class, ground improvement method(s), excavations, embankments, use of lightweight fills, corrosion potential of soils,

impact to utilities and groundwater, standard retaining systems, culvert foundations, minor Structure foundations, and vibration measurements, control and criteria requirements to avoid damage to nearby historical Structures and any settlement or ground movement issues.

8.3.2 Foundation Design Report

Developer shall prepare Foundation Design Reports in accordance with NCDOT's Guidelines for Preparing Foundation Reports. A separate Foundation Design Report shall be submitted for each Structure. The Foundation Design Reports at a minimum shall include, but not be limited to:

- subsurface conditions;
- engineering analysis including seismic analysis;
- scour evaluation;
- erosion evaluation;
- seismic recommendations;
- foundation recommendations; and
- construction considerations.

Developer's foundation recommendations shall include design parameters, foundation types, foundation design elevations, recommended ground improvement measures, stability of retaining wall Structures and embankment slopes and seismic performance criteria. The Foundation Design Report shall also document that any expected settlement of the proposed Structure, or of adjacent existing Structures, will allow for acceptable serviceability throughout the life of the Structure. Where appropriate, Developer may combine the Foundation Design Report with the Geotechnical Design Report.

8.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 8 of the Technical Provisions:

- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions; and
- Notice at least ten Business Days prior to pre-production foundation installation or testing and prior to performing any production foundation installation activities.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

9 LAND SURVEYING

9.1 General

Developer shall perform all land surveying and mapping Work as necessary for the performance of the Work in accordance with the requirements of this Section 9 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

Developer shall ensure that all surveying is accurate and consistent with the requirements in this Section 9 of the Technical Provisions and the standards of the North Carolina Board of Examiners for Engineers and Surveyors. Developer's plans shall include datum description and project localization factor (including tie to North Carolina State Plane Coordinate System), survey control and calibration sheets, a table of Project Right of Way and easement points showing localized coordinates plus station/offset to nearest alignment and all other land surveying services necessary to complete the Project.

Developer shall contact the North Carolina Geodetic Survey Director prior to disturbing any geodetic monuments.

9.2 Survey Requirements

9.2.1 Units

Developer shall perform all survey in the U.S. Survey Feet except as otherwise required by this Section 9 of the Technical Provisions.

9.2.2 Survey Control Requirements

Developer's surveys shall conform to the CA Documents and all applicable North Carolina surveying Laws, codes, and policies as defined by the North Carolina Board of Examiners for Engineers and Surveyors.

Developer shall base all horizontal and vertical control on the control established by NCDOT or set by a North Carolina licensed Registered Professional Land Surveyor retained by Developer. All controls shall comply with the minimum tolerances set out in Table 9.1 in this Section 9 of the Technical Provisions.

Developer shall prepare survey control and calibration sheets containing GPS Site calibration, datum description with localization (ground-grid) scale factor and tie to North Carolina State Plane Coordinate System. These sheets shall be included in the Highway plans submitted with the Design Submittal set out on Section 2.9 of the Technical Provisions.

Developer shall tie any additional horizontal and vertical control for the Project to the NCDOT-supplied control network.

9.2.3 Horizontal & Vertical Control

Developer shall meet or exceed the accuracy of the appropriate level of survey as defined in Table 9.1 and Table 9.2 in this Section 9 of the Technical Provisions to establish additional horizontal control. Horizontal control is to be established, at a minimum, on the North Carolina State Plane Coordinate System NAD 83, 2011 Epoch or later. Vertical control shall be established, at a minimum, on the North American Vertical Datum of 1988 (NAVD 1988), Geoid 2012 or later.

9.2.3.1 Horizontal Accuracy Requirements

Developer shall base all bearings or angles on the grid bearing of the North Carolina State Plane Coordinate System, with the epoch specified.

Table 9.1

Error of Closure	1:20,000	loop or between monuments
Allowable Angular Closure	± 3” √*N*	*N*= number of angles in traverse
Accuracy of Bearing in Relation to Course	± 04”	maximum for any course
Linear Distance Accuracy (Minimum Length of Line)	1:2,500 (1,250feet)	distance between azimuth pairs should be at least 1,250’ minimum where possible; distance between points in pair should be 500’ minimum
Positional Tolerance of Any Monument	*AC*/ 50,000	*AC* = length of any course in traverse
Adjusted Mathematical Closure of Survey (No Less Than)	1:500,000	an “adjusted” error of closure should be zero, with minimal rounding

9.2.3.2 Vertical Accuracy Requirements

Developer shall establish vertical control, at a minimum, to 3rd Order (Error of Closure = 0.05’ √ M, where M = miles of loop traverse between two separate monuments).

9.2.4 Alignment Descriptions

Developer shall provide a description of all alignments upon which Project Right of Way or easement points are based. These alignments shall include all points of change in direction (PC, PT, TS, ST, etc.), including station and offset and coordinates (North, East). This shall be in tabular form and included along with the survey control calibration sheets submitted with the Design Document Submittals set out in Section 2.9 of the Technical Provisions. This requirement does not supersede any required format included in standard design requirements for plan sheets.

9.2.5 Right of Way Surveys

Developer shall include all control networks on the survey plans that must be submitted with the Design Document Submittals set out in Section 2.9 of the Technical Provisions. All property boundary survey Work performed as part of the Project shall be performed under the supervision of a Registered Professional Land Surveyor licensed in the State of North Carolina. All property corners located shall be tied to the nearest design alignment by distance and extension of the property line bearing from the point to the alignment.

Developer shall establish and set any preliminary and final monumentation of the Project ROW through the Term. These monuments shall be documented in tabular format along with the survey control and calibration sheets included in the Design Document Submittals set out in Section 2.9 of the Technical Provisions and in the As-Built Record Plans as appropriate. That format shall include station/offset (right or left) of nearest alignment, plus localized coordinate (North, East).

9.2.5.1 Accuracy Standard

In performing right of way surveys consisting of boundary locations, Developer shall meet or exceed the accuracy standards of the appropriate level of survey as defined in Table 9.2, Chart of Tolerances.

Table 9.2

Chart of Tolerances

	URBAN/RURAL	URBAN BUSINESS DISTRICT	REMARKS AND FORMULAE
Error of Closure	1:10,000	1:15,000	loop or between control monuments
Angular Closure	15" $\sqrt{N}$	10" $\sqrt{N}$	N = number of angles in traverse
Accuracy of Bearing in Relation to Source	20 sec.	15 sec.	sin = denominator in error of closure divided into 1 (approx.)
Linear Distance Accuracy	0.1 foot per 1,000 feet	0.05 foot per 1,000 feet	sin x 1000 (approx.) where ± = accuracy of bearing
Positional Error of any Monument	AC/10,000	AC/15,000	AC = length of any course in traverse
Adjusted Mathematical Closure of Survey (No Less Than)	1: 500,000	1: 500,000	an “adjusted” error of closure should be zero, with minimal rounding

Developer shall base bearings or angles on the grid bearing of the North Carolina State Plane Coordinate System, with the epoch specified.

9.2.6 ROW and Permanent Easement Monuments

Developer shall install initial stable monuments and subsequently replace such monumentation with permanent monuments to delineate the Project ROW and points of permanent easement at locations specified herein. These initial monuments shall be installed prior to ROW acquisition or commencing any construction activities. The location of such markers shall be recorded on the Design Document Submittals intermediate roadway plans or ROW plans, submitted to NCDOT in accordance with Section 2.9 of the Technical Provisions.

Upon completion of the ROW acquisition, at locations where monumentation will not be disturbed during construction, Developer shall replace the initial stable monuments with permanent monuments. Upon completion of all Construction Work that would disturb monumentation, Developer shall replace the remaining initial stable monuments with permanent monuments. Permanent monuments to delineate permanent easement and ROW boundaries consist of a 5/8 inch iron bar (#5 rebar) at least 30 inches long together with a cap. The caps for permanent monuments to delineate permanent easement boundaries shall be labeled “NC

Department of Transportation Permanent Easement Do Not Disturb". Caps for permanent monuments to delineate ROW boundaries shall be labeled "NC Department of Transportation Right of Way Do Not Disturb". Developer shall be responsible for the installation or replacement of all ROW monuments impacted by construction or otherwise requiring relocation.

Developer shall install initial stable monuments and permanent monuments as specified above, at all points of curvature or change in direction of the right of way boundary, including but not limited to the following:

- points of curvature (PCs);
- points of tangency (PTs);
- points of intersection (PIs);
- points of compound curvature (PCCs);
- points of reverse curvature (PRCs);
- tangent to spiral (TS);
- spiral to curve (SC);
- curve to spiral (CS);
- spiral to tangent (ST);
- all intersecting crossroad ROW boundaries and sight distance boundaries; and
- all beginning and ending points of Control of Access lines.

Developer shall install monuments as required above at changes in direction or breaks in right of way boundary and at a distance between adjacent monuments shall not exceed 2000 feet. At locations where changes in direction or breaks in right of way boundary exceed 2000 feet, Developer shall install the intermediate monuments at approximately equidistant spacing.

Developer shall include the station and offset distance to nearest alignment and localized coordinates (North, East) for right of way monumentation in tabular form and graphically on the As-Built Record Plans. The tabulated data shall be submitted to NCDOT concurrently with the As-Built Record Plans.

See Section 2.5.2 of the Technical Provisions for additional requirements.

9.3 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 9 of the Technical Provisions:

- survey data shall be included in the Roadway plans and provided in accordance with Exhibit 2-09 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

10 ROADWAYS

10.1 General

Developer shall design and construct all roadway Elements in accordance with the requirements of this Section 10 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

10.2 Design Requirements

10.2.1 General

Developer shall design and construct the Project to provide at a minimum the same number of Existing General Purpose Lanes within the Existing ROW as of the Proposal Due Date. Developer shall not eliminate, reduce the width of or otherwise permanently restrict access to existing ramps and loops.

Developer shall design and construct the HOT Lanes as described in the Technical Provisions and elsewhere in the CA Documents. For avoidance of doubt, the HOT Lanes include the buffer separating the HOT Lanes from the GP Lanes. The exact length and location of start and end points of the HOT Lanes shall be determined by Developer's Design Documents in accordance with the Project scope description in Section 1 of the Technical Provisions and elsewhere in the CA Documents.

In the South Section, south of Lasalle Street, Developer shall shift the alignment of I-77 to the East, and modify alignment of existing ramps to accommodate the shift in the alignment of I-77 as may be necessary, so as to avoid any permanent impacts to the Oaklawn Park neighborhood. In addition, Developer's design shall not result in temporary impacts that extend more than ten feet outside of the Existing ROW in the Oaklawn Park neighborhood including any impact to existing improvements outside the Existing ROW. Developer shall construct sound barrier walls at such location no less than two feet from the Existing ROW limit. If the existing brick walls conflict with placement of the sound barrier wall in the vicinity of Dean Street, then the brick wall shall be removed to the extent necessary such that twelve (12) feet of clearance exists between the proximal point of the remaining portion of the brick wall and the sound barrier wall to be constructed in this area.

Developer shall design and construct all HOT Lanes and General Purpose Lanes to be 12 feet wide, unless otherwise specified in the Technical Provisions.

Developer shall design and construct ten foot paved inside Shoulders on Interstate routes unless otherwise specified in the Technical Provisions. If Developer's design requires widening or replacement of a portion of the existing outside paved Shoulder, Developer shall provide 14 foot outside Shoulders, 12 foot of which shall be paved. This includes but is not limited to areas where Developer's design requires shifting traffic onto the existing Shoulders as a permanent Travelway and areas where the ingress/egress design requires widening.

On I-77 between I-277 (Brookshire Freeway) and I-85 (between approximate MM 11.2 and 12.7), Developer shall design and construct ten foot paved inside Shoulders, 12 foot lanes, and 14 foot outside Shoulders of which 12 foot will be paved Shoulders. For other areas, if Developer's design does not require widening or replacement of a portion of the existing outside paved Shoulder, Developer may match the width of the existing outside Shoulder at such locations.

Through the I-85 interchange along the GP Lanes, inclusive of the I-85 SB to I-77 SB ramp, if Developer's design does not require widening of the median Shoulder, Developer may match the width of the existing median Shoulder at such locations. This exclusion applies equally to

the existing barrier offsets separating the I-85 SB to I-77 SB ramp traffic from the existing I-77 SB Shoulders. The southern limits of this excluded area are from the back of gore of the existing I-85 NB to I-77 SB ramp merge with the existing I-77 SB GP Lanes and the back of the gore at the diverge of the existing I-77 NB to I-85 NB ramp from the existing I-77 NB GP Lanes (approximate MM 12.7). The northern limits of this excluded area are from the back of the gore of the existing I-85 SB to existing I-77 NB GP Lanes merge with the existing I-77 NB GP Lanes (approximate MM 13.8) and from the back of the gore at the existing I-77 SB to I-85 SB ramp diverge from the existing I-77 SB GP Lanes (approximate MM 13.7).

In those areas where the HOT Lanes are physically detached from the GP Lanes, the Shoulder widths along the HOT Lanes shall meet the Shoulder width requirements dictated by the AASHTO A Policy on Geometric Design of Highways and Streets for a four lane freeway, unless otherwise approved as a Design Exception.

Developer may reduce the width of the outside Shoulder to a width no less than 10 foot beneath existing Bridges that have restricted clearance. Otherwise, Developer shall not reduce the width of the existing paved shoulder except as otherwise specified in the Technical Provisions.

If Developer's Design Documents modifies a portion of existing ramps or loops, the width of Shoulders on such ramps and loops designed and constructed by Developer shall match the width of the existing Shoulders at such locations.

On Interstate routes, paved Shoulders shall be designed and constructed in accordance with the requirements of Section 10 and Section 11.2 of the Technical Provisions applicable to the Travelway pavement of such Interstate routes.

Developer shall provide rumble strips along the Project inside and outside paved Shoulders, including HOT Lanes, GP Lanes, direct connectors, ramp and loop terminals, acceleration, deceleration, and auxiliary lanes, in accordance with the NCDOT *Roadway Standard Drawings* except that rumble strips shall not be constructed on rigid pavement within the buffer or at other locations that NCDOT determines, in its sole discretion, that such rigid pavement will likely be incorporated into future Travelways.

A minimum four-foot buffer, complying with the requirements of Section 11.2 of the Technical Provisions for the Travelway pavement shall be located between the inside General Purpose Lanes and HOT Lanes with appropriate delineation, unless otherwise noted in the Technical Provisions. Developer may reduce the width of the buffer to no less than three-foot width beneath existing Bridges with restricted clearance. The minimum buffer width shall be three-foot on the causeways in the North Section. The buffer shall be in accordance with the MUTCD requirements for buffer-separated preferential lanes, including Chapter 3D Markings for Preferential Lanes and Chapter 3H Channelizing Devices, and shall provide for a safe vehicular travel between the GP Lanes and HOT Lanes. Developer's design for the buffer shall not include curbs, traversable or non-traversable. For clarity, Developer's design shall not include a barrier that prevents vehicles from crossing the buffer between the GP Lanes and HOT Lanes during an emergency.

The Project shall be designed and constructed for the I-77 and I-277 corridor to maintain the designation as controlled access Highway as designated by NCDOT.

NCDOT has obtained an approved Interchange Modification Report (IMR) prepared by Atkins (sealed December 3, 2013). If required, NCDOT will be responsible for obtaining a revised IMR required for the discrepancies between the approved IMR and the Technical Provisions in the minimum Design Speed and minimum shoulder width for the direct connection. If Developer revises the roadway designs such that the approved IMR is nullified, Developer shall re-analyze the interchange(s) and prepare a revised IMR (to the same limits as the original IMR) for

NCDOT and FHWA review and approval. It is Developer's sole responsibility to assess what types of revisions to the approved IMR would require a revised IMR. Developer shall prepare any revisions to the IMR as required by Developer's Design Documents in accordance with NCDOT and FHWA requirements, including the FHWA Interstate System Access Information Guide.

When the elevation of a replacement Bridge differs from the elevation of the existing Bridge, Developer shall establish a grade line to assure proper vertical clearance and vertical alignment of the Travelway and Bridge.

The limits of construction on the roadways crossing the Project shall be of sufficient length to tie to existing roadways based upon the current NCDOT and AASHTO guidelines and standards.

When Developer designs and constructs a Bridge with sidewalks and there is existing sidewalk within the limit of Developer's Work, Developer shall construct sidewalks adjacent to the roadway from the Bridge sidewalk to the existing roadway sidewalk. The width of such sidewalks shall be equal to the width of the existing roadway sidewalk or five feet, whichever is greater.

10.2.2 Ingress, Egress, Weaves and Termini for HOT Lanes

Developer shall design and construct ingress/egress and the logical termini to the HOT Lanes in accordance with the Technical Provisions.

As part of the Design Documents to be submitted in accordance with the Technical Provisions and Book 3, Developer shall produce detailed traffic simulations and capacity analyses for the entire Project and including roadways extending within, at a minimum, a half mile from the ROW limits and connecting to the Project using either CORSIM or VISSIM traffic simulation software, or equivalent, as approved by NCDOT. Such analyses shall also include capacity analysis to assess any traffic impact (delay and queuing) on signalized intersections access to or from the Project using capacity analysis software such as Synchro/SimTraffic, or equivalent. The analyses shall be conducted following NCDOT *Congestion Management Capacity Analysis Guidelines* and shall be submitted for NCDOT approval. Such analysis shall be submitted no later than submittal of the Intermediate Design Submittal for the roadway design.

The traffic simulations shall in particular demonstrate that Developer's design of the HOT Lanes access points (including termini, ingress, egress, and weaves) as well as junction points for ramps, loops, and interchanges is safe and does not independently cause any adverse impact on the operating performance of the GP Lanes at such locations, including impacts on ramps, loops and interchanges to and from the GP Lanes, including a future interchange at Westmoreland Road, or alternatively, a future interchange located within 2000 feet of the existing Westmoreland Road crossing of I-77. The primary measure of operating performance at these locations will be density and Level of Service. In the event Developer's design adversely impacts the operating performance at such locations, the analyses shall demonstrate, to NCDOT's satisfaction and at NCDOT's sole discretion, that Developer's design mitigates any such adverse impacts.

For the assessment of GP lane operation along the entire length of the corridor, Developer shall compare the proposed Build HOT scenario to a No Build scenario. This comparison shall be based on the No Build 2017 traffic data and the general format used in Table 3-3 of the Environmental Assessment. This assessment shall provide for the HOT Lanes and the GP Lanes separately and combined, for both the AM Peak Period and PM Peak Period, and for both southbound and northbound traffic. Developer shall demonstrate that no degradation to the operation of the GP Lanes occurs through this analysis. Degradation is defined as an increase to density, a decrease to vehicle miles traveled, or a decrease in average travel speed.

In addition, Developer may, at its sole cost and expense, submit to NCDOT for review and approval a proposed change or modification to an ingress and/or egress location specified in Section 1.1.1 and Section 1.1.2 of the Technical Provisions. Prior to a Submittal of such proposed change or modification to NCDOT for review and approval, Developer shall submit to NCDOT sufficient preliminary information and analyses for any proposed change or modification so that NCDOT may communicate such proposed change or modification to the applicable stakeholders for their review and concurrence. NCDOT shall facilitate any stakeholder review within 30 days of receipt of sufficient preliminary information and analyses. Developer shall incorporate and make any adjustment to a proposed change or modification to address any NCDOT and applicable stakeholder comments included in such concurrence. Upon NCDOT and stakeholder concurrence with the preliminary information, Developer shall include such information and analyses in the Submittal of such proposed change or modification to an ingress and/or egress location as required in this Section 10.2.2 of the Technical Provisions and comply with the requirements of Section 7.2.2 of the Agreement.

After consultation and approval as required with stakeholders and the MPO, NCDOT may incorporate a new interchange with I-77 within 2000 feet of the existing Westmoreland Road crossing of I-77 in lieu of creating a future interchange at the existing Westmoreland Road alignment. Developer shall coordinate with NCDOT, stakeholders and the MPO as to the optimum placement of a future interchange that may be located within 2000 feet of the existing Westmoreland Road crossing of I-77.

Developer shall submit to NCDOT for review and comment new and updated traffic data, analysis and simulations following the requirements of Section 10.2.2 of the Technical Provisions at least 12 months prior to any additions or proposed changes or modifications to the geometry of the HOT Lanes, including any HOT Lane ingress, egress or termini, or any ramps, loops or interchanges. NCDOT will provide comments to Developer within 90 days of receipt of the analyses and simulations. For avoidance of doubt, this requirement applies to future modifications of the roadway geometry or pavement markings using traffic data appropriate for the time in which the modification is proposed to be made.

10.2.3 Roadway Geometry

The HOT Lanes shall be located to the median side of the GP Lanes except in the I-85 interchange, with a buffer separation between the HOT Lanes and the GP Lanes unless otherwise specified. For the I-85 interchange, Developer's design shall specify the location of the HOT Lanes. Developer shall design and construct the roadway pavement to provide safe and adequate Travelway drainage and to prevent hydroplaning and to comply with the safety requirements in Section 23 of the Technical Provisions, including Table 23.1 and Table 23.2.

Developer shall design and construct all new roadway Elements according to NCDOT's Standard Drawings and Standard Special Provisions, except as otherwise specified in the Technical Provisions. Developer shall design and construct all independent alignments for the HOT Lanes according to NCDOT's Standard Drawings and Standard Special Provisions, except as otherwise specified in the Technical Provisions. For the purpose of this Section 10.2.3 of the Technical Provisions, "independent alignment" means a Travelway that is not adjacent to or nearly adjacent to an existing Travelway to the extent that the alignment of such Travelway is controlled by the alignment of the existing Travelway.

Developer is not required to improve existing horizontal alignment, vertical alignment, grade, horizontal stopping sight distance, and vertical stopping sight distance to bring such alignments and sight distances up to current design standards (to the extent such alignments did not previously meet current design standards).

Existing cross slopes and superelevations may be retained and Developer is responsible for adjusting the existing cross slopes and superelevations only to the extent necessary so as to (1) ensure that no proposed cross slope or superelevation is flatter than the underlying existing cross slope or superelevation; (2) ensure that water does not drain from Lanes with a steeper cross slope or superelevation to those with a flatter cross slope or superelevation (except to the extent that such condition currently exists); (3) tie to relocated crown points as may be necessary in accordance with the Developer's Design Documents (4) provide safe and adequate Travelway drainage, to prevent hydroplaning; and (5) comply with the safety requirements in Section 23 of the Technical Provisions, including Table 23.1 and Table 23.2. Developer shall demonstrate to NCDOT that the above conditions have been met in Developer's Design Documents. Upon NCDOT concurrence that these conditions have been met, Developer shall provide recommendations as to the limits and usage of the Leveling Course Allowance to enhance cross slopes, superelevations, or other such surface course improvements.

At locations where the existing superelevation is at the 0.08 maximum allowed, Developer's design may exceed the maximum allowed superelevation up to a maximum of 0.10 to satisfy these superelevation requirements.

Immediately preceding and following existing Bridges to be retained, the mainline pavement cross slope or superelevation may transition to match the existing bridge cross slope or superelevation. If a Design Exception is required to maintain the existing bridge cross slope or superelevation for Bridges to be retained or widened, NCDOT will obtain such Design Exception.

If a Design Exception for stopping sight distance is required because Developer's design requires concrete median barrier rail in specified locations, NCDOT will obtain such Design Exception.

For alignments that are not "independent alignments", Developer shall provide a resurfacing grade that adheres to the following:

- resurfacing grades shall adhere to the resurfacing requirements defined in Section 11 of these Technical Provisions;
- resurfacing grades shall address hydroplaning concerns and existing localized dips and bumps; and
- a resurfacing grade that is "best fit" to the existing profile that adheres to the requirements noted above will be permitted for an alignment, or portion thereof.

When the HOT Lanes are adjacent to the Existing General Purpose Lanes and the HOT Lanes alignment is controlled by the alignment of the Existing General Purpose Lanes, Developer shall not be required to design the HOT Lanes to the current geometric standards, including horizontal alignment, vertical alignment, and stopping sight distance.

In tangent sections in the North and Central Section, Developer shall design and construct the buffer and HOT Lane(s) to slope toward the median to the extent practicable. Developer shall incorporate appropriate design features to maximize the rate of departure of water from the Travelway. Developer's design shall not allow the hydraulic spread to encroach on the HOT Lanes or the GP Lanes during a four inch per hour rain storm.

Developer shall follow the AASHTO *Model Drainage Manual,* and AASHTO *Highway Drainage Guidelines* for hydroplaning considerations.

Developer shall design paving limits within the Project ROW that adhere, at a minimum, to the requirements below:

- on undivided roadways, pave or resurface all lanes and paved Shoulders of the roadway to the outermost limits of Work that impacts the pavement (such as but not limited to widening of the pavement, patching, or installation or removal of pavement markings);
- on divided roadways, pave or resurface all lanes and paved Shoulders on each side of the divider, irrespective of the Work on the opposite side of the divider, to the outermost limits of Work that impacts the pavement (such as but not limited to widening of the pavement, patching, or installation or removal of pavement markings); and
- when construction is not continuous along a roadway, resurface the roadway where the construction discontinuity is less than 1,000 feet.

Developer shall evaluate the algebraic difference in rates of cross slope or superelevation (roll-over) between existing paved Shoulders and Travelways and the associated suitability for carrying traffic during construction. In the event that the roll-over does not conform to the design standards for the proposed temporary traffic patterns, Developer shall provide cross slopes and superelevations that meet the design standards and eliminate roll-over concerns.

The existing interchange ramps and loops are not expected to require reconstruction except in the areas of tie-ins to the widened mainline section. Should Developer's Design Documents impact the existing ramps or loops, Developer shall restore the ramp/loop horizontal and vertical alignments to pre-construction conditions or better, matching the existing typical section. When Developer constructs a new or reconstructs an existing acceleration or deceleration lane, the lengths of such acceleration or deceleration lane shall comply with current standards. For clarity, Developer is not required to change the location, alignment, lane width, shoulder width, or Design Speed of existing ramps and loops to comply with current standards.

Developer's design and construction shall not permit vegetation growth between guardrail and paved Shoulder or on any paved area. Developer's design shall not permit a sag vertical curve low point on any Bridge or Bridge approach slab to the extent such low point did not previously exist on the Bridge or Bridge approach slab.

Developer's Design Documents shall provide the specified minimum vertical clearance for all Bridges.

Developer's Design Documents shall adhere to the following:

- lane drops for dual HOT Lanes or single HOT Lane shall be from the outside lane (right drop) and use a minimum 70:1 taper rate unless otherwise specified in the Technical Requirements. Tapers for weave areas between the HOT and General Purpose Lanes shall use a minimum 70:1 taper rate;
- if Developer revises the lane alignment to be parallel to the longitudinal joints in rigid pavement, longitudinal joints in pavement shall not be in the wheel path of the final lanes. For clarity, joints in rigid pavement shall be located at the edge of the final lanes or at the center of the final lanes. To shift a longitudinal joint to one of the aforementioned locations, a minimum 50:1 transition will be allowed that translates the longitudinal joint elsewhere;
- unless noted otherwise in the CA Documents, the Design Speed for all freeways shall be the greater of the minimum Design Speed for the facility or the speed limit for the facility plus five-mph. When Developer's design results in revision of the alignment of a

Travelway, the revised alignment shall adhere to the minimum Design Speed required by the CA documents;

- from the southern terminus of the Project to MM 14, the minimum Design Speed shall be 60 mph for the GP and HOT Lanes on I-77 and I-277 and from MM 14 to the northern terminus of the Project the minimum Design Speed for the GP and HOT Lanes on I-77 shall be 70 mph, except when specified otherwise in Section 10.2.3 of the Technical Provisions. For clarity, Developer is not required to modify the horizontal alignment, vertical alignment, and stopping sight distance of the existing roadway (to the extent such alignments did not previously meet current design standards) and the adjacent HOT Lanes solely to comply with the minimum Design Speed;
- the minimum Design Speed for the direct connection HOT Lanes between the I-77 HOT Lanes and the I-277 HOT Lanes shall be 50 mph with a maximum grade applicable to a rolling type of terrain although an approved Design Exception for Shoulder stopping sight distance permits Design Speed of 60 mph;
- design the horizontal alignment, vertical alignment, and stopping sight distance of the HOT Lanes in accordance with the CA Documents except when controlled by the existing roadway alignment;
- when Developer's design requires construction of a new intersection, all turn lane lengths shall meet the current NCDOT standards where vehicle storage does not govern. When Developer's design requires reconstruction of an existing intersection, Developer shall provide left turn lane lengths to meet current NCDOT standards to the extent that space is available between ramp terminals and the number of lanes required per Section 14.2 for bridge replacements, but shall not reduce the existing turn lane lengths. Developer is not required to upgrade existing intersection turn lane lengths when Developer's Design Documents do not require reconstruction of such intersection. Right turn warrants shall be analyzed and incorporated as required by NCDOT standards. All analysis must be reviewed and approved by NCDOT prior to incorporating into the final Design Documents; and
- at all intersections impacted by Developer's Design Documents excluding resurfacing, the following design vehicles shall be required for all turning movements:
    - WB-67 at all ramp/loop intersections with Y-lines; and
    - WB-62 at all other intersections.

Developer's Design Documents shall identify each location where longitudinal joints in rigid pavement cross the wheel path of a Travelway and the design features incorporated to mitigate the impacts of such joints on motorists.

10.2.4 Barriers, Walls, and Medians

Developer's Design Documents shall adhere to the following:

- all fixed objects within the clear zone recovery area shall be protected by guardrail or concrete barrier;
- along all 3:1 fill slopes, constructed at fill heights that are equal to or greater than 12 feet, Developer shall install guardrail;
- guardrail along existing I-277 ramps and loops shall be replaced or reset to meet standard height requirements with new end treatments;

- along all fill slopes steeper than 3:1, constructed at fill heights that are equal to or greater than 6 feet, Developer shall install guardrail;
- when concrete barrier is required, Developer's design shall incorporate concrete barrier consistent with NCDOT Standard Drawings;
- Developer shall evaluate warrants for glare screens for all traffic on I-77 and I-277 and, if warranted, design and construct glare screen;
- within the vehicle recovery area, single face concrete barrier in front of all sound barrier walls, retaining walls and all Elements acting as a retaining wall; and
- new concrete monolithic channelization islands designed and constructed by Developer that are keyed into the pavement shall be used at all at-grade intersections with restricted movements impacted by Developer's Design Documents, excluding resurfacing, shall be keyed into the pavement. Developer is not required to upgrade existing channelization islands when Developer's Design Documents do not require reconstruction of such islands.

With the exception of the ten foot height exception on bridges as noted in this Section 10.2.4, and the exclusion of any wall noted in Exhibit 10-01 of the Technical Provisions as not to be constructed, Developer shall design and construct sound barrier walls for the South Section in accordance with the Design Noise Report for TIP Project No. I-3311C prepared by Atkins (approved June 18, 2013), Design Noise Report Addendum #1 for TIP Project No. I-3311C prepared by Atkins (approved September 30, 2013) and Design Noise Report Addendum #2 for TIP Project No. I-3311C prepared by Atkins (approved February 12, 2014); for the Central Section in accordance with the Design Noise Report for TIP Project No. I-5405 prepared by Atkins (approved October 22, 2012); and for the North Section in accordance with the Design Noise Report for TIP Project No. I-5405 prepared by Atkins (approved October 22, 2012) and in accordance with the Design Noise Report for TIP Project No. I-4750 prepared by RK&K (approved July 10, 2013); and provided by NCDOT, including the new sound walls identified in Exhibit 10-01 of the Technical Provisions and any other sound barrier walls, or portions thereof, impacted by Developer's design and construction. Developer is not required to design and construct sound barrier walls supported on bridges to have a height greater than ten feet.

If Developer revises the horizontal alignments more than ten feet or vertical alignments more than two feet from that shown in the Final Design Noise Reports provided by NCDOT and increases or decreases noise impacts, Developer shall re-analyze and complete a revised noise report, complying with 23 CFR 772, the NCDOT Traffic Noise Abatement Policy and the NCDOT Traffic Noise Analysis and Abatement Manual, for NCDOT and FHWA review and approval. If adjustments to, or addition of sound barrier walls are required as a result of deviations in Developer Design from the preliminary design upon which such Design Noise Reports were based, Developer shall be responsible for the adjustments and/or additions. All modifications must be accompanied by revised Traffic Noise Model (TNM) files, sound barrier wall envelope drawings and a report sufficient to fully describe the modifications, their need and purpose.

Developer shall design and construct sound barrier walls complying with Exhibit 10-01 of the Technical Provisions. Developer shall perform all geotechnical investigations necessary to design the foundations and shall be responsible for the wall envelope details. Developer's design shall provide no less than 12 foot clearance between the back of sound barrier walls and other structures, including existing walls.

Developer shall not remove or modify existing brick privacy walls in the South Section unless otherwise approved by NCDOT, except as otherwise specified in the Technical Provisions.

Within 60 days after Substantial Completion of all Project Sections, Developer shall prepare and submit to NCDOT a summary of the sound barrier walls constructed on the Project so as to satisfy FHWA's reporting requirements. Such summary shall include the average height, total length, total area (sq. ft.), and average unit cost (dollars per sq. ft.).

10.2.5 Cut and Fill Slopes

Unless noted otherwise in the CA Documents, the new or modified cut and fill slope designed and constructed by Developer shall be no steeper than 2:1, and new or modified slopes inside interchanges designed and constructed by Developer shall be no steeper than 4:1, except that 4:1 slopes are not required for construction of the direct connection HOT Lanes between the I-77 HOT Lanes and the I-277 HOT Lanes. Developer is not required to modify existing slopes to comply with the specified slope limitations.

10.2.6 Fence

Developer shall repair or replace in like kind damaged, missing, or malfunctioning control of access fencing to meet the requirements set forth in NCDOT Roadway Design Manual and maintain control of access fencing in accordance with Section 23 of the Technical Provisions. For clarity, Developer shall install control of access fencing at overpasses as set forth in NCDOT Roadway Design Manual Part II, Section 10-7 at all locations where such fencing does not currently exist.

10.2.7 Toll Zone Pull Off Areas

Developer's roadway design shall provide for safe parking area for the use of ETCS maintenance personnel outside of the Travelway and Shoulders and provide safe conditions for ETCS maintenance activities to be conducted.

10.3 Roadways under the Jurisdiction of Other Governmental Entities

When Developer's design requires Work on roadways under the jurisdiction of a Governmental Entity, Developer shall execute such Work according to the design and construction requirements of the Governmental Entity and coordinate such Work with and obtain required approval of the Governmental Entity.

10.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 10 of the Technical Provisions:

- traffic simulation and capacity analysis for review and comment with Design Documents;
- new/updated traffic simulation for review and comment 12 months prior to additions/ changes/ modifications to any HOT ingress, egress or termini, or any ramps, loops or interchanges;
- Revised Noise Report for approval if Developer revises the horizontal and/or vertical alignments and increases noise impacts; and
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

11 PAVEMENT

11.1 General

Developer shall design and construct all roadway pavements in accordance with the requirements of this Section 11 and Section 10.2.3 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3, and in particular Developer shall demonstrate that the design shall achieve the operational requirements set out in the CA Documents.

Developer shall not reduce the thickness of the existing pavement without NCDOT approval except that Developer may temporarily reduce the thickness of such pavement during the Construction Period and during the performance of its Renewal Work in accordance with the RFC Design Documents and the requirements in Section 11 of the Technical Provisions.

Developer shall design and construct all pavements, including widening, using subsurface geotechnical data collected by and engineering analyses performed by Developer and meeting at a minimum the requirements set forth in Section 8 of the Technical Provisions. For clarity, Developer is not required to provide a structural design for pavement when such paving Work consist of resurfacing existing pavement or replacement of milled pavement unless specified otherwise in Section 11 of the Technical Provisions. When Developer performs Work on existing pavement, the thickness of pavement upon completion of such Work shall be no less than the thickness of the pavement prior to beginning such Work except as otherwise specified in the CA Documents or approved by NCDOT.

Developer's GP Lanes pavement design shall be Developer's GP Lanes pavement design included in Exhibit 2 of the Agreement except as otherwise approved by NCDOT.

All pavement design, including pavement design for Renewal Work performed by Developer, shall be prepared by a Pavement Designer that meets the requirements of Section 2.14.2.3 of the Technical Provisions.

11.2 Design Requirements

11.2.1 Pavement Design

Developer's Design Documents shall be provided to NCDOT in accordance with Exhibit 2-09 of the Technical Provisions and shall include the Pavement Design Report, which documents the engineering assumptions, considerations, and decisions contributing to Developer's pavement design, including the following:

- pavement design details by location, including structural layer materials, general specifications, and thicknesses;
- relevant pavement evaluation data (structural and functional) and condition information;
- site conditions;
- relevant geotechnical data and drainage requirements;
- 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;
- evaluation of existing paved Shoulders proposed to be incorporated into a permanent Travelway regarding the suitability of such Shoulders for carrying the projected traffic volume as specified in Section 11.2.1 of the Technical Provisions;

- description of how subsurface geotechnical data collected by and engineering analyses performed by Developer have been incorporated;
- description of how Developer's Design Documents will achieve the operational requirements of the CA Documents;
- methods employed to assure uniformity in the pavement surface or maintenance of the interface between the existing pavement and the widened pavement when different materials are used;
- design methods adopted in developing the pavement design(s) and the rationale for their selection; and
- other considerations used in developing the pavement design(s) that the Pavement Designer determines is germane.

Developer shall design the pavement for the Project using the AASHTO functional Highway classification(s).

Developer shall design and construct the pavement for the HOT Lanes direct connection between the I-77 HOT Lanes and the I-277 HOT Lanes in accordance with the following:

- pavement that is consistent with the adjoining I-77 HOT Lane pavement between I-77 and the direct connection Bridge over NC 16; and
- pavement that is consistent with the adjoining I-277 HOT Lane pavement between I-277 and the direct connection Bridge over NC 16.

Developer shall design the pavement to minimize differential settlement between the existing and new surfaces.

For roadways adjacent to and crossing the Project that are disturbed by the construction activities of the Project, Developer shall, at a minimum, repair or replace the pavement of such roadway to match the surface type and pavement structure of the existing roadway. Developer shall use the pavement design for roads contained in Table 11.4 except as otherwise approved by NCDOT.

Regardless of projected traffic volumes, Developer's pavement design for new pavement including widening for the Project shall adhere to the following at a minimum:

- 2012 AADT = 185,400, 2035 AADT of 231,400, four percent dual trucks, and four percent TTST trucks for all GP Lanes on I-77;
- 2012 AADT = 101,400, 2035 AADT = 123,600, four percent dual trucks, and four percent TTST trucks for all GP lanes on I-277;
- Developer's traffic forecast shall be used for design of the I-77 HOT Lanes, including the buffer, but in no case shall the pavement structure and thickness be less than the minimum specified in Section 11.2.1 of the Technical Provisions and such pavement design and traffic forecasts shall be submitted to NCDOT for review and comment;
- pavement shall be designed using the NCDOT Pavement Design Procedure; the Mechanistic-Empirical Pavement Design Guide, Pavement ME Design (Version 1.3 or later); or the 1993 AASHTO Guide for Design of Pavement Structures;
- pavement design using the Mechanistic-Empirical Pavement Design Guide, Pavement ME Design procedure adhere to Table 11.3 of the Technical Provisions;

- pavement design shall be prepared by Pavement Designer that meets the requirements of Section 2.14.2.3 of the Technical Provisions;
- pavement designs for the mainline and ramps shall include subgrade input consistent with Section 8 of the Technical Provisions;
- pavement designs for the I-77 and I-277 GP Lanes and Shoulders shall include chemical stabilized subgrade;
- rigid pavement designs shall include a permeable drainage layer and a separator layer below the drainage layer;
- design parameters for the NCDOT *Pavement Design Procedure* and the *1993 AASHTO Guide for Design of Pavement Structures* (or later) shall meet or exceed those shown in Table 11.1;
- asphalt pavement for I-77 and the Shoulders of I-277, including ramps, shall be designed in accordance with the requirements of this Section 11.2.1 of the Technical Provisions, but in no case shall Developer's Design Documents reflect a pavement thickness less than the minimum thickness described below:
    - asphalt;
        - minimum thickness: 11 inches;
    - asphalt/ABC;
        - minimum thickness of ABC layer: eight inches;
        - minimum thickness of asphalt over ABC: six inches;
    - asphalt/CTABC;
        - CTABC thickness: eight inches;
        - minimum thickness of asphalt over CTABC: seven inches;
- rigid pavement for I-77 and I-277, including ramps, shall be designed in accordance with the requirements of this Section 11.2.1 of the Technical Provisions, but in no case shall Developer's Design Documents reflect a pavement design that does not meet all the requirements below:
    - minimum slab width within Travelway: 12 feet except that the minimum width for ramp tapers is six feet;
    - maximum slab width within Travelway: 16 feet;
    - minimum thickness: ten inches; and
    - transverse joint spacing: 15 feet except that when widening existing pavement the joints in the new pavement shall match the joints in the existing pavement;
- assumed subgrade condition shall be consistent with the requirements of the pavement design procedure used for the design; and
- base must be non-erodible and must allow drainage of the pavement structure while protecting the subgrade from moisture.

11.2.2 Temporary Pavement

Developer shall prepare a separate Pavement Design Report for the temporary pavement or include the design of temporary pavement in the Pavement Design Report for permanent pavement. Where Developer elects to prepare a separate Pavement Design Report for temporary pavement, Developer shall submit this report to NCDOT for review and comment at least 30 days prior to commencing any Work associated with the construction of the temporary pavement. Developer's Pavement Design Report shall include the expected duration for traffic on the temporary pavement and the expected traffic volume and loading.

11.2.3 Widening Pavement

Developer's design for the uniform widening of the existing asphalt pavement shall provide widening no less than six feet, except that such minimum width of widening can be reduced when Developer can demonstrate proper experience and equipment necessary for more narrow widening, subject to review and approval by NCDOT. Where Developer proposes uniform widening of the existing asphalt pavement by less than six feet, Developer shall submit such proposed widening to NCDOT for approval concurrent with the Pavement Design Report and method statement detailing methodology and equipment to be used for the pavement construction. Tapers at the beginning or end of a new lane that is adjacent to existing asphalt pavement are excluded from the minimum uniform pavement widening requirements in this Section 11.2.3 of the Technical Provisions.

When Developer's design requires widening the existing pavement, Developer shall design and construct the pavement such that the entire width of the Travelway has the same type of pavement surface. For clarity, Developer is not required to design and construct Shoulders on I-277 to have the same type of pavement surface as the Travelway.

When Developer's design requires widening of the existing rigid pavement Travelway, such pavement widening shall be constructed of the same type of rigid pavement design except as otherwise permitted in Section 11 of the Technical Provisions.

Developer may widen the existing rigid pavement on I-277 between Bridge No. 590332 to 100 feet north of Hamilton Street with flexible pavement provided that the existing rigid pavement is rehabilitated per Section 11.4 of the Technical Provisions and overlaid with a minimum three inches of S9.5D.

11.2.4 Renewal Work by Developer

For its Renewal Work, Developer shall design the pavement that adheres to the following at a minimum:

- resurfacing thickness for minor rehabilitation appropriate for the asphalt mix type used;
- pavement design life of minimum 30 years for major rehabilitation; and
- present and projected AADT through the design period, including the percent of trucks, based upon average traffic reported by Developer for the previous two years.

For the purpose of pavement renewal the following terms shall apply:

- minor rehabilitation consists of non-structural enhancements made to the existing pavement sections to eliminate age-related, top-down surface cracking that develop in flexible pavements due to environmental exposure. Minor rehabilitation of asphalt pavement typically includes milling and replacement or resurfacing to an approximate thickness of 1.5"; and

- major rehabilitation consists of structural enhancements that both extend the service life of an existing pavement and/or improve its load-carrying capability.

11.2.5 Pavement Design Report

Developer shall prepare a Pavement Design Report covering pavement design evaluation and approach as detailed in Section 11 of the Technical Provisions and a whole life strategy that demonstrates compatibility with the O&M Plan pursuant to Section 23.1.4 of the Technical Provisions. Developer shall submit the Pavement Design Report to NCDOT for review and comment concurrently with the Design Documents as set out in Section 2.9 of the Technical Provisions and Exhibit 2-09 of the Technical Provisions.

11.3 Pavement Drainage

Except on the high side of superelevated roadways, Developer shall design and construct Shoulder drains and outlets for widened Travelway and full depth paved Shoulder pavement and new Travelway and full depth paved Shoulder pavement constructed by Developer as follows:

- on both sides of the bituminous pavement throughout sag vertical curves, throughout crest vertical curves located in cut sections, and where the longitudinal grade is less than one percent; and
- on both sides of the rigid pavement.

When Developer's design requires removal of existing Shoulder drains and/or outlets, Developer's Pavement Design Report shall document how drainage of the existing pavement shall be maintained. When existing pavement is widened, Developer's Design Documents shall provide for drainage of the existing and proposed pavement structure utilizing the existing shoulder drains, new shoulder drains, or a combination of the two that provides adequate drainage. For avoidance of doubt, Developer is not required to remove existing paved Shoulders expressly for the purpose of installing Shoulder drains.

Table 11.1

Minimum Design Parameters for 1993 AASHTO Guide for Design of Pavement Structures

DESIGN INPUT PARAMETER	FLEXIBLE	RIGID
Design Life	30 years	30 years
Initial Serviceability	4.2	4.5
Terminal Serviceability (Design Year ADT >80,000)	3.0	3.0
Terminal Serviceability (Design Year ADT<80,000)	2.75	2.75
Truck Factor-Duals	0.3	0.3
Truck Factor-TTST	1.15	1.60
Lane Distribution Factor – Median Lanes (Two lanes per direction)	0.5	0.5
Lane Distribution Factor – Outside Lanes (Two lanes per direction)	0.9	0.9
Lane Distribution Factor – Median Lanes (Three or more lanes per direction)	0.5	0.5
Lane Distribution Factor – Outside Lanes (Three or more lanes per direction)	0.8	0.8
*Reliability	95%	95%
*Overall Standard Deviation	0.45	0.35

*1993 AASHTO Guide for Design of Pavement Structures only

Table 11.2

Estimated Milling and Replace Asphalt Pavement

I-77 General Purpose Lanes

FROM	TO	QUANTITY
South Project Terminus	MM 20.0	10% of Total Area
MM 20.0	MM 24.5	100% of Total Area
MM 24.5	North Project Terminus	None

Table 11.3
Minimum Pavement Design Criteria for Mechanistic-Empirical Pavement Design Guide, Pavement ME Procedure

PARAMETER	INTERSTATES AND OTHER FREEWAYS	NON-FREEWAY PRIMARY ROADS	SECONDARY ROADS
Design Life	30 years	20 years	20 years
Reliability	90%	90%	80%
ASPHALT PAVEMENTS			
Total Rutting	0.50 in	0.50 in.	0.50 in.
AC Rutting	0.25 in	0.25 in.	0.25 in.
Top Down Cracking	1000 ft/mile	1000 ft/mile	1000 ft/mile
Bottom Up Cracking	10%	10%	10%
IRI (30 year design life)	185 in/mile*	200 in/mile*	200 in/mile*
RIGID PAVEMENTS			
Faulting	0.15 in	0.20 in	0.20 in
Slab Cracking	10%	10%	10%
IRI (30 year design life)*	185 in/mile	200 in/mile	200 in/mile

*IRI for pavement design criteria only

Table 11.4
Asphalt Pavement Designs

Routes	Surface	Intermediate	Base
Hamilton St (City), Oaklawn Ave (City), La Salle Street(City), and SR 2158 (Griffith St)	3.0” S9.5B	4.0” I19.0B	4.0” B25.0B

Table 11.5
Estimated Rigid Pavement Slab Removal and Replacement
I-277 Lanes

Roadway	Quantity
I-277 Through and Auxiliary Lanes	200 S. Y.
I-277 Ramps and Miscellaneous	1,000 S.Y.

11.4 Construction

Developer shall:

- provide incidental milling of the end of existing bituminous pavements at locations where new bituminous pavement surface course joins such existing pavement to provide a smooth transition. When connecting to existing pavement, the minimum required surface layer pavement thickness of such new pavement or existing pavement shall not be reduced. Developer shall not perform incidental milling more than 48 hours prior to placement of the new bituminous surface layer. When the new surface course is not placed prior to restoration of traffic to the normal pattern, Developer shall provide a temporary asphalt wedge to provide for a smooth driving surface;
- resurface Travelways open to public traffic within 48 hours after such Travelway pavement has been milled;
- design and construct the underlying longitudinal joint location to minimize reflective cracking. In addition, longitudinal joints of all pavement surface course layers shall not be located in the final traffic pattern wheel path;
- construct pavement on Travelways that complies with "Pavement Surface Testing" as provided in Exhibit 11-01 of the Technical Provisions;
- not use warm mix asphalt;
- prepare the subgrade and base beneath the mainline pavement structure with an automatically controlled fine grading machine using string lines, laser controls or other approved methods to produce final subgrade and base surfaces and as required by the CA Documents;
- remove the existing asphalt overlay from existing rigid pavement on I-277, including ramps, loops, and auxiliary lanes, from N. Brevard Street to approximately 400 feet east of Hamilton Street;
- rehabilitate all existing rigid pavement on I-277, between the Bridge No. 590320 over N. Brevard St. and the Bridge Nos. 590337, 590340, and 590339 over I-77 NB Lane including ramps between I-277 and I-77 NBL, N College Street, N Church Street, and N Graham Street, to the limits of the rigid pavement to achieve a MRI no greater than 70 when tested in accordance with Exhibit 11-01. Such rehabilitation of the rigid pavement shall be in accordance with the provision titled "Rigid Pavement Rehabilitation" contained in Book 3 and other CA documents and include at a minimum:
    - patching of all spalls;
    - polymer patch of all cracks;
    - replace broken pavement slabs at locations identified by NCDOT and not to exceed quantity stated in Table 11.5 of the Technical Provisions; and
    - construction, repair and sealing of all pavement joints.
- not place asphalt overlay on new and rehabilitated rigid pavement on I-277 except as otherwise permitted in Section 11 of the Technical Provisions;
- submit a CWMP in accordance with Section 4.3 of the Technical Provisions detailing method of handling and disposing of slurry from the diamond grinding operation to

NCDOT for review and approval no less than 30 days prior to beginning the diamond grinding operation;

- at a minimum, diamond grind all rigid pavement (existing and proposed) and the adjacent Bridge approach slab in accordance with “Diamond Grinding Rigid Pavement” in the provision titled “Rigid Pavement Rehabilitation” contained in Book 3;
- disposal of slurry from diamond grinding shall comply with Permit No. WQ0035749 issued by DENR to NCDOT for Diamond Grind/Hydrodemolition Land Application of Diamond Grinding and Hydrodemolition Operation Slurry, the CWMP, and all other applicable Laws, regulations, and Environmental Commitments;
- at Developer’s option, mill all or portions of existing pavement prior to resurfacing the existing HOV and General Purpose Lanes on I-77 with an asphalt surface;
- in addition to the spot mill and replacement of pavement specified in this Section 11.4 of the Technical Provisions, resurface the existing HOV and General Purpose Lanes on I-77 with an asphalt surface, as follows:
  a) resurface all Travelways (including all auxiliary lanes), but excluding ramps as described in (b) and (c) below, with a minimum of 1.5" depth Asphalt Concrete Surface Course (ACSC) Type S9.5D;
  b) resurface ramps, including tapers, from I-77 to non-freeways to within five feet of the intersection with such non-freeways, with a minimum of 1.5" depth ACSC Type S9.5D;
  c) resurface ramps and connectors, including tapers, from I-77 to other freeways to a minimum of 100 feet beyond the back of the I-77 ramp gore or to the end of construction, whichever is greater, with a minimum of 1.5" depth ACSC Type S9.5D;
  d) excluding I-277, resurface all Shoulders adjacent to Travelways that are resurfaced with a minimum of 1.5" depth ACSC Type S9.5C or Type S9.5D; and
  e) mill existing asphalt paved Shoulders on I-277, including ramp, loops and auxiliary lanes, adjacent to the existing rigid pavement that will be retained to a depth 1.5" below the surface of the existing rigid and resurface such Shoulders with a minimum of 1.5" depth Asphalt Concrete Surface Course Type S9.5C or Type S9.5D;
- spot mill General Purpose Lanes, excluding ramps and tapers, at a minimum, to a depth of 2.5” and prior to restoring traffic to such Travelway, replace the milled pavement with Asphalt Concrete Intermediate Course Type I19.0D at locations identified by NCDOT and not to exceed percentages stated in Table 11.2, the depth of such milling shall be in addition to milling Developer elects to perform prior to resurfacing;
- maintain at a minimum vertical clearance under any existing Bridge as specified in Section 14.2 of the Technical Provisions; and
- protect pavement within and outside the Project ROW from damages caused Developer’s Work; any such damage caused by Developer‘s Work shall be repaired promptly by Developer.

11.5 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 11 of the Technical Provisions:

- CWMP in accordance with Section 4.3 of the Technical Provisions no less than 30 days prior to beginning the diamond grinding operation;
- proposal for widening existing pavement less than 6 feet for approval concurrently with Pavement Design Report; and
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

12 HYDRAULICS

12.1 General

Developer shall design and construct all hydraulics Elements in accordance with the requirements of this Section 12 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

Developer shall follow NCDOT's publications entitled "North Carolina Division of Highways Guidelines for Drainage Studies and Hydraulic Design" and "Stormwater Best Management Practices Toolbox" to design and construct structural BMPs to the maximum extent practicable to comply with all relevant Federal and State laws, regulations, rules and policies, such as National Flood Insurance Program, Catawba River Basin: Protection and Maintenance of Existing Riparian Buffers (15NCAC 02B.0243), and NCDOT's "Guidelines for the Location and Design of Hazardous Spill Basins".

The North Carolina Department of Environmental and Natural Resources (NCDENR) issued a Statewide National Pollutant Discharge System (NPDES) Stormwater Permit NCS000250 to NCDOT. Developer shall coordinate with the NCDOT to ensure full compliance with all the requirements, limitations, and obligations of this permit or subsequent permits in the execution of the Work.

12.2 Design Requirements

Developer shall design and construct all necessary hydraulic systems to ensure the safety of the Project corridor motorists. Except when otherwise specified in Section 12 of the Technical Provisions, when Elements of existing hydraulic systems are utilized for drainage of the Project, Developer shall determine the functionality and capacity of existing hydraulic systems and document this assessment as part of the Design Document Submittal as required in Section 2.9 of the Technical Provisions demonstrating that Developer's Design Documents are based upon this assessment. Developer shall design the hydraulic systems to take account of any phased delivery of the Project. Any such phased delivery shall be documented by Developer in the Design Documents as required in Section 2.9 of the Technical Provisions.

Developer is not required to modify or supplement existing hydraulic systems to comply with the requirements of Section 12 of the Technical Provisions when such hydraulic system is for conveyance of drainage across the Project ROW except to lengthen existing culverts and cross pipes as necessary to accommodate Developer's Design.

In the South Section, Developer shall modify or supplement existing hydraulic systems to rectify any existing hydraulic problems directly adjacent to Dean Street properties.

Developer shall prepare and submit Bridge/Culvert Survey and Hydraulic Design Reports (BSR/CSR) using NCDOT standard form for each Bridge or culvert to NCDOT for review and approval prior to beginning design of the Structure. Culverts with side tapered inlets shall comply with the Environmental Commitments.

Developer shall adhere to the requirements of Section 2.4.9.1.10 of the Technical Provisions.

Prior to submission of the Conceptual Design Submittal required under Section 2.9 of the Technical Provisions, Developer shall organize and conduct meeting(s) to review the proposed hydraulic design. Developer shall incorporate the comments from such meeting(s) in the design prior to submitting the Conceptual Design Submittal to NCDOT and shall demonstrate, to NCDOT's satisfaction, that such comments have been incorporated into such Design Submittal.

Developer shall on the earlier of a date no later than 30 days prior to submission of any environmental permit application or 30 days prior to submission of the Final Design Submittal required under Section 2.9 of the Technical Provisions, organize and conduct meeting(s) to review Developer's Final Design Submittal. Developer shall incorporate the comments from such meeting(s) in the design prior to submitting the Final Design Submittal to NCDOT and shall demonstrate, to NCDOT's satisfaction, that such comments have been incorporated into such Design Submittal.

Developer shall record minutes of all meetings required under this Section 12.2 of the Technical Provisions in accordance with Section 2.6 of the Technical Provisions.

Developer shall provide copies of roadway plans and permit impact sheets to NCDOT a minimum of 30 days prior to the applicable interagency meetings. Developer shall prepare the permit drawings and impact summary sheets for submittal of the USACE 404 permit application, NCDWQ Section 401 certification and buffer certification application plus any other required permits.

As part of the DMP, Developer shall prepare, implement, manage, operate, and, as required, update a Stormwater Management Plan in accordance with this Section 12.2 of the Technical Provisions, Developer shall prepare and submit to NCDOT a Stormwater Management Plan.

Developer's Stormwater Management Plan shall include at a minimum the following:

- Stormwater Management Plan, Version 1.2 or later (http://www.ncdot.org/doh/preconstruct/highway/hydro/Forms/SMP_v1-2-Project_or_TIP_No_Date.xls)
- Hydraulic Plan Sheets and supporting stormwater control measure design calculations.

Developer shall develop a Stormwater Management Plan and a Stormwater Management Program in accordance with the requirements set forth in Section 23.1.15 of the Technical Provisions.

Developer shall locate, design, and construct stormwater controls and implement the Stormwater Management Plan using Best Management Practices per the latest NCDOT Stormwater Best Management Practices Toolbox. Developer shall locate, design, and construct Hazardous Spill Basins between Catawba Ave. and the north Project terminus in accordance with Appendix O of the North Carolina Division of Highways *Guidelines for Drainage Studies and Hydraulic Design***.**

Developer shall install stormwater controls to the maximum extent practical to comply with all laws, rules, regulations, and permits necessary for the satisfactory completion of the Project.

Developer shall design the facility so that hydraulic spread during the 4 inch per hour storm does not intrude into the permanent Travelway unless existing conditions do not provide for a full shoulder and such existing conditions do not otherwise require modification in Developer's Design Documents.

12.3 Construction Requirements

Developer shall not perform any Construction Work in a FEMA regulatory floodplain prior to NCDOT receiving approval from the required regulatory agencies, and at a minimum the agencies specified in Section 2.4.9.1.10 of the Technical Provisions.

12.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 12 of the Technical Provisions:

- Bridge/Culvert Survey Reports (BSR) for Structures for review and comment prior to Structure design in accordance with Exhibit 2-09 of the Technical Provisions;
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions; and
- minutes of meetings in accordance with Section 2.6 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

13 EROSION AND SEDIMENTATION CONTROL

13.1 General

Developer shall perform all erosion and sedimentation control Work in accordance with the requirements of this Section 13 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

The North Carolina Department of Environment and Natural Resources (NCDENR) delegated authority to implement the Sedimentation Pollution Control Act (NC General Statutes 113A, Article 4) to NCDOT. Developer shall undertake the roles and obligations of NCDOT under the Sedimentation Pollution Control Act. Developer shall undertake all Work in accordance with the requirements of the Sedimentation Pollution Control Act.

Developer's execution of the Work in accordance with the Sedimentation Pollution Control Act and any delegated obligations shall be subject to oversight by both NCDOT and NCDENR. Both NCDOT and NCDENR are empowered and have the authority to issue violation notifications or cease and desist orders when necessary, in the sole discretion of NCDOT and NCDENR for the Work performed by Developer that is not in compliance with the Sedimentation Pollution Control Act.

At least 30 days prior to the planned date for beginning of the design of erosion and sedimentation control plans and 60 days prior to the planned date for the Final Design Submittal as defined in Section 2.9 of the Technical Provisions, Developer shall convene an Erosion and Sedimentation Control Plan review meeting with NCDOT and, at the sole discretion of NCDOT, with NCDENR to discuss Developer's design of erosion and sedimentation control plans according to the Erosion and Sedimentation Control Plan as required by the NCDENR *Erosion and Sediment Control Planning and Design Manual*. Ten Business Days prior to the planned date of the meeting Developer shall provide to NCDOT a draft version of the Erosion and Sedimentation Control Plan for all Work that may result in erosion or sedimentation. Developer shall record and distribute minutes of the meeting in accordance with Section 2.6 of the Technical Provisions. Developer shall then incorporate the comments Developer received at and after the meeting into the Erosion and Sedimentation Control Plan to be submitted not later than 10 Business Days before submitting the final clearing and grubbing erosion control plans as per Section 13.2 of the Technical Provisions. Developer shall submit the Erosion and Sedimentation Control Plan to NCDOT for approval.

After approval, Developer shall implement and adhere to the requirements and obligations in the Erosion and Sedimentation Control Plan. Developer shall not commence any ground disturbing activities until the Erosion and Sedimentation Control Plan is approved.

Developer shall take all reasonable precautions to comply with all regulations of all authorities having jurisdiction over public and private land governing erosion and sedimentation control. Developer shall comply with Exhibit 13-02 of the Technical Provisions titled "Erosion and Sediment Control/Stormwater Certification" set out in the exhibits to this Section 13 of the Technical Provisions.

13.2 Design Requirements

Developer shall prepare clearing & grubbing erosion control plans, intermediate stage erosion control plans, and final grade erosion control plans in accordance with Developer's Erosion and Sedimentation Control Plan, Developer's Vegetation Management Plan and the requirements of this Section 13 of the Technical Provisions. Developer shall not perform any land disturbing activities, including clearing and grubbing, without Released for Construction (RFC) clearing & grubbing erosion control plans and RFC grading erosion control plans. Developer's Vegetation

Management Plan will comply with the requirements of Exhibit 23-01 of the Technical Provisions titled "Mowing and Herbicide Policy and Guidelines" and, at a minimum include the following:

- narrative overview that describes the "what, why, where, when and how" of vegetation management;
- coordination with other Work;
- provisions for early establishment of grasses and other vegetation;
- procedure and schedule for fertilizer topdressing, supplemental seeding, repair seeding and mowing; and
- procedure for maintaining As-Built Record Plans ("red-line" plans that record the changes that have occurred during construction and are incorporated onto the plans manually) that detail the date and location that temporary seeding, permanent seeding, repair seeding and fertilizer topdressing have been performed.

The Vegetation Management Plan shall be closely aligned and fully consistent with Developer's proposed grading and hauling operations.

Developer shall submit the Vegetation Management Plan to NCDOT for approval concurrent with the O&M Plan. In addition, Developer shall submit an updated Vegetation Management Plan to NCDOT for approval no less than 40 days prior to any land disturbing activity and not later than the 1st of each month when Developer has exposed erodible area as part of the monthly Progress Report.

Developer's Design Documents submissions required under Section 2.9 of the Technical Provisions shall include a separate set of plans for erosion and sedimentation control at the various stages as follows:

- clearing and grubbing plans;
- grading plans; and
- revised or supplemental plans when revisions are made to the roadway or hydraulic Design Documents, or when requested by NCDOT.

Developer shall comply with the requirements of the Roadside Environmental Standard Provision titled Environmental Sensitive Area in Book 3 of the Technical Provisions.

13.3 Construction Requirements

Developer shall perform the Work in accordance with the Vegetation Management Plan and the Erosion and Sedimentation Control Plan.

Developer shall perform the Work to minimize soil erosion and in accordance with Section 107 of NCDOT Standard Specification and coordinate the Work with other operations such that no more than 17 acres of exposed, erodible surface area will be accumulated at any one time by the clearing and grubbing operation until erosion control measures are provided. Install temporary or permanent erosion control measures as soon as clearing and grubbing or land disturbing activities begin. Developer shall perform such erosion control Work, temporary or permanent, as needed to minimize erosion.

Developer shall satisfy all requirements of the Off-Site Reclamation Procedures in Book 3, including closeout inspection of the Site, prior to Final Completion.

Developer's Work that results in land disturbing activity outside the Project ROW shall comply with the provisions for Off-Site Reclamation Procedures in Book 3 and all other CA Documents

requirements respecting erosion and sedimentation control that otherwise apply within the Project Right of Way. In case of conflict between these requirements, the higher standard shall apply. Developer's Erosion and Sedimentation Control Plan shall contain procedures for such Work.

Immediately after the erosion control measures required by the Clearing and Grubbing Erosion Control Plans have been installed for the entire Project, or for individual segments if Developer has divided the project into construction segments, Developer's erosion and sedimentation control designer shall inspect the Project to verify adequacy, constructed dimensions and installation of all erosion control devices. After this initial inspection(s), the aforementioned designer shall inspect the project conditions a minimum of every 30 days during the grading operations to verify the field conditions of disturbed areas draining to erosion control devices. The erosion and sedimentation control designer shall, within five days of such inspection of erosion control Work, submit documentation of such review to NCDOT and make appropriate design revisions to the Clearing and Grubbing and/or Grading Erosion Control Plans resulting from or required by these field inspections for NCDOT review and comment, in accordance with Section 2.9 of the Technical Provisions.

Developer may request an increase in the accumulated acres exposed, erodible surface area resulting from by clearing and grubbing and if approved, establish and maintain such erosion control measures as needed. Failure on the part of Developer to perform the required erosion control measures will be just cause for NCDOT to direct the suspension of clearing and grubbing operations in accordance with Article 108-7 of NCDOT Standard Specification and suspension will be in effect until such time as Developer has satisfactorily performed the required erosion control Work. If Developer fails to perform the directed Work within a reasonable period in NCDOT's sole discretion, NCDOT may have the Work performed in accordance with Article 105-16 of NCDOT Standard Specification and the CA Documents.

Developer shall maintain comprehensive As-Built Record Plans for erosion and sedimentation control that detail when and where permanent, temporary, and repair seeding as well as topdressing was performed during construction. The As-Built Record Plans shall detail when and where sediment and erosion control Elements were performed.

Developer shall adhere to the following requirements:

- Erosion and Sediment Control/Stormwater Certification — Exhibit 13-02
- Erosion and Sedimentation Control Plans — Exhibit 13-03

13.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 13 of the Technical Provisions:

- draft Erosion and Sedimentation Control Plan for approval ten days prior to pre-design meeting;
- minutes of Erosion and Sedimentation Control Plan review meeting for review and comment within three Business Days of meeting;
- final Erosion and Sedimentation Control Plan for review and comment no later than 10 Business Days before submitting the final clearing and grubbing erosion control plans;
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions;
- Vegetation Management Plan for approval concurrent with the O&M Plan;

- updated Vegetation Management Plan for approval no less than 40 days prior to any land disturbing activity and not later than the 1st of each month when Developer has exposed erodible area as part of the monthly Progress Report; and
- documentation by Developer's erosion and sedimentation control designer of erosion control Work each inspection of erosion control Work within five days after the conclusion of each inspection.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

14 STRUCTURES

14.1 General

Developer shall design and construct Structures in accordance with the requirements set forth in this Section 14 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

14.2 Highway Bridge Design Requirements

Developer shall prepare Structure recommendations for each proposed Bridge within the Project ROW in accordance with the NCDOT *Roadway Design Manual*. Bridges shall be designed and constructed to meet the geometry (width, length, skew, span arrangements, etc.) shown on the Structure recommendations prepared by Developer, which shall be submitted to NCDOT for review and comments. Developer shall obtain NCDOT Structure numbers from NCDOT for all Bridges and bridge-class culverts. The Structure numbers, when provided by NCDOT, shall be shown on the applicable layout sheets of the Design Documents and all Developer's Design Documents, plans, and communications with NCDOT pertaining to the Work on such Structures.

Developer shall modify or shall remove and replace existing Bridges as required by Developer's design.

Developer shall design all new Bridges to achieve a minimum design service life of 75 years. Developer shall design all new widening of existing Bridges to achieve a minimum design service life of 75 years. For clarity, such 75 year design service life for the widening of existing Bridges is applicable only to the widened portion of such Bridges. Developer shall comply with all other requirements of the CA Documents pertaining to Bridges, including the Handback Requirements.

With respect to plans preparation, Developer is encouraged to use NCDOT *Structures Management Unit Manual*.

Developer's proposed Bridge geometry for new or replaced Bridges shall satisfy the minimum horizontal requirements and a 17'-0" minimum vertical clearance over interstate routes. For Bridges that remain in place over interstate route, the existing vertical clearance shall be no less than the minimum of existing vertical clearance or 17'-0". Such vertical clearance requirements apply, both during construction, and throughout the Term.

Bridges on flyovers or direct connections shall have the wider Shoulder on the inside of curvature for both directions of travel.

Developer's proposed Bridges replacing existing Bridges shall not reduce the width or span of the existing Bridge or the number and type of lanes, Shoulders, and/or sidewalks on the existing Bridge unless otherwise specified in the Technical Provisions or approved by NCDOT.

Developer shall at a minimum, replace Bridge No. 590297 carrying I-77 SB lanes over I-77 NB lanes south of I-85 if the approval conditions of Cintra ATC-01 cannot be met, as described in Section 1.1.3 of the Technical Provisions.

Developer shall design and construct the following Bridges to meet, at a minimum, the following criteria:

- a Bridge on Oaklawn Avenue over I-77 to replace Bridge No. 590286 that does not include placement of embankment material, Bridge piers, or any other permanent construction on the property at 1014 Andrill Terrace, Charlotte NC owned by Mecklenburg County and that provides two 12-foot lanes, two six-foot bicycle lanes, two

seven-foot shoulders, two two-foot wide gutters (for a combined 15-foot offset from face of curb to Travelway), and two five and one-half foot sidewalks;

- a Bridge on LaSalle Street over I-77 that replaces Bridge No. 590153 with five 12-foot lanes, a four-foot pavement marking buffer, two five-foot bicycle lanes, two two-foot wide gutters, and two six and one-half foot sidewalks; and
- a Bridge on Griffith Street (SR 2158) over I-77 to replace Bridge No. 590364 with two 12-foot lanes, two five-foot bicycle lanes, two two-foot wide gutters, two six-foot sidewalks, and span lengths so as not to prohibit the addition of one future lane on I-77 in both directions.

If Developer's Design Work, including that for Renewal Work performed by Developer, requires removal and replacement of Bridge on Hamilton Street over I-277 that replaces Bridge No. 590335, Developer shall design and construct the replacement Bridge with two seven and one-half foot wide sidewalks, two two-foot wide gutters, and two 14-foot lanes.

If Developer's Design Work, including that for Renewal Work performed by Developer, requires removal and replacement of Bridge No. 590323 (Sunset Rd – US 21) over I-77, Developer shall design and construct the replacement Bridge with seven 12-foot lanes, a four-foot pavement marking buffer, two five-foot bicycle lanes, two two-foot wide gutters, and two six-foot sidewalks.

If Developer's Design Work, including that for Renewal Work performed by Developer, requires removal and replacement of the Bridge on Hambright Road (SR 2117) over I-77 to replace Bridge No. 590353 with two 12 foot lanes, two five-foot bicycle lanes, two two-foot gutters, and two six-foot sidewalks;

If Developer's Design Work, including that for Renewal Work performed by Developer, requires removal and replacement of the Bridge on Westmoreland Road (SR 2147) over I-77 that replaces Bridge No. 590362 with two 12-foot lanes, a two-foot wide gutter on the north side of Bridge, a six and one-half foot sidewalk on the north side of Bridge, a two-foot offset from the south side of Travelways to a barrier separating the Travelways from the multi-use path, and a ten-foot wide multi-use path on the south side of the Bridge.

If Developer's Design Work, including that for Renewal Work performed by Developer, requires removal and replacement of those Bridges located at, or north, of the Exit 31 interchange, the replacement Bridges shall be designed and constructed so as not to prohibit an eight lane section on I-77 in addition to any existing auxiliary lanes.

When Developer's design requires removal and replacement of existing Bridges or modification of existing Bridges carrying non-freeway traffic, Developer shall coordinate with NCDOT and applicable Governmental Entities to determine plans to accommodate both motorized and non-motorized modes of transportation except for those bridges where accommodation for non-motorized modes of transportation are specified in Section 14.2 of the Technical Provisions. Developer shall design and construct Bridges to accommodate non-motorized modes of transportation in accordance with the NCDOT Pedestrian Policy Guidelines.

When Developer's design requires widening and rehabilitation of existing Bridges, Developer's design shall include, at a minimum, replacement of Bridge rails and barriers that require removal with rails and barriers complying with Section 14.2.6 of the Technical Provisions, repair of existing Bridge deck joints, replacement of existing joint seals, and replacement of existing girder bearings.

Developer's Design Documents shall include Developer's inspection reports documenting the condition of the existing Bridge Elements, and maintenance or rehabilitation Work that Developer proposes to perform through the Term. When such Work includes rehabilitation of

the Bridge deck, Developer shall submit to NCDOT for approval a Bridge Deck Rehabilitation Evaluation Inspection Plan for approval prior Developer performing such inspections. This plan shall clearly identify the Bridge(s) to which it applies (including Bridge number) and shall include at a minimum visual, physical and chemical inspection of the Bridge prior to preparation of Design Documents and inspection during performance of such rehabilitation Work. Developer shall perform a Bridge deck evaluation in accordance with this plan and incorporate the results of such evaluation in Developer's Design Documents. Bridge deck evaluation shall be performed by or under the responsible charge of a professional engineer licensed in North Carolina.

When the cross slope of the existing Bridge is not continuous across the entire width of the Bridge, Developer's Design Documents for widening or rehabilitation of such Bridge shall include cross sections, at intervals no greater than 50 feet, of the existing and proposed Bridge deck surface, with the edge of each proposed traffic lane delineated.

When Developer's design requires widening of the existing Bridges listed in Table 14.1, Developer's design and construction shall include, at a minimum, rehabilitation of the existing Bridge deck and replacement of the existing bearings in accordance with Book 3 and other CA Documents. Such rehabilitation shall include a latex modified concrete overlay, such overlay having a thickness no less than 1.25 inches, of the existing Bridge deck, existing approach slabs, the widened portion of the Bridge deck and the widened portion of approach slabs.

Table 14.1

Bridge No.	Description
590332	I-277 over railroad and NC Music Factory Blvd.
590330	I-277 over N. Graham St.
590328	I-277 over N. Church St.
590327	I-277 over N. Tryon St.
590326	I-277 over N. College St.
590322	I-277 over undesignated road
590320	I-277 over N Brevard St.
590281	I-77 SB Ramp over I-77 SBL
590282	I-77 NB Ramp over I-77 SBL
590283	I-77 SB Ramp over Andrill Terrace & Irwin Creek
590302	I-77 NB Lane over I-85
590303	I-77 SB Lane over I-85
590351	I-77 NB Lane over Colonial Pipeline
590352	I-77 SB Lane over Colonial Pipeline
480052	I-77 NB Lane over Reeds Creek or Lake Norman
480053	I-77 SB Lane over Reeds Creek or Lake Norman
591037 *	I-77 SB HOT Lane over I-85
591036 *	I-77 SB HOT Lane over I-85 Ramp

* Bridges included in Table 14.1 assuming the Department's approval conditions of Alternate Technical Concept No. Cintra ATC-01 can be met.

Developer shall follow the additional design requirements in Section 16.2.3 for the widening of Bridge No. 590332 on I-277 over railroad and NC Music Factory Blvd.

Existing Bridges that Developer proposes to widen shall be widened using girders composed of the same material as the existing girders in the respective span and, at grade separations, and to the extent practicable, the visible portion of a widened substructure that is consistent with the appearance of the existing substructure. The relative stiffness between existing substructures/foundations and adjacent widened substructures/foundations shall be considered in the overall Bridge widening design.

14.2.1 Highway Bridge Types

Developer shall not use the following Bridge types:

- timber Bridges;
- masonry Bridges;
- structural plate arches;
- cored slab and box beam Bridges;
- Bridges with intermediate hinges;
- Highway Bridges with fracture-critical members;
- cast-in-place concrete slab span Bridges;
- 3-girder superstructures; and
- girder types with decks precast with the girder.

Developer shall design box girders to be accessible for all inspection and maintenance activities without impacting traffic. Developer shall size the inside depth of steel, cast-in-place concrete or concrete segmental box girders with due consideration to interior inspection. Developer shall provide adequate access openings into all cells of the girders to facilitate all inspection and maintenance activities.

Developer shall design segmental concrete Bridges to conform to the following:

- if monolithically cast overlay is used as part of the deck protection system, Developer shall develop fully engineered design guidelines for the thickness of the monolithic concrete removed and replaced in a manner that keeps distress and changes in surface profile at the time of concrete removal to levels that do not reduce the structural integrity of the Structure;
- all expansion joints shall be sealed or drained such that no water or contaminants penetrate the joints; and
- the design, detail, and construction of segmental Bridges shall provide for the easy addition of supplemental post-tensioning. AASHTO LRFD Bridge Design Specifications Article 5.14.2.3.8 shall apply and Diablos are not permitted.

14.2.2 Highway Bridge Design Parameters

Developer's Design Documents for new and widened structural Bridge Elements shall be based on the load and resistance factor design (LRFD) methodology as presented in the AASHTO

LRFD Bridge Design Specifications, including interim revisions except as otherwise specified in Section 14.2.2 of the Technical Provisions.

In addition, Developer's Design Documents shall conform at a minimum to the requirements of the following chapters of the NCDOT *Structures Management Unit Manual*:

- Chapter 2 – Design Data
- Chapter 3 – Materials

Developer shall design segmental Bridges to conform to the requirements of *AASHTO Guide Specifications for Design and Construction of Segmental Bridges*.

Developer's Design Documents shall conform to the following:

- a live load rating chart for girders and culverts shall be included with all the Bridge Design Document Submittal set out in Section 2.9 of the Technical Provisions and shall state design assumptions and methodology used in the load rating calculations. Load ratings shall be in accordance with NCDOT *Structures Management Unit Manual* (including policy memos) and AASHTO's Manual for Bridge Evaluation. Load ratings shall be based on the Load and Resistance Factor Rating (LRFR) methodology. Design load ratings, legal load ratings and load rating summary sheets shall be provided as part of the Design Document Submittal; and
- for existing Bridges to be widened, live load ratings shall be provided for existing girders and shall be included with the Bridge widening plans and shall state design assumptions and methodology used in the load rating calculations, however, Developer is not required to replace girders in the retained portion of the existing Bridges regardless of the existing girder rating.

14.2.3 Highway Bridge Decks and Superstructure

The type of Bridge deck and superstructure shall not be restricted to those typically used by NCDOT. Other types and components may be used by Developer only if:

- they have been accepted for general use by the Federal Highway Administration (FHWA); and
- Developer demonstrates to NCDOT that the design of the Bridge type and components will meet the functional requirements of the Project.

Developer shall show the type, size, and location of proposed deck expansion joint systems on the Conceptual Design Submittal for each Bridge. Developer shall minimize the number of deck joints wherever possible and Developer shall locate joints to provide for maintenance accessibility and future replacement.

Developer shall design corrosion protection measures and minimum concrete cover for new Bridges and widened portion of existing Bridges to satisfy the requirements in NCDOT *Structures Management Unit Manual*.

For Bridges with sidewalks that cross over the Project that require replacement, Developer shall design sidewalks to meet the criteria of the AASHTO Roadside Design Guide.

Developer shall design and construct Bridge superstructures, joints, and bearings to be accessible for inspection and maintenance. Developer shall design and construct open-framed superstructures to be accessible with walkways or by use of ladders or an under-Bridge inspection truck.

Developer shall install locked entryways on all hatches and points of access.

14.2.4 Modification of Existing Support Load

When Developer incorporate existing supports for signs, lights, traffic signals and ITS devices, Developer shall not modify the load on such supports except when one of the following conditions are met:

- Developer's Design Documents demonstrate that the proposed load does not exceed the original design load for the support; or
- Developer's Design Documents include a structural analysis of such support, where the proposed load on the support exceeds the original design load for the support, which satisfies NCDOT that the existing support can accommodate the proposed load, in accordance with the latest version of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals.

14.2.5 Highway Bridge Foundations

Developer's Bridge span arrangement and foundation locations shall accommodate the geometry of Developer's Design Documents as well as the traffic criteria in the Technical Provisions.

Developer shall not use spread footings in locations with scour potential.

Developer shall not design Bridges with Mechanically Stabilized Earth (MSE) walls as structural foundations or that subject MSE walls to vertical loads.

Developer shall design and construct Bridge approach slabs and reinforced Bridge approach fills for all new Bridges. When Developer widens existing Bridges that have existing Bridge approach slabs, Developer shall design and construct Bridge approach slabs for the widening portion of existing Bridges. When Developer widens existing Bridges that have existing reinforced Bridge approach fills, Developer shall design and construct reinforced Bridge approach fills for the widening portion of existing Bridges. For clarity, when Developer widens existing Bridges that do not have existing reinforced Bridge approach fills and/or Bridge approach slabs, Developer shall design and construct the Work similar to the existing Bridge Elements.

When Developer widens existing Bridge approach fills, Developer shall design and construct the Bridge approach fills for the widening portion to slope away from the existing Bridge approach fill. Developer's Design Submittals shall include details for the approach fill widening that demonstrate drainage accommodations.

Developer shall design and construct Bridges to have a minimum of 1'-6" overburden (cover) on tops of Bridge substructure footings.

Developer shall not use timber piles.

14.2.6 Highway Bridge Railings and Barriers

Developer shall cause Bridge railing and barrier systems designed and constructed by Developer to be tested in accordance with NCHRP Report 350 and certified by an independent third party acceptable to NCDOT unless the railing and barrier systems are listed in Table 14.2 and respect the Design Speed in Table 14.2.

Table 14.2

STD NAME	DESCRIPTION
BMR34	Two-Bar Metal Rail
BMR567	Three-Bar Metal Rail with sidewalk, acceptable for Design Speeds not exceeding 45 mph
CBR1	Concrete Barrier Rail (minimum 42” height)
CBR2	Vertical Concrete Barrier Rail (minimum 42” height)
GRA2	Guardrail Anchorage for Barrier Rail
GRA3	Guardrail Anchorage Details for Metal Rails and Vertical Concrete Barrier Rail

14.2.7 Retaining Walls

Developer shall not use steel modular walls. Modular walls employing interlocking blocks shall not be used where surcharge loads from vehicular traffic are present.

Developer shall design and construct retaining walls plumb and level.

Developer shall provide retaining wall layout plans that address slope maintenance above and below the wall and drainage from behind the wall as part of the Design Document Submittal set out in Section 2.9 of the Technical Provisions.

Retaining walls shall be designed and constructed to be free-draining and shall not retain water pressure.

14.2.8 Structure Drainage Systems

Developer shall perform Bridge deck drainage analysis in accordance with the guidelines provided in AASHTO LRFD Bridge Design Specifications Article 2.6.6. Developer shall avoid direct discharge into streams, Shoulders or Travelways.

For the design of drainage Structures associated with roadway and Highway Structures, Developer shall apply HL-93 loading.

Developer’s drainage structures, Bridge drainage systems, and waterproofing measures for railway Bridges shall conform to the requirements of AREMA and the specific railway owner’s requirements. In addition, no direct discharge onto railroad right-of-way shall be permitted.

14.2.9 Sign Supports and Tolling Gantries

Developer shall design and construct the infrastructure for supporting the ETCS. Structures supporting tolling equipment shall be equipped with vibration control suitable for satisfactory operation of the equipment. Developer shall design Structures to minimize interference with traffic when servicing tolling equipment.

Attachment of sign Structures or tolling gantries to Bridges will not be permitted on the Project.

Developer shall not use monotube sign supports and monotube or cantilever Dynamic Message Sign (DMS) support Structures except as otherwise provided in this Section 14.2.9 of the Technical Provisions. Cantilever sign supports may be used when the DMS or DMS in combination with a static sign has a combined weight that does not exceed 1,500 lbs.

Developer shall provide new sign and tolling gantry support foundations that are plumb and that are designed to not rotate.

Developer shall design and construct foundations for new metal poles in accordance with Book 2 and Book 3.

14.2.10 Reinforced Concrete Box Culverts

Developer shall lengthen the existing reinforced concrete box culverts as required by Developer's design and/or construction methods.

14.3 Construction Requirements

14.3.1 Steel Finishes

The top coat color for structural steel paint provided by Developer shall conform to Section 442 of the NCDOT Standard Specification for Roads and Structures.

Developer shall protect steel Bridge girders and framing, including weathering steel members, at locations beneath Bridge deck expansion joints in accordance with Section 442 of the NCDOT Standard Specifications for Roads and Structures.

Developer shall protect all components of the Structure that are susceptible to corrosion and/or staining from weathering steel run-off.

14.3.2 Barrier Rail and Railing System Finishes

Developer shall construct barrier rail systems to have smooth surfaces and to follow the alignment of the finished roadway grade.

14.3.3 Disposal of Hydrodemolition Slurry

Developer shall submit a CWMP in accordance with Section 4.3 of the Technical Provisions that describes the collection, treatment, and disposal of run-off water generated by the scarification and hydro-demolition processes to NCDOT for review and approval no less than 30 days prior to beginning the hydrodemolition. Developer's disposal of slurry from hydrodemolition shall comply with Permit No. WQ0035749 issued by DENR to NCDOT for Diamond Grind/Hydrodemolition Land Application of Diamond Grinding and Hydrodemolition Operation Slurry, the CWMP, and all other regulations.

14.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 14 of the Technical Provisions:

- Structure recommendations for review and comment prior to Preliminary Roadway Plans;
- Design Documents and Working Drawings in accordance with Exhibit 2-09 and Exhibit 2-10 of the Technical Provisions;
- Bridge Deck Rehabilitation Evaluation Plan for approval prior Developer performing such inspections; and
- CWMP in accordance with Section 4.3 of the Technical Provisions no less than 30 days prior to beginning the hydrodemolition.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

15 AESTHETICS AND LANDSCAPING

15.1 General

Developer shall perform the aesthetics and landscaping Work in accordance with the requirements of this Section 15 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

15.2 Voluntary Aesthetic Elements

Developer shall design and construct the Voluntary Aesthetic Elements.

15.3 Sound Barrier Walls

Developer shall design and construct aesthetic treatment of sound barrier walls in accordance with Section 10.2.4 and Section 15 of the Technical Provisions.

15.4 Corridor Landscaping and Aesthetics Plan

Developer shall develop a Corridor Landscaping and Aesthetics Plan (CLAP) that establishes an overall, sustainable vision for the corridor through the Term. Developer shall consult with NCDOT and with adjacent municipalities through NCDOT and, to the extent practical, incorporate their vision into the CLAP. The CLAP shall be developed in concert with NCDOT and submitted and approved by NCDOT within 270 days after NTP2. In developing the CLAP Developer shall consider the required aesthetic Elements of the sound barrier walls per Exhibit 10-01 of the Technical Provisions, the Aesthetic and Landscaping Allowance Scope, and any Voluntary Aesthetic Elements. The CLAP shall also include details regarding future landscaping and future aesthetic hardscape Elements that will ultimately result in a uniform, corridor-wide landscape.

As part of the CLAP, Developer shall design landscape Elements to incorporate native plants or plants included on the plant list available on NCDOT Roadside Environmental Unit website (http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/design/plantlist/) that are suitable for the conditions encountered along the Project. The CLAP and the landscaping design shall include and address the following:

- preservation of existing trees and vegetation to the greatest extent possible;
- add seasonal color and texture in the landscape;
- design attractively landscaped interchanges;
- incorporate vegetative buffers for view management of adjacent development, Structures and/or properties;
- reestablishment of native vegetation on the corridor;
- provide a sustainable landscape for the corridor; and
- mowing limits to manage vegetation growth within the Project ROW and compatible with Exhibit 23-01 of the Technical Provisions.

15.5 Aesthetics and Landscaping Allowance Scope

Following approval of the CLAP, NCODT will prioritize those portions of the CLAP that are to be implemented by Developer within the Aesthetic and Landscaping Allowance. NCDOT will finalize the Aesthetics and Landscaping Allowance Scope in consultation with Developer so as to utilize efficiently the Aesthetics and Landscaping Allowance between NTP2 and Final

Completion and Developer shall design and construct the Aesthetics and Landscaping Allowance Scope accordingly.

15.6 Design Requirements

Developer shall design the aesthetics and landscaping Elements in accordance with the guidelines and requirements set forth in the approved CLAP, as well as the aesthetics and landscaping principles and design requirements of this Section 15 of the Technical Provisions including the aesthetic treatment of sound barrier walls and privacy walls, the Aesthetic and Landscaping Allowance Scope, and any Voluntary Aesthetic Elements.

15.7 Construction Requirements

Developer shall construct the aesthetics and landscaping Elements, including the aesthetic treatment of sound barrier walls and privacy walls, the Aesthetic and Landscaping Allowance Scope, and any Voluntary Aesthetic Elements before Final Completion per the requirements of this Section 15 of the Technical Provisions.

Developer shall place large trees no less than 40 feet from any Travelway except when protected by positive barrier. Large trees protected by barrier shall be no closer than ten feet behind the barrier.

Landscape planting shall be in accordance with Section 1670 of the Standard Specifications, including establishment required by Article 1670-14. The establishment period shall begin upon completion of the initial landscape planting on all Project Sections. Such establishment period shall end two years after the beginning of the establishment period and upon completion of replacement planting of trees and shrubs. Replacement planting consists of replacing those plants which are not in a living, healthy condition or do not conform to the Specifications contained in *American Standard for Nursery Stock* or damaged or stolen. Completion of the establishment period is not required for Final Acceptance.

15.8 Landscape Maintenance Plan

Developer shall prepare, implement, and, as required, update a Landscape Maintenance Plan (LMP) for all landscape planting, from NTP2 through the Term, including Existing Assets, and the establishment as required by Article 1670-14 of the Standard Specifications for landscape planting installed by Developer. The LPM shall also include all Developer's O&M Work necessary to maintain healthy and vibrant landscape and ensure that vegetation is managed to guarantee safe vehicular travel throughout the Term. The LMP shall include, at a minimum, activities and schedule for routine maintenance, annual maintenance, and periodic refurbishment of plant beds, including replacement of plant material. Such maintenance shall include at a minimum, procedure for vegetation control, fertilization, herbicide treatment, mowing adjacent to landscape planting, watering during the establishment, pruning, plant replacement, and mulch replacement for each type of plant and planting type (individual, single species beds and multiple species beds) to maintain a minimum depth of three inches. The LMP shall include a renewal schedule for landscape plant beds. The LMP shall identify landscape planting that will be maintained by others within the Project ROW as provided by agreements NCDOT has with third parties.

The LMP shall be submitted and approved as a component of the O&M Plan.

15.9 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 15 of the Technical Provisions:

- Corridor Landscaping and Aesthetics Plan in concert with NCDOT within 270 days of NTP2;
- Landscape Maintenance Plan as a component of the O&M Plan; and
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

16 RAILROAD COORDINATION

16.1 General

Developer shall perform all railroad coordination Work in accordance with the requirements of this Section 16 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

Developer shall identify each railroad owner within or in the vicinity of the Project ROW and shall be solely responsible for coordinating all Work with impacts or encroachment to railroad owner's properties or operations within or in the vicinity of the Project ROW.

Developer shall adhere to clearance, crashwall and other requirements as stipulated in the Memorandum of Understanding executed by Norfolk Southern Corporation, the CSX Letter dated March 10, 2014, and drawings in Exhibit 16-03, unless otherwise agreed upon among the Department, railroad owners, and Developer.

16.2 Project Work Affecting Railroad Operations

16.2.1 Railroad Agreements

Developer shall prepare agreements, and pay any fees and other costs necessary to construct or modify any facility within the railroad owner's right of way, including Design Documents for review and comment, approval or execution by NCDOT as may be required. Developer shall obtain assistance from NCDOT in the negotiation and review of all railroad agreements prepared by Developer. All railroad agreements will be between NCDOT and the railroad. Developer shall reimburse the railroad agency for staff time to represent the railroad to conduct reviews and provide comments and approval of Developer's plans and specifications. Developer shall submit the final executed agreement documents and attachments as part of the Final Design Documents for Work on the railway right of way to be submitted in accordance with Section 2.9 of the Technical Provisions prior to submittal of Final Design Document.

16.2.2 Agreement for Construction, Maintenance and Use of Right of Way

Developer shall coordinate with all railroad owners, including the Norfolk Southern Corporation and CSX Railroad, and NCDOT in the installation of any railroad crossings and any related appurtenances. Developer shall develop and negotiate any necessary agreement with the railroad owner as may be required to establish the general framework for addressing coordination or potential conflicts between Developer Work and a railroad owner. Developer shall use the standard NCDOT agreement forms in Exhibit 16-01 and Exhibit 16-02 of the Technical Provisions as may be amended or modified by the railroad owners or by NCDOT in their sole discretion. The two party agreement between the NCDOT and the railroad owner shall set forth the terms and conditions under which the Work will be performed, including but not limited to railroad protective liability insurance for bodily injury liability, property damage liability, and physical damage to property, as may be required by the railroad owners. The agreement shall also include necessary Force Account items such as preliminary engineering, construction engineering, flagging, and signal and communication lines. The railroad owner shall have sole authority to determine technical and operational requirements, including clearances and the need for flagging, as may be required to protect its operations and property. Developer shall be bound by and comply with all terms and conditions of such agreements.

For the purpose of execution of such agreements, Developer shall seek concurrence and approval from the railroad owner(s) and NCDOT. Subject to acceptable terms and conditions, NCDOT will review and provide approval of the final agreement provided by Developer, or ask Developer to resubmit as the case may be, within ten Business Days. After NCDOT has

approved the final agreement, NCDOT will transmit within five Business Days the agreement to the railroad owner(s) for execution. Upon execution by the railroad owners(s), NCDOT will execute the agreement within 60 Business Days.

Prior to commencing any activities within a railroad right of way, Developer shall obtain insurance approval, per activity, from the appropriate railroad(s). No less than 60 days prior to beginning Work within the railroad right of way, Developer shall submit two copies of the insurance documents, containing all the railroad requirements, to the NCDOT for coordination with the appropriate railroad(s). NCDOT will execute the agreement within ten Business Days of approval by the Board of Transportation. Developer shall not commence Work in the railroad owner's right of way until all agreements have been executed, insurance acquired, and all approvals of proposed design and construction plans have been obtained from the railroad owner and NCDOT.

The agreement form specified under this Section 16 of the Technical Provisions is set out in the following exhibits to the Technical Provisions.

Norfolk Southern Railway Co. Agreement Form	Exhibit 16-01
CSX Transportation Inc. Agreement Form	Exhibit 16-02

16.2.3 Design Requirements

Developer shall verify and obtain from the railroad owners such information as may be pertinent to Developer's Design Work. In particular, Developer's Design Work shall verify and accommodate all requirements associated with existing conditions and with the Charlotte Railroad Improvement and Safety Program (CRISP) project, as may be applicable.

In addition to Submittal requirements specified elsewhere in the CA Documents, Developer shall provide Design Submittals for Work within the railway right of way in accordance with Exhibit 2-09 (see "Work within Railway Right of Way") and Exhibit 2-10 of the Technical Provisions. Developer shall allow at a minimum 45 days for review and approval of Submittals requiring approval by the railroad owner.

16.3 Construction Requirements

Developer shall verify and obtain from the railroad owners such information as may be pertinent to Developer's Construction Work. In particular, Developer shall verify and accommodate all requirements associated with existing conditions and with the Charlotte Railroad Improvement and Safety Program (CRISP) project, as may be applicable. Developer shall not impede the CRISP project.

Developer shall contact the respective railroad owner representative to coordinate plan and design requirements, required railroad encroachment, future railroad projects within or in the vicinity of the Project ROW, including rail capacity needs such as but not limited to additional tracks, maintenance of roadways or walkways and vertical and horizontal clearance, and acquisition of required temporary or permanent right of way and easements from the railroad owner.

16.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 16 of the Technical Provisions:

- railroad agreements for approval 60 days prior to any Work being done within the railroad right of way; and

- final executed agreement documents and attachments to submittal of Final Design Document.
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

17 PAVEMENT MARKINGS & MARKERS

17.1 General

Developer shall design, construct, and maintain all pavement markings, pavement markers, and delineation in accordance with this Section 17 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3. Pavement markings, pavement markers, and delineation Work shall include designing, installing, modifying, maintaining, or removing pavement markings, markers and other delineation necessary for the satisfactory completion and safe operation of the Project. Developer shall prepare plans, install, and maintain pavement delineation as needed for the Project. Developer shall prepare all necessary engineering studies and applicable design reports to justify all the Project pavement delineation Elements used throughout the Project.

Developer shall inspect the permanent pavement markings, at a minimum, annually. Such white and yellow pavement markings shall maintain a reflectivity of no less than 100 mcd/lux/m^2 or in accordance with the MUTCD if specified.

17.2 Design Requirements

Developer shall design pavement markings, pavement markers and other delineation devices necessary to provide a complete and functional system and that meets the following performance requirements:

- provides for the safe, orderly and predictable movement for all traffic;
- provides for all categories of traffic using the Project;
- meets all standards for markings, including separation of HOT Lanes from General Purpose Lanes;
- are visible under all lighting conditions and when pavement is wet;
- provide such guidance and warnings as needed to ensure the safe and informed operation of individual Elements of the traffic stream; and
- all pavement markings and markers, permanent or temporary, where no longer required for traffic demarcation shall be completely removed.

Developer shall provide six inches wide polyurea pavement markings with highly reflective elements or thermoplastic pavement markings for lane lines, edge lines, and skips for the Project.

Developer shall install delineators on the freeways and ramps in accordance with the NCDOT applicable standards. Developer shall delineate noses of all raised islands and inside edges of exclusive turn lanes (channelized curbs) in accordance with the requirements of Manual on Uniform Traffic Control Devices (MUTCD).

Developer shall install pavement markings for crosswalks at locations where pedestrians are accommodated.

Developer's Final Design Submittal for pavement markings and markers plans shall show any required modifications to existing pavement markings beyond the roadway construction limits to ensure appropriate tie-ins. Developer shall ensure that tie-ins of pavement markings and markers with existing pavement markings outside the Project Right of Way are undertaken in accordance with the requirements of this Section 17 of the Technical Provisions.

17.3 Construction Requirements

Developer shall use pavement marking and marker products that conform to NCDOT Standard Specifications for Roads and Structures and are listed on NCDOT's Approved Products List.

Developer shall install pavement markings and markers in accordance with the manufacturer's procedures and specifications.

17.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 17 of the Technical Provisions:

- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

18 SIGNING

18.1 General

Developer shall develop a signing plan for the Project, design and construct all necessary guide, warning, supplemental, sequential and regulatory signs for the General Purpose Lanes and HOT Lanes, ramps, interchanges, arterials, and any other roadway affected by the Project in accordance with Section 18 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3. Developer shall develop a signing plan for the Project which shall provide for modifications to signing outside the Project Right of Way that is rendered inaccurate, ineffective, confusing, or unnecessary by the Project. The modification shall include the addition, removal, or alteration of signs and appurtenances.

Developer shall ensure that signs are clearly visible, provide clear direction and information for Project motorists, safely guide motorists and comply with all applicable Manual on Uniform Traffic Control Devices (MUTCD) requirements, including provisions for HOT Lanes and ETCS.

18.2 Administrative Requirements

Developer shall arrange and coordinate all meetings with all local agencies that will assume responsibility for maintaining signing. Developer shall provide NCDOT with notification of such meetings a minimum of five Business Days prior to the start of the meeting. NCDOT, in its discretion, may attend such meetings. Developer shall arrange and coordinate all meetings with requesting agencies or individuals regarding special signs. Developer shall record minutes of all such meetings in accordance with Section 2.6 of these Technical Provisions.

18.3 Design Requirements

Developer shall prepare signing plans that include layouts showing the locations of ground mounted and overhead signs, special sign details, and structural and foundation requirements. Developer's Design Documents shall include the locations of ground-mounted and overhead signs, graphic representation of all signs (existing and proposed), guide sign and special sign details, and structural and foundation requirements. Signs shall be located in a manner that avoids conflicts with other signs, vegetation, Dynamic Message Signs (DMS), lighting, and Structures.

Developer shall equip all new or relocated ground mounted signs with supports that breakaway or have yielding features that have been successfully crash tested in accordance with National Cooperative Highway Research Program Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features" and shall locate new and relocate existing signs such that the nearest edge of the sign is a minimum of 30 feet from the near edge of the Travelway. Developer shall be responsible for determining, designing, and installing any protection for proposed and existing sign supports and overhead sign supports in accordance with Section 10 of the Technical Provisions.

Developer shall remove existing milemarkers and install milemarkers every 2/10 mile on the Project. Each milemarker location shall have two milemarkers mounted back to back on the outside Shoulder for each direction of travel on the mainline. The milemarker designs shall be in accordance with the Intermediate Enhanced Reference Location Signs (D10-5) referenced in the Standard Highway Signs.

Existing sign panels that do not meet the requirements of MUTCD Table 2A-3 titled Minimum Maintained Retroreflectivity Levels shall be replaced and such replacement signs and supports shall meet the requirements of the Technical Provisions.

18.3.1 Overhead Sign Assemblies

Developer shall design and install new overhead sign assemblies, including cantilever sign assemblies, for a wind speed of no less than 90 mph. Developer shall include exit panels as part of the sign height when calculating the windload area. The minimum vertical clearance beneath all overhead sign assemblies, including cantilever sign assemblies, shall be 17 feet.

Developer shall design median barrier footing and median transition barrier assembly to accommodate sign supports mounted on median barrier. Developer may modify existing overhead sign assemblies, including cantilever sign assemblies, to accommodate proposed signs if the following conditions are met:

- demonstration that the total area of all sign panels on the Structure does not exceed the original design wind load area for that Structure; and
- a structural analysis is performed for any existing sign Structure, where the total area of all sign panels on the Structure exceeds the original design wind load area for that Structure, which satisfies NCDOT that the existing Structure can accommodate the proposed sign panels, in accordance with the latest version of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals.

Developer shall replace or modify the existing overhead sign assemblies as necessary to accommodate Developer's Design Documents.

18.3.2 Monotube Sign Support Structures

Monotube sign supports shall not be used.

18.3.3 Overhead Sign Supports

Overhead sign supports installed or modified by Developer shall be located a minimum of 40 feet from the near edge of the Travelway on Interstate routes to the center of the sign support. If the minimum 40-foot distance cannot be obtained without exceeding the Project ROW, or due to drainage or utility conflicts, the overhead sign supports shall be located a minimum of 22 feet from the near edge of the Travelway and protected by guardrail or other NCDOT approved positive protection barrier.

Developer shall provide the appropriate positive protection and drainage for all overhead sign supports.

18.3.4 Project Signs outside the Project ROW

For signs installed by Developer outside of the Project ROW but within a public right of way, Developer shall design, install, and maintain the signs in public right of way controlled by local or other State agencies. Developer shall coordinate with applicable Governmental Entities for the design, installation, and maintenance of such signs.

18.3.5 Toll Rate Signs and Other Toll Related Information Signs

Developer shall design, provide, install, test, operate, and maintain dynamic messaging signs, in accordance with all requirements of the Manual on Uniform Traffic Control Devices (MUTCD) (the "Toll Rate Signs"). At a minimum, Developer shall provide dynamic message signs in advance of all Toll Segments to notify Project corridor motorists of the Toll Rates applicable at the time of passage. At a minimum, Developer shall install Toll Rate Signs:

- one mile in advance of a point of entry;
- one half mile in advance of a point of entry; and

- one half mile in advance of a point of exit if there are separated entry and exit points at which the entry sign for the next Toll Segment Toll Rate Sign is not clearly visible to the Project corridor motorists.

Toll Rate Signs shall display the actual toll amounts charged to Users in effect at any given time, as established in Exhibit 4 of the Agreement. Dynamic Toll Rate Signs shall also display when tolls are suspended in accordance with Section 3.5 of the Agreement.

Developer shall include details of all Toll Rate Signs in the signing Design Submittals as required by Section 2.9 of the Technical Provisions. Developer may combine equipment from multiple devices into a single standard cabinet if space allows. However Developer shall not install equipment into existing NCDOT cabinets.

Developer shall also design and install static signs to inform Project corridor motorists of the accepted methods of payment for use of the HOT Lanes and signs providing Project corridor motorists directions to the Charlotte area walk-in Customer Service Center, as required by Law.

18.3.6 Third-Party Signs

In addition to the warning, regulatory, and guide signs within the Project ROW, NCDOT or Governmental Entities may request that third-party signs, including Logo and tourist oriented directional signs , be installed by a third party. Developer shall coordinate and cooperate with any third party performing such Work. NCDOT may solicit input from Developer in reviewing applications for new third-party signs, but will retain the sole authority for approving installation of such signs.

18.3.7 Overhead Signs Lighting

Developer shall design and install lighting for all overhead signs except as provided in this Section 18.3.7 of the Technical Provisions. Lighting will not be required for overhead sign assemblies when North Carolina Grade A or North Carolina Grade C retro-reflective sheeting is used for the legends (text) and border of all signs on the overhead sign assembly.

18.3.8 Additional Signing

Developer shall install advisory speed signs with flashing warning lights and chevrons along all ramps, existing or constructed by Developer, with a Design Speed less than current AASHTO or NCDOT standards. Such advisory speed signs and chevrons shall be installed in accordance with the MUTCD and NCDOT guidelines. At a minimum, Developer shall install an advisory speed sign with flashing warning lights and chevrons to the I-277 NB on-ramp at Graham Street.

Developer shall install advance warning signs for reduced vertical clearance along all roadways with existing overhead Bridges having vertical clearances below AASHTO or NCDOT standards. Developer shall also install such advanced warning signs on I-85 in advance of the I-77 NB Bridge over I-85 (Bridge No. 590302), whether such signs are within or outside the Project ROW. All such advance warning signs shall be installed in accordance with current MUTCD and NCDOT guidelines and policies.

18.3.9 Construction Requirements

Developer shall maintain all existing ground mounted and overhead signs that are affected by construction, including temporary installations of guide and Logo signs on supports, overhead assemblies, foundations, lighting systems and any other Element of the sign system in a serviceable condition.

When damage occurs to the Logo signs or the business panels during construction or installation, Developer shall notify NCDOT's Logo Coordinator as soon as possible. Developer

shall be responsible for replacement of damaged Logo signs or Logo business panels. If the Logo signs are removed and disposed of per the Release for Construction sign design, the business panels on the signs shall be removed and returned to NCDOT's Logo Coordinator. The order of preference for Logo signs shall be maintained (see MUTCD section 2F.02).

Developer shall maintain appropriate advance guide signs and/or exit direction signs at all times and shall not obstruct the view of the signs by motorist. Developer shall replace any other signs removed or damaged when performing Construction Work before the end of the work day.

18.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 18 of the Technical Provisions:

- Design Documents and Working Drawings in accordance with Exhibit 2-09 and Exhibit 2-10 of the Technical Provisions; and
- minutes of signing meetings for review and comment within three Business Days of the meeting.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

19 SIGNALS

19.1 General

When Developer constructs a new intersection or modifies an existing intersection, Developer shall perform signal analysis; design and construct new traffic signals and/or revise existing traffic signals as required by Developer's Design Documents in accordance with the requirements of this Section 19 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

19.2 Design Requirements

Developer shall be responsible for providing a design that is safe for motorists and that is economical to operate and maintain. The design shall be consistent with current NCDOT practice.

19.2.1 Signalization

At a minimum, Developer's Design Documents for all new traffic signals and existing traffic signals that are modified shall comply with the current NCDOT guidelines and the Manual of Uniform Traffic Control Devices (MUTCD).

Developer shall design intersections and traffic signals that optimize vehicle level of service (LOS) or flow, minimize delay, and accommodate pedestrians and cyclists as necessary. Developer shall design and prepare plans for the traffic signal installations, including the preparation of traffic signal plans, electrical and programming details, utility make-ready plans and fiber optic communication plans and special provisions. Developer shall design all the aforementioned plans to be compatible with the existing signal system.

Developer shall schedule a pre-design meeting with NCDOT before signal design begins. Developer shall coordinate and implement all signal designs for inclusion in the signal system at the appropriate time. Developer shall design, implement, develop, and modify coordinated signal system timing plans during construction to accommodate traffic pattern changes.

Developer shall design and install warranted traffic signals, both permanent and temporary, for staged construction, as necessary. Developer shall also design and implement modifications to existing traffic signals as a result of Developer's Design Documents. The traffic signal designs and modifications shall be completed in accordance with the current NCDOT Standards and Standard Special Provisions. Developer is not required to modify existing traffic signals except that portion of such traffic signals that require modification by Developer Design Documents.

19.3 Construction Requirements

Prior to construction, Developer shall provide a detailed set of Communications Plans, Project Special Provisions, and Catalog Cuts as part of the design submissions set out in Section 2.9 of the Technical Provisions.

Developer shall coordinate Work on existing signals with NCDOT. Upon completion of all construction at an intersection in accordance with this Section 19 of the Technical Provisions, Developer may request that NCDOT inspect the Work for acceptance. When NCDOT determines that all traffic signal Work at an intersection has been completed satisfactorily, NCDOT will notify Developer of the satisfactory completion of such Work and Developer shall not be responsible for further maintenance of the traffic signal at the intersection.

Developer shall coordinate with the Utility Owner(s) and ensure necessary power service is initiated and maintained for permanent signal systems. Developer shall ensure power is provided to all Developer-installed signals.

Developer shall install all communications cables and conduit systems in such a manner that avoids conflicts with other Utilities. Developer shall be responsible for coordinating all Utility make-ready Work with the appropriate Utility Owner.

19.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 19 of the Technical Provisions:

- Design Documents and Working Drawings in accordance with Exhibit 2-09 and Exhibit 2-10 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

20 LIGHTING

20.1 General

Developer shall perform all temporary and permanent lighting Work in accordance with the requirements of this Section 20 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

20.2 Design Requirements

If Developer's design impacts existing lighting, Developer shall undertake all Work necessary to provide and maintain a complete and functional system that meets the following requirements:

- is durable;
- avoids debilitating or discomforting glare to motorists;
- provides for ease of maintenance and of servicing;
- is energy efficient;
- complies with the aesthetic requirements;
- uses flat glass, full cutoff luminaries; and
- minimizes light pollution and light trespass.

Developer's lighting design shall include lighting layouts and supporting photometric calculations, including computer generated spacing charts, or foot-candle and uniformity graphs that demonstrate how the proposed lighting system will illuminate the proposed roadway as required by the Agreement.

For the I-77/I-485 interchange, Developer shall design and construct full interchange lighting in accordance with *AASHTO Roadway Lighting Design Guide, October 2005.* Developer's lighting design shall comply with the following minimum illuminance and luminance design values:

- Average Maintained Illuminance – 0.8 (foot-candles)
- Illuminance Uniformity Ratio – 4:1 (average foot-candles : minimum foot-candles)

Lighting limits for this interchange shall be limited to a 3000-foot radius measured from intersection of the I-485 west bound bridge and I-77.

Developer shall conduct certain additional interchange Work as follows:

- At the interchange of I-77 and WT Harris Blvd., Developer shall relocate the high mast located in the median if it is impacted by Developer's Design Documents; and
- At the interchange of I-77 and Brawley School Rd., Developer shall relocate the high masts located in the median if they are impacted by Developer's Design Documents;

Where existing light standards are structurally adequate, Developer may utilize existing light standards for new lights as provided in Section 14.2.4 of the Technical Provisions.

Developer shall adjust the existing lighting systems affected by the Project, if impacted by Developer's design. Developer shall coordinate with NCDOT, municipality and/or other agencies having jurisdiction in the area of the existing lighting systems. Developer shall coordinate the placement of lighting equipment with Developer's landscape design.

Developer shall minimize the potential hazards of lighting pole placement. For all single arm poles located within the clear zone of the roadways, Developer's Design Documents shall incorporate AASHTO approved breakaway devices and breakaway fuse holders. High-mast

light supports shall be located a minimum of 50 feet from any Travelway. To the extent practicable, Developer shall provide luminaries of equal height along the roadway. Developer shall not place ITS cable, fiber-optic lines, signal conductors, or any other non-lighting related cables or conductors in the lighting conduit, trenches, or junction boxes.

20.3 Construction Requirements

Developer shall coordinate with the Utility Owner(s) to ensure power service is initiated and maintained for all permanent lighting systems forming part of the Work. Developer shall also obtain from Utility Owners their specific requirements for working clearances and other necessary requirements and incorporate these into Developer's processes and procedures for the delivery of the Work.

20.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 20 of the Technical Provisions:

- Design Documents and Working Drawings in accordance with Exhibit 2-09 and Exhibit 2-10 of the Technical Provisions.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

21 INTELLIGENT TRANSPORTATION SYSTEM

21.1 General

Developer shall design, construct or otherwise provide, operate, and maintain all necessary Intelligent Transportation Systems (ITS) infrastructure, devices, and support systems as required in this Section 21 of the Technical Provisions and the CA Documents including but not limited to the applicable provisions of Book 2 and Book 3, to deliver an operational transportation management system.

The transportation management system shall be fully capable of detecting recurring congestion and transportation Incidents, verifying the nature of the recurring congestion and Incidents, managing the congestion, Incident Response, and clearance, providing traveler information, and performing interagency coordination. The transportation management system shall also be fully capable of supporting transportation Emergency operations. Refer to the Section 23 of the Technical Provisions for information regarding ITS operations and maintenance requirements.

Developer shall provide for a Transportation Management Center facility (Developer TMC). Such facility may be new construction or an existing facility appropriate for the functions to be performed. To supplement the Developer TMC, NCDOT will make available sufficient space for one person and their workstation per shift in the control room at the existing Metrolina Regional TMC. In addition, the Metrolina Regional TMC may accommodate up to two vehicles provided by Developer (26,000 GVW or less) 24 hours a day to be used for Incident management.

The physical limits of the system include the Project ROW and more broadly the I-77 roadway and interchanging roadways from the decision points in advance of the approaches to ramps and/or signalized intersections, which may extend outside the Existing ROW.

The objectives of the transportation management system are:

- detect vehicle travel characteristics in all travel lanes;
- perform remote surveillance of the roadway;
- provide traveler information utilizing Dynamic Message Signs (DMS);
- communicate with Incident responders;
- inform motorists in real-time of tolling suspension under Section 3.5 of the Agreement using Toll Rate Signs and CMS;
- support High Occupancy Toll (HOT) Operations with traffic data collection, closed circuit television (CCTV) surveillance, dynamic message signs, Toll Rate Signs (TRS), enforcement systems, traffic Incident management and maintenance, and communications infrastructure;
- maintain existing communications infrastructure and ITS devices in the corridor during construction and post Construction Period; and
- provide safe and efficient traffic operation.

21.2 Design Requirements

Developer shall undertake all Work necessary to provide a complete and functional ITS that meets the following requirements:

- the system shall be durable and maintainable;

- the system shall be designed, installed, operated, and maintained in accordance with the manufacturer's requirements, guidelines and recommendations;
- the system shall detect and visually confirm traffic Incidents within three minutes of their occurrence;
- the system shall activate DMSs within five minutes of Incident confirmation;
- the system shall directly communicate with Incident responders via voice and data methods to coordinate Incident management and determine when Incident clearance has occurred;
- the system shall manage and operate all ITS field devices and supporting infrastructure from a central location with an integrated platform of hardware, software, display and communications technologies;
- all devices shall communicate using National Transportation Communications for ITS Protocol (NTCIP)standards;
- structure design shall be in accordance with Section 14 of the Technical Provisions; and
- the system shall provide for ease of operation, preventive and responsive maintenance

Developer shall provide the following for the ITS portion of the Project:

- a Concept of Operations document for the Project. This document shall be created in conformance with IEEE Standard P1362 V3.2, and ANSI/AIAA G-043-1992 Guide for the Preparation of Operational Concept Documents. The concept of operations shall address the HOT Lanes and General Purpose Lanes with specific discussion on device placement methodology. The Concept of Operations shall be submitted concurrently with the Conceptual Design Documents;
- a Technical Design Report shall be developed documenting the system network in detail and the computer hardware / software Elements of the Project. The document shall provide the networking architecture, a physical device inventory with locations, internet protocol (IP) addressing schema, individual IP device addresses, a security model description, and specifics of the security model implementation, firewall configuration, and computers / devices on the network. All inventories shall include vendor supplying device/software/firmware, version numbers, set up configuration parameters, passwords, IP addresses, warranty information, physical location, and intended purpose. The Technical Design Report shall be submitted to NCDOT as a part of the final ITS plans Submittal in conformance with the requirements described in Section 2.9 of the Technical Provisions;
- As-Built documentation for the ITS Elements of the Project in accordance with Section 2.9.5 of the Technical Provisions; and
- Operations and Maintenance Manuals shall be assembled for all of the ITS Elements and communications equipment. The manuals and Planned Maintenance Schedules for the ITS Elements shall be submitted for each Project Section in accordance with Section 23.1.4 of the Technical Provisions.

Developer shall coordinate the placement of ITS Elements with Developer's landscape design. See Section 6.9 of the Technical Provisions for other requirements.

21.2.1 Vehicle Detection System

Developer shall design a non-intrusive vehicle detection system (VDS) covering all of the HOT Lanes, General Purpose Lanes, ramps and auxiliary lanes at a maximum of one half mile intervals. Locations should be chosen to ensure typical travel characteristics are being monitored. The VDS shall detect vehicle passage and determine travel times, volume, detector occupancy, and speed. The VDS shall collect sufficient data to identify Traffic Backups or Developer shall provide portable VDS to identify Traffic Backups when Closures are initiated. Portable VDS for identification of Backups shall be, at a maximum of one half mile intervals from one mile in advance of the Closure to the end of the Closure. Traffic volume and speed data on the GP Lanes and the HOT Lanes shall be summarized in continuous five minute aggregate bins with a count accuracy of 95% or better. The HOT Lanes are subject to additional requirements for monitoring and collecting speed and traffic volume data as set forth in Section 24 of the Technical Provisions. Data shall be collected, stored for a minimum of two weeks, and transmitted to NCDOT daily.

21.2.2 Closed Circuit Television (CCTV) System

Developer shall design CCTV camera assemblies to provide 100% coverage of the HOT Lanes, the General Purpose Lanes, auxiliary lanes, ramps, and ramp junctions. Cameras shall be color, with pan-tilt-zoom operation with a minimum of 355 degrees of rotation and include lowering devices for maintenance. Cameras shall be mounted at a minimum of 45 feet above the highest Travelway elevation on rigid poles to avoid wind-caused sway. Camera placement shall provide DMS message verification by Developer TMC operators where possible and Developer shall identify in their design which cameras will be able to verify DMS messages. The CCTV poles shall be located outside the clear zone unless guardrail or barrier wall is in place for other purposes. Existing CCTV assemblies may be utilized in the design if compliant with the Technical Requirements. Developer may utilize existing CCTV supports for new CCTV as provided in Section 14.2.4 of the Technical Provisions.

NCDOT owns licenses for Protronix *VideoPro* (CCTV) central software that is available for Developer's use if desired.

21.2.3 Freeway DMS

Full matrix color DMS's are to be placed and used to support the traffic operations on the HOT Lanes and the General Purpose Lanes consistent with current NCDOT standard operating procedures, including but not limited to NCDOT *Policy for the Use of Dynamic and Changeable Message Signs*. NCDOT reserves the right to directly post or override messages in support of regional Incident management activities or in the event that displayed messages are not consistent with the current NCDOT standard operating procedures.

Developer shall locate DMS to provide adequate decision time in advance of major interchanges and/or diversion routes within the Project limits to provide traveler information. Developer shall determine the quantity and location of the Project DMS and shall install a minimum of 16 DMS along I-77 and I-277. Major interchanges are defined as those associated with the approved NCDOT diversion routes, provided in Exhibit 22-01 of the Technical Provisions. The DMS shall comply with the requirements of Book 3 and other CA Documents. The supporting Structures shall be located outside the clear zone unless guardrail or barrier wall is in place for other purposes. DMS Structures shall be designed to provide DMS placement over the affected portion of the roadway. Existing DMS assemblies may be utilized in the design if compliant with the Technical Provisions. Developer may utilize existing DMS assemblies that comply with or that are modified to comply with the Technical Provisions.

Developer may utilize existing DMS supports for new DMS as provided in Section 14.2.4 of the Technical Provisions.

21.2.4 Arterial DMS

Developer shall determine the number and location of full matrix color arterial DMSs on arterial highways at decision points in advance of direct arterial - to - HOT Lane access points with the Project to provide traveler information, including traffic information regarding the Project. Developer shall operate the arterial DMS in conformance with NCDOT standard operating procedures NCDOT *Policy for the Use of Dynamic and Changeable Message Signs*. NCDOT reserves the right to directly post or override messages in support of regional Incident management activities or in the event that displayed messages are not consistent with the current NCDOT standard operating procedures. The DMS shall comply with the requirements of Book 3 and other CA Documents.

21.2.5 Communications System

Developer shall design a new communications network to fully support the Transportation Management System and the Project's HOT control systems. The communications system shall connect all field Elements. The communications shall be Ethernet-based utilizing hardened Ethernet managed edge switches at all ITS field devices, Layer Three Gigabit Ethernet routing switches in field hubs to aggregate and distribute data, and a core routing switch. The network shall communicate over single mode fiber optic (SMFO) cable. The network shall be designed with a minimum of 50% spare capacity for bandwidth and fiber count. The design shall include network management software. Developer shall provide information regarding proposed network security protocols that will be used to secure the data transmitted over this network.

The existing NCDOT ITS communication infrastructure within the Project ROW shall remain in place. Developer shall be responsible for the maintenance of the existing and newly built ITS communications infrastructure in the Project ROW and any ITS communications infrastructure built by Developer outside of the Project ROW. Maintenance includes all activities associated with keeping the communications system fully operational. Developer is not expected to upgrade the existing ITS communications infrastructure.

Developer shall design Developer TMC to include facilities, computer hardware, software, flexible display of video and data for operators and management, Developer TMC security system and uninterruptible and backup power systems. The design shall include furniture and other equipment necessary for 24 hours per day, seven days per week continuous operation. The design shall include telephone and 800 MHz radio equipment for voice communications and data communications with incident response agencies, Incident Management Assistance Patrol (IMAP) and maintenance personnel, NCDOT, City of Charlotte, and other transportation operations agencies, and broadcast media.

21.3 Advanced Traffic Management Software (ATMS)

Developer shall provide a central control software platform to manage the ITS devices in a comprehensive manner in a common user interface supporting Incident management standard operating procedures consistent with NCDOT practices.

21.4 ITS Interface with NCDOT

Developer shall provide NCDOT with informational access to the ITS Elements of the Project. Developer shall provide NCDOT with three (3) workstations, to be placed in NCDOT operations centers, with installed, fully functional Developer ATMS software to view and control the ITS

devices on the Project. A workstation is defined as a desktop computer, monitor and supporting peripherals required for a fully functional operator workstation. Developer shall also provide a NTCIP data feed to disseminate traffic and Incident data for use by the NCDOT 511 system and the supplied data shall be available to NCDOT without restriction on use. The data feed shall comply with the following standards:

- OASIS Consortium
- Emergency Data Exchange Language (EDXL) Distribution Element v1.0
- Common Alerting Protocol (CAP) v1.2
- IEEE Std 1512-2006, IEEE Standard for Common Incident Management
- IEEE Std 1512.1-2006, IEEE Standard for Common Traffic Incident Management
- IETF RFC 4648, Base-N Encodings Best Practice

An alternative method for the data feed may be the use of the NCDOT Smartlink system.

Developer shall provide video sharing capabilities with the NCDOT, the City of Charlotte, State and local police, and any other Governmental Entity as directed by NCDOT. Video sharing shall be for viewing purposes only. Video sharing shall be accomplished through the provision of a full motion video distribution solution whereby authorized requesters receive video feeds for integration and display on the workstations provided in accordance with this Section 21.4 of the Technical Provisions. Video distribution shall also be available via a secured Internet connection or NCDOT communications backbone with the authorized requester building the display interface using Developer provided software developer's kit (SDK) and/or application programming interface (API). Developer shall provide a high speed Internet portal for video sharing access. High speed Internet access is defined as sufficient bandwidth to support video sharing of a minimum of ten concurrent full motion video requests.

21.5 Construction Requirements

Construction Work shall not impact the availability, operations, or visibility of any existing ITS device or the existing communications infrastructure. Any planned existing system ITS device or communications infrastructure outages shall require Developer coordination with and approval by NCDOT.

VDS construction shall include placement of detectors on rigid poles and/or existing Structures where mounting opportunities exist within manufacturer's recommended height and range from the Travelways. VDS construction shall provide for maintenance personnel to have a level concrete pad in front of the equipment cabinet for safe, effective maintainability without a Closure.

CCTV construction shall provide for maintenance personnel to have a level concrete pad in front of the equipment cabinet for safe, effective maintainability without a Closure. CCTV equipment including camera, lens, housing, and equipment cabinet shall perform acceptably in statistically anticipated weather conditions. CCTV equipment shall be constructed for compatibility with video compression format(s) desired by NCDOT including Ethernet and H.264.

DMS construction shall provide for support Structures meeting the static and dynamic loading of both DMS and static signing. All cabling shall be contained in conduit or internal to the Structure. Access to the DMS via catwalks shall be provided so that maintenance personnel entering the sign do not require a Closure. Front access arterial DMSs, when mounted on cantilevers, shall be placed to avoid a Closure during maintenance.

Construction shall include all supporting power systems obtained from commercial power sources. Developer shall attempt to optimize the construction of load centers so that various ITS devices, toll devices, and lighting are constructed utilizing common duct banks and sources of electricity. Load centers shall be outside of the clear zone.

Each equipment cabinet shall be constructed with an uninterruptible power supply (UPS) and associated batteries or backup generator to sustain operation of the equipment at average power consumption rates for a minimum of four hours. The UPS shall include a remote management capability. DMS cabinets shall be constructed with the capability to connect portable generators for sustained operation of the DMS under average power consumption for 24 continuous hours. Equipment may be consolidated in common cabinets where feasible including with HOT equipment and associated shelters. Equipment cabinets shall be outside of the clear zone.

Construction of the communications network shall utilize compatible routing switches to provide Interoperability within the Gigabit network with industry standard non-proprietary routing protocols. Construction of communications network shall utilize static IP addresses and separate virtual local area networks (VLANs) for CCTV and DMS devices. Construction shall include full documentation of the network configuration including IP addresses, subnets, gateways, VLANS and associated devices/locations. Documentation shall also include physical network topology to the port level. All fiber optic cable shall be new, uniform, and tested on the reel before installation. All installed fiber optic cable shall be documented with as-built drawings.

Construction of conduits shall be performed so that one side of the roadway is favored for the placement of communications, ITS devices and power. Placement should provide for maintenance personnel to work outside the clear zone where possible. Power, ITS and communications conduits shall be separate and have separate pull boxes and splice boxes. Pull and splice boxes shall be marked to indicate their use and NCDOT as the owner. Underground cable markers shall be placed near the right of way line to identify the facilities and one-call locate information. Copper communications cable shall include placement of a trace wire for use during cable location operations. A spare two-inch conduit for power systems shall be provided for maintenance purposes. Two spare two-inch conduits for communications systems shall be provided for maintenance and future use by NCDOT. Drop cables from field devices to associated equipment cabinets do not require spare conduits. Conduits crossing roadways shall not cut or disturb the pavement during installation.

21.6 ITS Integration and Testing

Developer shall develop and submit an ITS Integration and Testing Plan (ITS ITP) to NCDOT for review and comment in accordance with the requirements of the CA Documents. The ITS ITP shall be submitted concurrent with Developer's final ITS plans Submittal. Thereafter Developer shall implement and, as required, update such ITS ITP as Developer or NCDOT determines is necessary to comply with the requirements of the CA Documents and Good Industry Practice. Developer shall perform system integration utilizing the systems engineering process. Test plans shall be utilized to document each device installation. Test plans shall be utilized to document stand-alone operations of each device installation, and the integration of the complete system of all field devices and the central control platform. The ITS ITP shall include at a minimum the following components:

- Factory Testing Plan;
- Fiber Optic Splicing and Testing Plan; and

- System Operational Test Plan.

Developer shall provide NCDOT no less than ten Business Days notice of the performance of all factory equipment testing, fiber optic splice testing and system operational testing, and shall allow and provide NCDOT reasonable access to such tests as required by the CA Documents.

Except for the observation period specified in Section 21.6.3, prior to substantial completion of each Project Section, Developer shall provide to NCDOT documentation of the satisfactory completion of all ITS tests required by Section 21.6 of the Technical Provisions.

21.6.1 Factory Testing Plan

Developer's Factory Testing Plan shall identify ITS components that will be tested at the factory and the type of test that will be conducted on such components. At the time of delivery such ITS components to the Project, Developer shall provide to NCDOT a Type 4 material certification in accordance with Article 106-3 of the Standard Specification.

21.6.2 Fiber Optic Splicing and Testing Plan

Developer shall submit a Fiber Optic Splicing and Testing Plan to NCDOT for review and comment, prior to beginning Work on the ITS. The Fiber Optic Splicing and Testing Plan shall include the following:

- location of all proposed fiber optic splices, including what is being spliced;
- location of all temporary fiber optic splices;
- scheduled date of splices and testing;
- tests to be performed;
- equipment to be used for the testing;
- calibration results of testing equipment; and
- list of Project contacts (including phone numbers) for Developer and NCDOT staff.

The Fiber Optic Splicing and Testing Plan shall be submitted with each final ITS plans Submittal that includes ITS information. The Fiber Optic Splicing and Testing Plan shall be updated as necessary with each design change affecting testing type and location.

Within ten days of completion of the splicing and testing of ITS Elements, Developer shall submit Project documentation and fiber optic test documentation to NCDOT, in accordance with Section 2.9 of the Technical Provisions.

21.6.3 System Operational Test Plan

Developer shall develop an ITS System Operational Test Plan including testing procedures and pass/fail requirements. Developer's System Operational Test Plan shall include at a minimum components such as:

- introduction:
    - purpose;
    - reference documents;
    - traceability matrix; and
    - points of contact.
- testing process and methodology:

    - test plan objectives;
    - testing methods;
    - assumptions:
        - source documents;
        - environmental needs;
        - training needs; and
        - testers.
    - problem identification and resolution;
    - test script;
    - issue tracking;
    - disposition of signed scripts and ITS final acceptance signature sheet; and
    - estimated schedule for testing and locations.
- System Operational Test Plan signature block (when all scripts are completed and passed).

Test scripts shall be a step-by-step description of the operator actions required to execute the test with a description of the expected outcome. Each test script will include a sign off block for the tester, NCDOT observer and an indication of pass, fail, could not be completed, accepted as is, and a comment area.

A testing log shall be created and maintained by Developer that includes items such as:

- unique issue number – for each issue noted for the test. A test may have multiple issues that were observed, in which case each issue is tracked separately;
- component – the affected part of the system, e.g., DMS, CCTV, Toll system Elements;
- Acceptance Test number and System Requirement number – this will include the "Acceptance" Test script number affected by this issue if using a test script verification method or System Requirement number if using other verification methods;
- date – the date the issue was observed;
- tester – the Person or persons that observed the issue;
- issue description – the step within the script that had an issue and a detailed description of the problem so that the issue can repeated;
- status – for example, Failed, Ready to Retest, Passed, Defer;
- severity – for example, Minor, Major, Critical; and
- script procedure issue – issues with the test procedure itself, not the software.

A 60-day ITS observation period shall be initiated immediately after Substantial Completion of each Project Section under live traffic conditions for such Project Section and a 60-day ITS observation period of the entire system shall be initiated immediately after Substantial Completion of the last Project Section under live traffic conditions. During the observation period, Developer shall respond to any mechanical, electrical, software, communications, or other malfunctions within two hours and make any needed repairs within eight hours. The 60-

day period is suspended during this time. If NCDOT determines in its sole discretion that the failure(s) was significant or recurring, corrective action shall be taken by Developer and another 60-day observation period shall be conducted.

An observation period stoppage shall be restarted under the following rules:

- a stoppage in the first 29 days shall be corrected and the observation period shall be restarted after the Defect is corrected at the point at which the stoppage occurred. For example, if the observation test is stopped on day three of the observation period, independently of the time it takes to correct the Defect, the observation period will resume after the Defect is corrected at day three of the 60 day observation period;
- a stoppage on day 30 through 60 shall be corrected and the observation period shall be restarted after the Defect is corrected at day 30 in the 60 day observation period.

Retesting will be based on Developer's description of the action required to fix the problem. Software changes will require more retesting than data changes.

Developer shall have current training on all testing equipment used. Developer shall provide documentary evidence that the instruments used for testing have been calibrated in accordance with the instrument manufacturer's specifications within the last 12 months. Developer shall have all testing equipment calibrated annually for the duration of the testing. Measurements recorded during the tests shall be supplied to NCDOT.

Developer shall have in its possession a certification of test device calibration in accordance with the American National Standards Institute (ANSI) guidelines. The testing device shall measure electrical and insulation characteristics of power and signal control cables, and calibration documentation of optical cable test equipment. ANSI guidelines call for annual calibration of test equipment.

Depending on the construction schedule, ITS components may be installed and made operational, and subsequently relocated. Such relocated components shall undergo all required tests after they are relocated.

21.7 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 21 of the Technical Provisions:

- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions;
- Technical Design Report as a part of the final ITS plans Submittal;
- Integration and Testing Plan concurrent with final ITS plans Submittal;
- notice of ITS test no less than ten Business Days prior to test;
- Project documentation and fiber optic test documentation within ten days of completion of the splicing and testing of ITS equipment; and
- documentation of the satisfactory completion of all ITS tests prior to Substantial Completion of each Project Section.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

22 TRAFFIC MANAGEMENT

22.1 General

Developer shall plan, develop, design, and implement traffic management on the Project in accordance with the requirements of this Section 22 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

22.1.1 Traffic Management Plan

Developer shall develop, implement, and maintain a Traffic Management Plan (TMP), which shall include at a minimum the traffic control plans for the Work, the Traffic Operations Plan, and the Incident Management Plan. The TMP shall include processes and procedures for identifying traffic management activities requiring communications in accordance with Section 3 of the Technical Provisions. Developer shall produce a TMP applicable for each phase of the Work, which impacts traffic. Developer may produce a TMP for portions of the Project smaller than a Project Section with NCDOT approval. The TMP shall include details of all planned traffic control devices, pavement marking, and signage applicable to each phase of Work. The information on the TMP shall be of sufficient detail to allow verification of design criteria and safety requirements, including typical sections, alignment, pavement marking layout, drop off conditions, and temporary drainage.

A Conceptual TMP shall be prepared by Developer prior to the TMP presenting Developer's approach to all areas covered under the TMP, including but not limited to hauling of materials to, from, and within the Project ROW. Developer shall submit the Conceptual TMP to NCDOT for review and comment. Developer shall allow 20 Business Days for NCDOT to review the Conceptual TMP.

Developer shall submit a revised Conceptual TMP to NCDOT for review and comment. Developer shall address NCDOT comments on the Conceptual TMP prior to commencing production of the TMP for each phase of Work.

The Traffic Management Plan shall include the following items, at a minimum:

- descriptions of the duties for all personnel with traffic management responsibilities;
- descriptions of the design methods to be used for temporary roadways and Structures including lighting, signing and pavement markings;
- procedures to identify and incorporate the needs of Emergency Service providers, law enforcement entities, and other related corridor users;
- methods and frequency of inspection and maintenance of all traffic control;
- descriptions of contact methods, personnel available, and response times for responses to any conditions needing attention during off-hours;
- procedures to modify the plans as needed to adapt to current Project circumstances;
- procedures to consult with NCDOT and other Governmental Entities;
- procedures to communicate TMP information to Developer's public information personnel and notify the public of maintenance of traffic issues;
- the procedures developed in the TMP shall be used to create the MOT plans;
- typical and critical cross-sections;
- major phases of Work and durations/schedule;

- sequence of construction and narrative;
- Lane Closures and durations including a Lane Closure analysis; and
- Road Closures and durations including a Road Closure analysis.

The TMP for O&M Work by Developer and any updates shall be submitted by Developer to NCDOT for review and approval 30 days prior to the anticipated date for the introduction of the traffic management measures covered by the plan. No traffic management measures shall be commenced until a TMP has been prepared by Developer and approved by NCDOT.

Developer's TMP for each phase of the Work shall include detail traffic control plans. Developer shall prepare plan sheets, notes, and details as per NCDOT's *Roadway Design Manual* and the North Carolina Manual on Uniform Traffic Control Devices. Developer shall prepare additional plan sheets such as cross sections, profiles, drainage structures, retaining wall details, and temporary sheet piling as necessary for proper construction and implementation of the traffic control plans. Developer shall submit the traffic control plans and any updates to NCDOT for review and approval 30 days prior to the anticipated date for the introduction of the traffic management measures covered by the plan. No traffic management measures shall be commenced until a TMP for such measures has been prepared by Developer and approved by NCDOT.

22.1.2 Road Closures

At a minimum, Developer shall maintain the existing traffic pattern for all roadways and comply with the Road Closure restrictions in Section 22 and Section 23 of the Technical Provisions and in the CA Documents. For avoidance of doubt, these requirements apply to any roadway, including ramps, loops, and connector roads.

When a Road Closure occurs, Developer shall reopen the Travelways at the required times to allow the traffic to pass.

Developer shall notify NCDOT no less than ten Business Days prior to a proposed Road Closure and obtain NCDOT approval. Such notice of proposed Road Closure shall identify the road, the precise location on the road, the operation for which the Road Closure is required, and the date(s) and time of the proposed Road Closure.

Developer shall not be allowed to close any roadway for any direction of travel for roads except during the times specified in Table 22-1. Any Road Closure shall only be allowed for the operations, times, and durations listed in this Section 22.1.2 of the Technical Provisions.

Except during the periods in Table 22-1, a median cross-over is not permitted even for operational use. However, a cross-over providing a minimum of one lane in each direction or temporary diversion of traffic to ramps on I-77, I-85, I-277 and NC 16 will be allowed for the purpose of Bridge demolition or girder installation or other Work when approved in the TCP during the times set forth in Table 22-1. Developer shall monitor the traffic flow during operation of the crossover and should a Traffic Backup extend to the advance warning signs, traffic shall be returned to the existing number of lanes in each direction until the Traffic Backup is eliminated.

Table 22.1
Permitted Road Closure Times for Certain Activities

ROAD NAME	ALLOWED CLOSURE TIME
All interstate routes, Brookshire Freeway (NC16), ramps, loops and flyovers connecting I-77 to I-277, I-85, I-485, US-21 NC-73, NC-150, Harris Blvd, Gilead Rd	Monday through Sunday 11:00 p.m. to 5:00 a.m.
All other roads	Monday through Friday 8:00 p.m. to 5:00 a.m. Saturday and Sunday 11:00 p.m. to 9:00 a.m.
Permitted Activities	
Traffic shifts to complete tie-in Work and placement of pavement markings and markers on Interstates and NC-16	15 minutes
Traffic shifts to complete tie-in Work and placement of pavement markings and markers on all other routes	30 minutes
Installation of overhead sign structures and/or work on existing overhead sign structures over Travelways on Interstates and NC-16	15 minutes
Installation of overhead sign structures and/or work on existing overhead sign structures over Travelways on all other routes	30 minutes
Bridge demolition and girder installation and removal on all routes	30 minutes

Except as otherwise approved by NCDOT in the TMP, the Road Closure shall be utilized only during times listed in Table 22.1, shall be used only for Work activities specified in Table 22.1 and shall not exceed the maximum Road Closure duration specified in Table 22.1.

22.1.3 Lane Closures, Shoulder Closures, and Lane Width Reduction

The requirements in Section 22.1.4 of the Technical Provisions shall be applicable to all Work performed until Substantial Completion of all Project Sections. Developer shall issue a Lane Closure Notice (LCN) to NCDOT and affected Governmental Entities ten Business Days prior to the publication of any notices or placement of any traffic control devices associated with Lane Closures or other change in traffic control requiring Lane Closures.

For a LCN for a non-NCDOT controlled facility, Developer shall secure approval in writing from the controlling Governmental Entity.

A LCN shall contain the estimated date, time, duration, and location of the proposed Work.

If an Emergency should occur, for NCDOT controlled facilities, a LCN shall be provided to NCDOT as soon as possible and in no later than two Business Days after the event. If an Emergency should occur, for non-NCDOT controlled facilities, Developer shall immediately notify the controlling Governmental Entity and shall notify NCDOT as soon as possible and in no later than two Business Days after the event. Developer shall keep NCDOT informed of any

and all changes or cancellations of proposed lane Closures prior to the date of their implementation.

Restrictions on Lane Closures include:

- Developer shall not install more than three miles of Lane Closures in any one direction on any roadway, measured from the beginning of the merge taper to the end of the Lane Closure;
- on multi-lane facilities, Developer shall not install more than two simultaneous Lane Closures in any one direction;
- Developer shall provide a minimum of five miles between Lane Closures, measured from the end of one Lane Closure to the first sign of the next Lane Closure;
- Developer shall not install more than one Lane Closure in either direction on a two-lane, two-way undivided facility;
- Developer shall remove Lane Closure devices from the lane when Work is not being performed behind the lane Closure devices or when a lane Closure is no longer needed;
- when barrier is placed on the Shoulder, Developer shall install Shoulder Closure signs and devices using NCDOT 2012 Roadway Standard Drawing No. 1101.04 in advance of the barrier;
- when personnel and/or equipment are working within 15 feet of an open Travelway, Developer shall close the nearest open Shoulder using NCDOT 2012 Roadway Standard Drawing No. 1101.04, unless the Work area is protected by an approved temporary traffic barrier or guardrail or as provided in Section 22 of the Technical Provisions;
- when personnel and/or equipment are working on the Shoulder adjacent to an undivided facility and within 5 feet of an open lane , Developer shall at a minimum close the nearest open lane using NCDOT 2012 Roadway Standard Drawing No. 1101.02, unless the Work area is protected by an approved temporary traffic barrier or guardrail or as provided in Section 22 of the Technical Provisions;
- when personnel and/or equipment are working on the Shoulder adjacent to a divided facility and within ten feet of an open lane, Developer shall at minimum close the nearest open lane using NCDOT 2012 Roadway Standard Drawing No. 1101.02, unless the Work area is protected by an approved temporary traffic barrier or guardrail, or as provided in Section 22 of the Technical Provisions;
- when personnel and/or equipment are working within a lane of travel of an undivided or divided facility, Developer shall at minimum close the lane using the appropriate roadway standard drawing from the NCDOT 2012 Roadway Standard Drawings. Developer shall conduct the Work so that all personnel and/or equipment remain within the closed lane(s); and
- Developer shall not perform Work involving heavy equipment within 15 feet of the edge of Travelway when Work is being performed behind a Lane Closure on the opposite side of the Travelway.

22.1.4 Lane Closure and Lane Width Reduction

The requirements in this Section 22.1.4 of the Technical Provisions shall be applicable to all Work performed until Substantial Completion of all Project Sections. At a minimum, Developer

shall maintain existing traffic patterns and shall not close a lane or shall not reduce the width of a lane to less than 11 feet during the period specified in Table 22.2 except as otherwise provided in the TMP and approved by NCDOT. When traffic is placed into the final configuration for any roadway, Developer shall maintain the final configuration and restrictions noted below are applicable.

Table 22.2

ROAD NAME	TIME RESTRICTIONS
one lane closed or reduced to width less than 11 feet on I-77 from South Terminus to MM 20, I-485, I-85, I-277, and Brookshire Frwy. (including ramps/loops)	Monday through Friday 5:00 a.m. to 10:00 p.m. Saturday and Sunday 9:00 a.m. to 8:00 p.m.
two lanes closed or reduced on I-77 from South Terminus to MM 20, I-485, I-85, I-277, and Brookshire Frwy. with three or more lanes in the direction and one lane closed or reduced to width less than 11 feet on I-77 from MM 20 to North Terminus	Monday through Friday 5:00 a.m. to 10:00 p.m. Saturday and Sunday 9:00 a.m. to 10:00 p.m.
one lane closed or reduced on all other routes	Monday through Friday 5:00 a.m. to 9:00 a.m. 3:00 p.m. to 8:00 p.m.

Developer shall not install, reset, and/or remove any traffic control device during the time restrictions listed above.

Except during Work on the existing HOV Lanes, Developer shall not allow or permit Lane Closures of the existing HOV Lanes at any time unless otherwise approved by NCDOT in writing. NCDOT will approve Closure of the HOV Lanes as a Permitted Closure during construction provided that Developer coordinates this activity with, and receives concurrence from, appropriate stakeholders and third parties (such as MUMPO technical staff and the Charlotte Area Transit System), provides such concurrence to NCDOT in writing, and satisfies all mitigation measures as may be identified by the appropriate stakeholders and third parties.

Except due to Incidents or Emergencies, unless otherwise approved by NCDOT writing, Developer shall not allow or permit Lane Closures or lane narrowing during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy on the roadways listed herein. Developer shall not close a lane or reduce the width of a lane to less than 11', impede traffic flow or alter the traffic flow on the aforementioned facilities. At a minimum, these requirements / restrictions apply to the period specified in Table 22.3 except as otherwise provided in the TMP.

Table 22.3

HOLIDAY or EVENT	RESTRICTION
New Year's	between the hours of 6:00 a.m. December 31st to 8:00 p.m. January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday then until 8:00 p.m. the following Tuesday.
Easter	between the hours of 6:00 a.m. the Friday before Easter and 8:00 p.m. the Monday after Easter.
Memorial Day	between the hours of 6:00 a.m. the Friday before Memorial Day to 8:00 p.m. the Tuesday after Memorial Day.
Independence Day	between the hours of 6:00 a.m. July 3rd and 8:00 p.m. July 5th. If Independence Day is on a Friday, Saturday or Sunday, between the hours of 6:00 a.m. Thursday before Independence Day and 8:00 p.m. Tuesday after Independence Day.
Labor Day	between the hours of 6:00 a.m. the Friday before Labor Day to 8:00 p.m. Tuesday after Labor Day
Thanksgiving	between the hours of 6:00 a.m. the Tuesday before Thanksgiving to 8:00 p.m. the Monday of the following week.
Christmas	between the hours of 6:00 a.m. the Friday before the week of Christmas Day and 8:00 p.m. the following Tuesday after the week of Christmas Day
NASCAR event at the Charlotte Motor Speedway	between the hours of 6:00 a.m. the Thursday before the 1st event until 8:00 p.m. the day after the last event
Carolina Panthers game played in Charlotte and Bobcats game played in Bobcats Arena	from three hours before the game to three hours after the game

22.1.5 Detours

Developer shall not utilize off-site detour of any highway for performance of construction or maintenance Work except as otherwise approved by NCDOT.

22.1.6 Hauling Restrictions

The requirements of Section 22.1.6 of the Technical Provisions shall be applicable to all Work performed from NTP2 until Substantial Completion of all Project Sections. Developer's TMP shall identify practices and processes for managing the safe ingress and egress of construction vehicles in the work zone.

All haul routes utilizing any street of a Governmental Entity shall be coordinated with the Governmental Entity and approved by both the Governmental Entity and NCDOT.

Developer shall keep traveled surfaces used in its hauling operations clear and free of dirt or other debris that would hinder safe traffic operation.

Developer shall conduct all hauling operations as follows:

- Developer shall not conduct any hauling operations against the flow of traffic of an open Travelway unless NCDOT has approved a temporary traffic barrier or guardrail to separate the traffic from the hauling operation;

- Developer shall not haul during the holiday and special events time restrictions listed in this Section 22 of the Technical Provisions, unless the hauling operation occurs completely behind temporary traffic barrier or guardrail and does not impact traffic operations;
- all entrances and exits for hauling to and from the work zone shall conform to the Roadway Standard Drawings. All hauling entrances, exits, and crossings shall be shown on the TMP. Haul vehicles shall not enter and/or exit an open Travelway at speeds more than ten mph below the posted speed limit;
- Developer shall coordinate the selection of the hauling access points with NCDOT who has final approval of the locations selected;
- hauling operations that perpendicularly cross a Travelway shall require Traffic Control and are subject to the time restrictions listed in Table 22.2 and Table 22.3; and
- multi-vehicle hauling (as defined in the *North Carolina Standard Specification for Roads and Structures Section* 1101-7) shall not be allowed ingress and egress from any open Travelway during the following time restrictions. The hauling time restrictions in Table 22.4 apply only where egress and/or ingress occur between the Work area and any Travelway of the roads specified in Table 22.4. Hauling operations that are conducted entirely behind a temporary traffic barrier or guardrail are allowed at all times and excluded from the time restrictions specified in Table 22.4.

Table 22.4
Multi-Vehicle Hauling Restrictions

For Multi-Vehicle Hauling Road Name Day and Time Restrictions
I-77, I-485, I-277, I-85, NC 16 (including associated ramps) Monday through Friday 5:00 a.m. to 8:00 p.m.
All other roadways Monday through Friday 6:00 a.m. to 9:00 a.m. 3:00 p.m. to 7:00 p.m.
For Single Vehicle Hauling Road Name Day and Time Restrictions
I-77, I-485, I-277, I-85, NC 16 (including associated ramps) Monday through Friday 6:00 a.m. to 9:00 a.m. 3:00 p.m. to 7:00 p.m.

22.2 Design Requirements

Developer's TMP shall address the minimization of impacts to the traveling public, neighborhoods, and businesses in the corridor. The primary consideration of the TMP must be safety of the traveling public and employees of Developer, Developer-Related Entities, NCDOT,

and other parties working in the corridor. Developer shall develop a TMP that maintains all types of traffic (where permitted, motorists, bicyclists, and pedestrians within the public right of way, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) as defined by the Manual for Uniform Traffic Control Devices (MUTCD).

22.2.1 Design Constraints

Developer design shall comply with mobility and design constraints as follows:

- maintain the same number of existing lanes, including auxiliary lanes using, at a minimum, 11-foot wide lanes on all roadways, except as otherwise allowed by the lane Closure time restrictions. Maintain four-foot wide inside and outside paved Shoulders in each direction on I-77, I-485, I-277, NC 16, I-85 unless temporary barrier is placed on the paved Shoulder. Shoulder under Structures only, maintain a minimum two-foot wide paved Shoulder adjacent to the Travelway and maintain a minimum one-foot wide paved Shoulder adjacent to auxiliary lanes/ramps;
- if Developer's design requires replacement of Hamilton Street Bridge (Bridge No. 590335), maintain a minimum of two 10-foot wide lanes and one five foot sidewalk on during construction of the replacement Bridge. No permanent easement shall be permitted or permanent ROW proposed for acquisition by Developer east of the eastern edge of the existing Bridge; however, a temporary easement may be permitted during Construction, at NCDOT discretion. Construction activity shall not encroach or impact existing parking spaces along the southeast or southwest quadrants of this area. Construction activity shall not encroach or impact Greenville Park and Walter G. Byers Elementary School on the north side of this area;
- maintain a minimum of two nine-foot wide lanes and two two-foot offsets from the barrier system during construction of the replacement Griffith Street Bridge (Bridge No. 590364);
- maintain a minimum of 11-foot wide lanes and existing Shoulder widths on all other roadways not defined above and maintain existing lane and Shoulder widths on all two-lane roadways;
- design, construct and maintain positive median cross-over protection for all divided roadways at locations required by then NCDOT *Roadway Design Manual*;
- all temporary traffic control devices, including barrier rails, shall be placed/located a minimum two foot offset (shy distance) from the edge of Travelway;
- temporary barrier rails shall be placed on paved surface and, unless anchored, shall have no less than two inch of paved surface behind the temporary barrier rails;
- Developer's TMP shall clearly designate all temporary reductions in speed limits. Unless otherwise listed in CA Documents and/or approved by NCDOT, the Design Speed for temporary alignments of Interstate, US and NC routes shall not be lower than the current posted speed limit. The minimum allowable Design Speed for temporary alignments on secondary roads shall be the higher of ten mph below the posted speed limit or 35 mph;
- temporary traffic shifts requiring vertical grades shall be considered a temporary alignment;
- for temporary traffic patterns, including but not limited to traffic shifts, merges and temporary alignments that will remain in place for a period longer than three days, there

shall be no breaks in the superelevation except when specifically justified by Developer's Final Traffic Control Design Documents and approved by NCDOT. Excluding the aforementioned temporary traffic patterns, changes in pavement cross slopes shall only occur on a lane line or lane midpoint and shall not exceed five percent;

- temporary traffic patterns shall not split traffic traveling in the same direction (i.e. separation by any type of barrier, Bridge piers, existing median, etc.);
- Developer shall provide safe access for wide-loads and oversized permitted vehicles through the work zone. Safe access shall entail, but is not limited to, a sufficient pavement Structure as described in Section 11 of the Technical Provisions, required vertical clearance, and minimum clear zone widths as per Table 22.5 of the Technical Provisions.
- Developer shall provide a smooth pavement surface for traffic at all times and shall not place traffic on lanes containing rumble strips; and
- Developer shall utilize Changeable Message Signs (CMS) as follows:
    - Developer shall develop and implement a master plan detailing the location of CMS along the Project and other roadways to display pertinent traffic information relevant to work zone conditions and alternative routes. The CMS master plan shall be submitted with the Final Traffic Control Design Documents. These CMSs shall be in addition to the existing devices provided by NCDOT and operated by the Metrolina Regional Traffic Management Center (MRTMC). Developer shall coordinate with the MRTMC if and when information relevant to Developer's work zone activities needs to be displayed;
    - all CMSs shall have the functionality to be controlled remotely by the MRTMC and operated in the field by Developer. Dynamic Message Signs currently use Daktronics Vanguard software. NCDOT is currently working on a project to replace existing ITS device control software with Statewide Advanced Transportation Management System software for communication with DMS and CCTVs. Developer shall coordinate with the NCDOT Smartlink contractor when such project is awarded in order to provide the required functionality. No construction shall begin until CMSs are properly communicating with the MRTMC. All CMS information should be included in the Public Information Plan and coordinated with the MRTMC;
    - for alternate routes, CMS locations and CMS messages shall be reviewed and approved by NCDOT and coordinated with the MRTMC prior to incorporation;
    - within the Project Right of Way, Developer shall provide and operate a minimum of one CMS per direction on on-ramps from I-277, I-77, I-85, I-485 and NC 16 that provides general construction activity information about the construction activities;
    - Developer shall show approximate CMS locations, along with the respective messages that have been coordinated with the MRTMC, in the TMP; and
    - when a CMS is placed within the clear zone specified in Table 22.5, provide proper delineation and protection for the traveling public.

Table 22.5

ROADWAY	MINIMUM CLEAR WIDTH
I-77, I-485, I-85, I-277, NC 16	20 feet
All other roadways, including ramps and loops	18 feet

22.2.2 Access

Developer shall maintain access to all adjacent streets, residences, schools, bus stops, mass transit facilities (park and ride lots), emergency services, businesses, parks and other public and private properties at all times. Current bicycle and pedestrian access and mobility shall be maintained to all roadways where it currently exists. Access to all existing transit stop locations shall be maintained during construction or alternative locations that are accepted by NCDOT shall be provided and specified within Developer's TMP and shall be approved by NCDOT. Developer shall coordinate with the Charlotte Area Transit System (CATS) and other transit agencies within and in the vicinity of the Project Right of Way for all traffic control phasing that will affect existing transit stops or transit routes.

22.2.3 Signing Requirements

Developer shall maintain signing continuity on all active roadways within or intersecting the Project at all times.

Developer shall install advance work zone warning signs when Work is within 100 feet from the edge of Travelway and no more than three days prior to the beginning of construction.

Developer shall install and maintain all emergency detour signing including covering or removing all detour signs within and off the Project Right of Way when a detour is not in operation.

Developer shall ensure proper signing (including but not limited to guide signs) on all roads at all times during construction. Proper signing includes all temporary and existing signs having messages conforming to the requirements of the MUTCD Permanent Signing Section. Developer shall include a Temporary Signing Plan in the traffic control plans.

22.2.4 Traffic Barrier Requirements

Developer shall use temporary traffic barrier that is on the NCDOT Approved Products List. Use of temporary barrier system shall be shown on the Conceptual TMP. Developer shall design the temporary barrier systems placement in accordance with the following requirements:

- perform an Engineering Study to determine the need for temporary barrier that considers clear zone distances, roadway geometry, anticipated construction year traffic volumes, traffic speeds, roadside geometry, workers safety, pedestrian safety, etc. in accordance with FHWA Final Rule on Temporary Traffic Control Devices (23 CFR 630 Subpart K). Developer shall adhere to the FHWA *Roadside Design Guide* to determine the length, flare rate, and clear zone. Developer shall adhere to the possible deflection of the proposed temporary barrier system in accordance with NCHRP-350 deflections from crash testing. Providing less than the minimum deflection distance shall require the use of anchored temporary barrier systems in accordance with the NCDOT Standard Specifications for Roads and Structures;
- when temporary barrier is used continuously on the right side of a direction of travel with three or more lanes for a distance greater than two miles, provide a paved motorist breakdown area every two miles, unless the useable right Shoulder width is ten feet or

greater. All breakdown areas shall be a minimum of 1,000 feet long and 14 feet wide;

- when temporary barrier is used continuously on both sides of a direction of travel for a distance greater than one mile, provide a paved motorist breakdown area on the right side of the Travelway every mile, unless the useable right Shoulder width is ten feet or greater. All breakdown areas shall be a minimum of 1000 feet long and 14 feet wide;
- Developer shall not place temporary barrier systems utilized for traffic control on unpaved surfaces;
- install temporary traffic barrier system a maximum of two weeks prior to beginning Work in any location. Once the temporary traffic barrier system is installed at any location, proceed in a continuous manner to complete the proposed Work in that location;
- place all temporary barrier used for traffic control directly on an asphalt or concrete surface. Developer shall not place temporary barrier systems utilized for traffic control on unpaved surfaces;
- once the temporary traffic barrier system is installed and no Work has been or will be performed behind the temporary traffic barrier system for a period longer than two months, remove the temporary traffic barrier system or reset the temporary traffic barrier system to provide a minimum Shoulder width of ten feet when required to protect traffic from a hazard;
- protect the approach end of temporary traffic barrier system at all times during the installation and removal of the barrier by either a truck mounted impact attenuator (maximum 72 hours) or a temporary crash cushion;
- protect the approach end of temporary traffic barrier system from oncoming traffic at all times by a temporary crash cushion unless the approach end of temporary traffic barrier system is offset from oncoming traffic as per Table 22.6:
- install temporary traffic barrier system with the traffic flow, beginning with the upstream side of traffic. Remove the temporary traffic barrier system against the traffic flow, beginning with the downstream side of traffic;
- install drums to close or keep closed tangent sections of the roadway until the temporary traffic barrier system can be placed or after the temporary barrier system has been removed. The distance, in feet, between drums shall be no greater than twice the numerical value of the posted speed limit (in miles per hour);
- Developer shall install temporary traffic barrier system in a manner that provides a minimum of 200 feet clear distance from the end of the pavement marking taper to the beginning of the barrier taper. When existing geometrics prevents installation of temporary traffic barrier system in a manner that provides a minimum of 200 feet clear distance from the end of the pavement marking taper to the beginning of the barrier taper, Developer shall identify the variance from the requirement and specify the maximum duration for the variance in the traffic control plans; and
- Developer shall be responsible for providing proper connection between the existing Bridge rail and the temporary barrier system and include this information in the appropriate plans.

Table 22.6

POSTED SPEED LIMIT (MPH)	MINIMUM BARRIER OFFSET (FEET)
40 or less	15
45 – 50	20
55	25
60 mph or higher	30

22.2.5 Traffic Control Device Requirements

Developer shall use traffic control devices that are on the NCDOT Approved Products List.

Channelizing device spacing shall not exceed a distance in feet equal to twice the posted speed limit. Channelization devices shall be spaced ten feet on-center in intersection radii.

Channelization devices shall be located three feet off the edge of an open Travelway, when lane Closures are not in effect.

Place sets of three drums perpendicular to the edge of the Travelway on 500-foot centers when unopened lanes are closed to traffic. These drums shall be in addition to channelizing devices.

22.2.6 Pavement Edge Drop Off Requirements

Within the Project widening limits, Developer shall backfill at a 6:1 slope up to the edge and elevation of the existing pavement and/or use proper traffic control setup to protect traffic from the drop off as follows:

- elevation differences that exceed two inches on roadways with posted speed limits of 45 mph or greater and a paved Shoulder four-foot wide or less;
- elevation differences greater than three inches on roadways with posted speed limits less than 45 mph and with a paved Shoulder four-foot wide or less;
- refer to the current AASHTO Roadside Design Guide for proper treatment of all other conditions;
- do not exceed a difference of two inches in elevation between adjacent open lanes of traffic for nominal lifts of one and a half inches; and
- install advance warning “UNEVEN LANES” signs (W8-11) 1,000 feet in advance of and a minimum of every half mile throughout any area where pavement is uneven.

22.2.7 Temporary Pavement Markings, Markers and Delineation

Developer shall design all temporary pavement delineation to comply with the same design and construction requirements as that of the permanent delineation except that the pavement marking materials shall comply with the requirements in this Section 22.2.7 of the Technical Provisions. Developer shall install temporary pavement markings that are the same width as existing on all roadways or within the lane width minimum requirements listed in the Technical Provisions. For roadways that do not have existing pavement markings, Developer shall install pavement markings that are the same width required for the final configuration markings in Section 17 of the Technical Provisions.

Developer shall install temporary pavement markings and temporary pavement markers on the interim surface or temporary pattern. The minimum requirements for pavement marking shall

be paint with reflective beads and the minimum requirements for markers shall be raised temporary markers.

Developer shall use any type of pavement markings on the NCDOT Approved Products List for temporary traffic pattern. However, Developer shall maintain a minimum retro-reflectivity for pavement marking on all roads (existing and temporary) at all times during construction, as follows:

- White: 125 mcd/lux/m^2
- Yellow: 100 mcd/lux/m^2

Prior to opening a Travelway to traffic on facilities that the installation of a proposed monolithic island has not occurred, outline the location of the proposed monolithic island with the proper color pavement marking and delineate the proposed monolithic island with drums.

Developer shall tie proposed temporary and final pavement marking lines to existing pavement marking lines. Remove/replace any conflicting/damaged pavement markings and markers by the end of each day's operation.

Developer shall not place temporary markings, other than Cold Applied Plastic Type 4, on any final asphalt pavement surface unless the temporary markings are placed in the exact location of the final pavement marking.

Developer shall remove existing pavement markings that conflict with temporary or permanent pavement markings. Developer shall remove all conflicting markings or markers prior to shifting traffic to a new pattern.

Developer shall make all modifications to existing pavement markings, markers and/or signing located outside the Project Right of Way that are necessitated by Developer's TMP.

22.2.8 Temporary Signals

Developer shall develop and implement a Temporary Signal Plan for each traffic shift at all current existing signalized intersections. In the event that the TMP warrants modifications to existing signals outside the Project Right of Way, Developer shall prepare and submit a temporary signal design for this modification. Developer shall not modify any existing signals without prior approval by NCDOT.

22.2.9 Miscellaneous

Developer shall provide portable temporary lighting to conduct night Work in accordance with the NCDOT 2012 Standard Specifications for Roads and Structures.

Developer shall maintain existing lighting levels, at a minimum, throughout the construction of this Project.

Developer shall provide proper drainage within the work zone.

Developer shall use law enforcement officers to maintain traffic through the Work area and/or at signalized intersections. Developer shall be responsible for coordinating with the law enforcement agency for the use of law enforcement officers. Developer shall only utilize officers who are outfitted with law enforcement uniforms and marked vehicles, which are equipped with proper lights mounted on top of the vehicle and agency emblems. Developer shall address the use of law enforcement officers in the technical proposal. However, at a minimum, law enforcement officer(s) shall be used in the following situations:

- during installation and removal of lane Closures on I-77, I-85, I-485, NC 16 and I-277;

- while working in the vicinity of signalized intersections; and
- during all Road Closures at any road.

Developer shall identify the need for a “No Parking/Tow Away Zone” ordinance on I-77, I-85, I-485, NC 16, and I-277 in the TMP. If approved, NCDOT will issue a “No Parking/Tow Away Zone” ordinance for the work zone on roadways identified by Developer. Developer shall provide and install proper signing for the “No Parking/Tow Away Zone” as follows:

- 1000 feet in advance of the “Begin Road Work” signs;
- on all on-ramps within the Project Right of Way; and
- a minimum of every 3000 feet in each direction.

Developer shall identify the need for a “$250 Speeding Penalty” ordinance on I-77, I-85, I-485, and I-277. If approved, NCDOT will issue a “$250 Speeding Penalty” ordinance for the work zone on roadways identified by Developer.

NCDOT may consider a Variable Speed Reduction ordinance for I-77, I-85, I-485, and I-277; provided the Project meets or exceeds the required criteria (See Guidelines for Work Zone “Variable” Speed Limits for NC Highway Construction and Maintenance Activities on High Speed Facilities). Developer shall identify the need for a Variable Speed Reduction ordinance; if approved, NCDOT will issue a Variable Speed Reduction ordinance for the work zone on roadways identified by Developer. Developer shall provide and install proper signing for such ordinance.

If Developer’s TMP cannot be designed to eliminate the need for a temporary speed reduction on I-77, I-85, I-485, and I-277, Developer shall include with the TMP a temporary speed reduction ordinance request to NCDOT that states why the ordinance is needed, why the TMP cannot be designed to avoid the need, and an engineering study that justifies such need. Upon receipt of the formal request, Developer shall allow six weeks for the Speeding Penalty Ordinance to be approved.

Developer shall design, install, maintain, and remove all required temporary shoring.

22.2.10 Additional Traffic Control Design Considerations

At NCDOT’s sole discretion and approval, Developer may submit a request to Work outside the hours specified above for lane and roadway Closures and for the hauling restrictions by providing an analysis demonstrating the viability of the request. Closures of longer durations may require a review of plans and public outreach. These items must be justified through documentation that demonstrates an acceptable level of service, access to abutting and corridor land uses, public safety impacts, and what the impacts would have on accelerating the opening of additional capacity.

22.3 Construction Requirements

Construction shall be in accordance with Developer’s TMP, the manufacturer’s directions or recommendations where applicable, the adopted applicable standards and specifications and the applicable provisions. These requirements shall apply throughout the Project.

22.3.1 Developer Responsibility

When Developer’s traffic control operations do not meet the intent of Developer’s TMP or any specific traffic control plans, in the sole discretion of NCDOT, Developer shall immediately revise or discontinue such operations to correct the deficient conditions.

Developer shall provide NCDOT the names of the Travel Demand Manager and support personnel, and the phone number(s) where they can be reached 24 hours per day, seven days per week.

22.3.2 Traffic Control Supervisor

Developer shall furnish a Traffic Control Supervisor meeting the requirements of Section 2.14.2.13 of the Technical Provisions. Developer's Traffic Control Supervisor shall be on the Project site overseeing all Road Closures and median crossover operations to ensure traffic control devices are properly installed and adjusted as necessary. Developer's Traffic Control Supervisor shall also make necessary changes to the traffic control operations and aid the Travel Demand Manager in the monitoring of traffic queuing.

22.3.3 Travel Demand Manager

Developer shall furnish a Travel Demand Manager meeting the requirements of Section 2.14.2.14 of the Technical Provisions. The Travel Demand Manager shall coordinate with the Traffic Control Supervisor in the field and be available or on call 24 hours a day, seven days a week. The Travel Demand Manager for the Project shall be capable of performing the following:

- direct/make any necessary changes in the traffic control operations in a timely and safe manner;
- coordinate and cooperate with traffic control supervisors of adjacent, and overlapping construction projects, as well as construction projects in proximity to the subject project;
- coordinate and cooperate with MRTMC to ensure proper messages are displayed on the CMSs and DMSs;
- attend and lead all scheduled traffic related meetings, as required by the Engineer of Record;
- monitor traffic delays and backups within the work zone and the network that is affected by the presence of the work zone;
- coordinate all public information and outreach effort; and
- coordinate with law enforcement, first responders, and other State agencies during Emergencies.

22.3.4 Traffic Pattern Alterations

Developer shall notify NCDOT in writing at least 21 calendar days prior to any traffic pattern alteration.

22.4 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 22 of the Technical Provisions:

Specifically, Developer shall submit to NCDOT:

- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions;
- Lane Closure Notice (LCN) ten Business Days prior to the publication or implementation; and
- Road Closure Notice (RCN) ten Business Days prior to the publication or implementation.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

23 OPERATIONS, MAINTENANCE AND REHABILITATION

23.1 General Obligations

Developer shall perform the O&M Work within the Project Right of Way as shown in Exhibit 9 of the Agreement and perform the O&M Work on any Project Elements that may be installed by Developer outside the Project Right of Way beginning on March 31, 2015 and until the end of the Term, in accordance with the requirements of this Section 23 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

The Project shall be monitored, operated and maintained 24 hours per day, seven days per week in accordance with the CA Documents. In particular, Developer shall provide Incident Response/Emergency Response and Emergency repair 24 hours per day, seven days per week in accordance with the Incident Management Plan and applicable Law. Developer shall provide the appropriate staff levels for these hours of operation and be available to assume these responsibilities from March 31, 2015 through the end of the Term.

NCDOT may perform a condition assessment review at any time at its sole discretion. NCDOT may periodically perform independent assessments and quality assurance reviews by inspecting repairs and other maintenance activities recently completed by Developer. In addition, NCDOT may perform field reviews of completed Work for quality and completeness. All records of the O&M Work performed by Developer shall be made available to NCDOT for review at any time during the Term upon at least forty-eight hours notice.

The O&M Work described in this Section 23.1 of the Technical Provisions will be subject to all requirements set forth in Table 23.1 for O&M During Construction and Table 23.2 for O&M After Construction. The Cure Periods and Fast Cure Periods shown in Table 23.1 and Table 23.2 will begin in accordance with Article 18 of the Agreement. Noncompliance Points and liquidated damages will be assessed for Noncompliance in accordance with the CA Documents and in particular Table 23.1 and Table 23.2 and Exhibit 14 of the Agreement.

23.1.1 Developer O&M Work Responsibility

23.1.1.1 O&M During Construction

From March 31, 2015 until Substantial Completion of the applicable Project Section, Developer's O&M Work responsibilities shall be as set forth in Section 23.1.1.2 of the Technical Provisions, except as follows.

For those Elements which are the responsibility of NCDOT under clauses (b), (c), (d), (e), (f) and (g) of Section 23.1.1.2 of the Technical Provisions below, if Developer replaces, widens, modifies or otherwise alters any of those Elements from March 31, 2015 until Substantial Completion of the applicable Project Section, Developer shall assume all O&M Work responsibilities on such Elements.

23.1.1.1.1 Asset Condition Survey Prior to Developer O&M Work Responsibilities

No less than 30 days prior to March 31, 2015, NCDOT will enlist a qualified independent third party inspector, at NCDOT's expense, to undertake an asset condition survey of all Elements within the Project Right of Way, in order to identify any pre-existing conditions that do not meet the minimum Performance Requirements set forth in Table 23.1 prior to Developer's O&M Work responsibilities beginning on March 31, 2015. Developer and NCDOT shall both agree upon and approve of the independent third party inspector to be used for the asset condition survey.

For all pre-existing conditions identified in the asset condition survey which do not meet the minimum Performance Requirements set forth in Table 23.1, the independent third party inspector shall determine if the pre-existing condition presents a safety issue or otherwise potentially hazardous situation.

If the pre-existing condition does not present a safety issue or otherwise potentially hazardous situation, Developer shall have a 180 day grace period, beginning on March 31, 2015, upon which to perform the necessary O&M Work to rectify the pre-existing condition and meet the minimum Performance Requirements before the Cure Period and assessment of Noncompliance Points set forth in Table 23.1 shall begin to apply.

If the pre-existing condition is determined to present a safety issue or otherwise potentially hazardous situation, and for any pre-existing condition that occurs between the time of the asset condition survey and March 31, 2015, Table 23.1 shall apply in its entirety immediately upon the beginning of Developer's O&M Work responsibilities on March 31, 2015.

23.1.1.2 O&M After Construction

After the Substantial Completion Date of the applicable Project Section, Developer shall be responsible for all O&M Work on the Project Elements, with the exception of the following, which shall be the responsibility of NCDOT:

(a) Renewal Work on NCDOT Retained Elements, subject to the conditions and limitations set forth in Section 23.1.7 of the Technical Provisions;

(b) O&M Work on all Bridges and roadways carrying non-freeway traffic over the HOT Lanes;

(c) O&M Work on all Bridges and roadways carrying I-85 and I-485 traffic, including ramps, loops, and collectors, beginning at the back of gore at I-77;

(d) O&M Work on all Bridges and roadways carrying NC 16 traffic north of I-77, including ramps, loops, and collectors, beginning at the back of gore at I-77;

(e) O&M Work on the following Bridges on I-277:

i. Bridge #590332 – NC Music Factory / Railroads;

ii. Bridge #590330 – N. Graham St.;

iii. Bridge #590328 – N. Church St.;

iv. Bridge #590327 – N. Tryon St.;

v. Bridge #590326 – N. College St.;

vi. Bridge #590322 – Undesignated Road / Old Railroad; and

vii. Bridge #590320 – N. Brevard St.;

(f) O&M Work on the box culvert Structure (Structure #590288) over Irwin Creek located 0.55 miles north of I-277 junction with I-77;

(g) O&M Work on the outside causeway slopes at Lake Norman, subject to the conditions and limitations set forth in this Section 23.1.1.2 of the Technical Provisions; and

(h) Winter Maintenance activities on both the General Purpose Lanes and HOT Lanes.

For the purpose of clauses (b), (c), (d) and (e) above, the Bridges and roadways include drainage systems, sidewalks, rails, barriers, signs, delineators, and other traffic devices immediately adjacent to and for use by travelers on such Bridges and roadways.

For the purpose of clause (g) above, the outside causeway slopes at Lake Norman are limited to outside the outside guardrails on the causeway. NCDOT will be responsible for all maintenance and remedial work necessary to maintain the stability of the earthen causeway embankment slopes, including rock plating thereof. However, at any time throughout the Term, NCDOT may request Developer to perform this work through a Change Order in accordance with Section 14.1 of the Agreement. Developer shall be responsible for all other O&M Work on the outside causeway slopes throughout the Term, including but not limited to, vegetation control, signage, and litter and debris removal.

For avoidance of doubt, Developer shall be responsible for all O&M Work on all Bridges carrying the HOT Lanes and General Purpose Lanes on I-77 within the Project ROW and all other Project Elements within the Project ROW, as well as O&M Work on Project Elements installed by Developer outside the Project ROW and necessary for the operation of the Project, with the exception of those listed in this Section 23.1 which shall be the responsibility of NCDOT.

The limit of the General Purpose Lanes shall be as specified in clause (a) of the definition of NCDOT Retained Elements in Exhibit 1 of the Agreement. Developer shall establish a self-monitoring program in order to ensure a safe and reliable Highway system and operate and maintain the Project with the main objectives of maximizing public safety, reliability, and Highway availability. Developer shall coordinate, plan, and perform the O&M Work required under the CA Documents in a manner that will provide safe conditions for the operations and maintenance staff, Emergency Response personnel, and the traveling public using the Project, while minimizing traffic disruptions.

23.1.2 Specifications, Standards, Manuals and Guidelines

Developer shall comply with the most recent versions of the Specifications, Standards, Manuals, and Guidelines, including, but not limited to, those provided in Book 3 and all other CA Documents.

23.1.3 Performance Measures

23.1.3.1 Noncompliance Point System

The occurrence of Noncompliance Events can trigger Noncompliance Points, as well as liquidated damages in accordance with the CA Documents. Noncompliance with the minimum Performance Requirements identified in Table 23.1 for O&M During Construction and Table 23.2 for O&M After Construction shall be assigned Noncompliance Points as per the Noncompliance Event Classification set forth in Table 23.4 below and as described in Article 18 of the Agreement.

Table 23.4

Noncompliance Event Classification	Points
A	1
B	2
C	3
D	4
E	5

23.1.3.2 Construction Noncompliance Events

Construction Noncompliance Events shall result from the failure to meet the minimum Performance Requirements set forth in Table 23.1 for all O&M Work performed by Developer. In the event of any Construction Noncompliance Event, NCDOT may schedule a meeting with Developer, at Developer's expense, to discuss the reason for Noncompliance and action required to mitigate future occurrences of the Noncompliance.

23.1.3.3 O&M Noncompliance Events

O&M Noncompliance Events shall result from the failure to meet the minimum Performance Requirements set forth in Table 23.2 for all O&M Work performed by Developer. In the event of recurring O&M Noncompliance Events, NCDOT may schedule a meeting with Developer, at Developer's expense, to discuss the reason for Noncompliance and action required to mitigate future occurrences of the Noncompliance.

23.1.4 Operations & Maintenance Plan

Developer shall develop and implement an O&M Plan, which shall initially address O&M During Construction and for each Project Section, be updated during the last annual update cycle that is at least 45 days prior to the first Substantial Completion Date to address O&M After Construction, including Developer's O&M Work related to the ETCS.

Developer shall submit the draft O&M Plan to NCDOT for review and approval within 45 days after NTP1. Developer shall submit the final O&M Plan to NCDOT for review and approval within 90 days after NTP1. The O&M Plan shall be completed in accordance with the requirements set forth in this Section 23 of the Technical Provisions. Within 45 days prior to the beginning of each Fiscal Year after NTP1, Developer shall update the O&M Plan and submit it to NCDOT for review and approval. Each update of the O&M Plan shall include changes to operating protocols, agreements and interactions with other entities, and indicate revised operating requirements for equipment.

The O&M Plan for all Developer's O&M Work (O&M During Construction and O&M After Construction), including O&M Work related to the ETCS, shall include, at the minimum, the following:

- inventory with location and clear description of all Project Elements, including Highway assets, facilities, ITS systems, ETCS, and equipment, within and outside the Project Right of Way to be operated and maintained by Developer;
- description of Developer's approach to inspection, Routine Maintenance, Planned Maintenance, Renewal Work, and other maintenance services performed by Developer;
- a staff organization chart and staffing plan including all positions, qualifications, training and certification processes, Work locations, Work hours, and contact details required for the O&M Work;
- details of Contractors employed to undertake O&M Work;
- the Operations Manual and Maintenance Manual for the O&M Work;
- Developer's self-monitoring processes, including a list of the procedures to be used for all activities associated with Developer's O&M Work, including Routine Maintenance, Planned Maintenance and other maintenance services, Renewal Work, ITS systems and monitoring, Emergency Response, Incident Response requirements, and ETCS as detailed in Table 23.1 and Table 23.2;

- method of tracking, reporting and calculating Noncompliance Points, including Construction Noncompliance Events and O&M Noncompliance Events, liquidated damages, and Closures, including Permitted Closures and Unavailability Events;
- description of Developer's approach to quality management, quality assurance, and quality control;
- description of Developer's approach to safety and security for the O&M Work;
- description of Developer's approach and assumptions for the Renewal Work performed by Developer and equipment/vehicle replacement, including life cycles and Renewal Work Schedule;
- assessment or management method that is designed to maintain sign retroreflectivity per Section 2A.08 of the MUTCD titled Maintaining Minimum Retroreflectivity;
- operating and maintenance procedures, including monitoring, for the Project's ITS systems;
- operating and maintenance procedures for the Project's ETCS to meet the requirements set forth in Section 24 of the Technical Provisions;
- description of Developer's approach to coordinate with NCDOT for all permit and inspection processes;
- description of Developer's approach to obtaining all Governmental Approvals required for the O&M Work including any revision, modification, amendment, supplement, renewal or extension thereof;
- description of Developer's approach to Emergency Response, and Incident Response, including coordination with required third parties;
- a list with addresses and phone numbers for all the facilities that will be used by Developer, including any off-site storage or maintenance facilities;
- a list of vehicles, tools, spare parts and Incident Response and other major equipment furnished by Developer to support the O&M Work;
- Vegetation Management Plan in accordance with Section 13 of the Technical Provisions;
- Landscape Maintenance Plan in accordance with Section 15 of the Technical Provisions;
- the O&M Work activities planned for next 12 months, on a monthly basis; and
- guidelines and procedures for the efficient, coordinated, and consistent implementation of the Safety Plan, Transition and Coordination Plan, Traffic Incident Management Plan, Traffic Management Plan, Emergency Response Plan, and any other plan required for the performance of the O&M Work.

23.1.4.1 Operations Manual

Developer shall develop and submit, as part of the O&M Plan, a detailed Operations Manual based on its O&M Work. This Operations Manual shall be submitted to meet the requirements set forth in the CA Documents and shall include information regarding the procedures for O&M During Construction and O&M After Construction. The Operations Manual shall be used by Developer's operations staff, including ETCS operations staff, and shall be updated in accordance with the requirements set forth in this Section 23 of the Technical Provisions to indicate the operations requirements for the Highway assets, equipment, and systems as they

are revised, upgraded and/or replaced. The Operations Manual shall be complete and include, at a minimum, the following requirements:

- a list of operations procedures and protocols, including a schedule of routine operations tasks and the required frequency;
- a contact list of the various entities and agencies, including NCDOT, that the operations staff will require coordination with, including their contact information (contact person, address, e-mail address, telephone numbers, website address);
- a contact list of Developer's key staff who will be coordinating with NCDOT and other various entities and agencies, including their contact information (contact person, address, e-mail address, telephone numbers, website address);
- operating protocols, agreements and interactions with other entities such as NCDOT, municipalities, counties, Emergency responders, police, fire and any other similar Governmental Entity;
- copies of all operations forms and checklists and associated procedures for monitoring and evaluation, including Construction Noncompliance Event and O&M Noncompliance Event logs, Noncompliance logs related to the performance of the O&M Work performed by Developer, and logs of Closures, including Permitted Closures and Unavailability Events;
- policies and procedures for handling personal injury or public safety concerns;
- steps and procedures for managing traffic during O&M Work, Closures, and third party events, including coordination with third parties for such events;
- established procedures for external communications; and
- approach and procedures to response, remediation, and clean-up efforts associated with Incidents, and in particular traffic Incidents, fuel spills, Hazardous Materials or other contamination causing events.

23.1.4.2 Maintenance Manual

Developer shall develop and submit as part of the O&M Plan, a detailed Maintenance Manual based on its O&M Work. This Maintenance Manual shall be submitted to meet the requirements set forth in the CA Documents and shall include information regarding the maintenance procedures for O&M During Construction and O&M After Construction. The Maintenance Manual shall be used by Developer's maintenance staff, including the ETCS maintenance staff, and shall be updated in accordance with the requirements set forth in this Section 23 of the Technical Provisions to indicate the maintenance requirements for the Highway assets, equipment, and systems as they are revised, upgraded and/or replaced. The Maintenance Manual shall be complete and include the following minimum requirements:

- a list of Routine Maintenance and Planned Maintenance procedures and required frequencies for all Highway assets, landscaped areas, ETCS, and ITS systems;
- a logical system breakdown of all Highway assets and ITS systems, including facilities equipment and systems and the levels of maintenance to be provided by Developer's staff;
- list of the Project's major systems and equipment manufacturers/vendors, including their contact information (contact person, address, telephone numbers, website address and e-mail address);

- list of Contractors used to perform any maintenance services and the identification of the services expected to be provided; routine and preventative maintenance tasks and the required frequencies;
- diagnostic procedures for equipment and systems;
- spare parts inventory procedures for all Highway assets, ETCS, and ITS systems;
- systems, software and equipment manufacturer's O&M manuals;
- copies of all as-built drawings that detail the components of the O&M Work and Renewal Work to be provided by Developer and the physical limits or boundaries of Developer's O&M Work, including wiring diagrams, schematic drawings, logic block diagrams, assembly and disassembly drawings clearly identifying the components;
- copies of all inspection forms, checklists, etc.; and
- a summary listing of all maintenance tasks for all Highway assets, ETCS and ITS systems categorized by system/discipline.

Standard service manuals for commercially available equipment and products shall be acceptable as part of the Maintenance Manual only if the equipment provided is standard off-the-shelf equipment without any custom features or functions. Custom equipment and systems shall have custom Maintenance Manuals that include detailed information that addresses the custom features of the equipment provided and shall include drawings. The non-applicable portions of standard manuals shall be neatly encircled and cross hatched to clearly indicate that these sections are not applicable.

23.1.4.3 Safety Plan

The O&M Work by Developer shall be performed in a manner that ensures the safety of the public and Developer's and Developer-Related Entities employees, and NCDOT employees in accordance with all applicable Laws and Safety Standards. Developer shall develop a Safety Plan that includes staff training, safety procedures, and protocols to address the hazardous conditions associated with its O&M Work by Developer. The Safety Plan shall address Developer's approach to meeting all the safety requirements as set forth in the CA Documents, and in particular the requirements set forth below and shall be included in the O&M Plan for review and approval. Developer shall:

- ensure the safety of all its personnel and shall maintain the safety required and provide safety equipment and procedures for the protection of employees and the public throughout the area(s) of the applicable Project Right of Way;
- ensure that all equipment used shall be maintained in a safe and efficient manner in accordance with all Laws, safety organizations, regulations and guidelines pertaining to providing the required services; and
- follow all safety requirements outlined in the National Electric Safety Code (NESC), the Occupational Safety and Health Administration (OSHA), and any standards or practices for safe installation or maintenance of required equipment per the CA Documents.

23.1.4.4 Transition and Coordination Plan

As part of the O&M Plan, Developer shall present a Transition and Coordination Plan and submit it for review and approval to NCDOT. The Transition and Coordination Plan shall detail how Developer shall work with NCDOT to ensure a seamless transfer of O&M responsibilities on March 31, 2015, how Developer will coordinate with NCDOT for all O&M Work performed by

Developer impacting areas outside the Project Right of Way throughout the Term. The Transition and Coordination Plan shall also detail how Developer shall coordinate with NCDOT for all O&M Work that is the responsibility of NCDOT.

23.1.5 O&M Monthly Reports

From March 31, 2015, Developer shall deliver the O&M Monthly Report to NCDOT for review and comment no later than the 15th day of each month. The format of the O&M Monthly Report shall be submitted to NCDOT by Developer for approval 60 days prior to March 31, 2015. Developer shall prepare the monthly reports in electronic format and each report shall contain at a minimum the following information:

- a summary of the Planned Maintenance activities for the upcoming month;
- a summary of the maintenance performed and completed for the previous month and confirmation that Developer performed all O&M Work in accordance with the CA Documents;
- a summary of the Planned Maintenance that was not completed for the month, including the reasons for the incompletion of the Planned Maintenance and a summary of deferred days for each deferred item;
- summary of the maintenance activities performed for the previous month beyond the Planned Maintenance activities for that month;
- detailed results of all Planned Maintenance and other maintenance Work that was performed during the month;
- summary of landscape maintenance activities;
- summary of inspected Bridges including detailing the Bridge repairs and associated maintenance activities;
- summary of all Nonconforming Work;
- details on all instances of Construction Noncompliance Events and O&M Noncompliance Events, describing at a minimum: the corresponding name and ID number per Table 23.1 and Table 23.2, the commencement time, duration, entity who identified the event first, details regarding the cure of such Construction Noncompliance Events and O&M Noncompliance Events including the steps taken and the time it took to cure, applicable Cure Period or Fast Cure Period, the status of the event as of the end of the month, Noncompliance Points if any associated with each event, and the changes (if any) made to the O&M Plan based upon the events;
- summary of Noncompliance Points accrued by Developer for the past month and total balance for the past 365 days and 1095 days, and liquidated damages assessed, including details of each assessment;
- summary of liquidated damages assessed pursuant to Exhibit 14 of the Agreement and any backup calculations associated with the determination of such liquidated damages;
- a summary of the status of the Project for the month identifying all Closures including details describing the location and duration and explaining as applicable for each Closure whether it is an Unavailability Event or a Permitted Closures;
- operator event log data including all operator actions and event details for traffic and systems events, security Incidents, weather Incidents, and the details of Developer's Incident Response including response time data, response records, etc.;

- Developer's Incident Response logs including a time based report of all actions and activities performed by Developer;
- detailed results of all inspections, assessments and testing activities, including the related procedures, forms, etc.;
- monthly ITS systems performance reports; and
- summary of all ITS systems activities including:
    - system availability reports/system uptime matrix;
    - preventative maintenance plan and progress;
    - device location;
    - date and time of failure;
    - description of failure or issues and impacts;
    - report of failure source;
    - technician responding;
    - arrival time at device location;
    - site conditions noted (e.g., weather, accident, fire);
    - actions taken (successful or otherwise);
    - date and time of resolution;
    - spare parts used: type, model, serial and control number;
    - photo documentation (digital only);
    - replaced parts: type, model, serial and control number;
    - action for replaced parts (e.g., in-house repair, return to factory);
    - general notes;
    - Mean Time Between Failure (MTBF); and
    - Mean Time Between Repair (MTBR).

23.1.6 O&M Annual Reports

On an annual basis, Developer shall create a consolidated O&M Annual Report. The O&M Annual Report shall summarize all of the activities associated with Developer's O&M Work for the year, the actual maintenance performed for the year, and confirmation that Developer performed its O&M Work in compliance with the CA Documents.

From March 31, 2015, Developer shall deliver the O&M Annual Report to NCDOT no later than the 30th day of each Fiscal Year for review and comment. The O&M Annual Report shall be completed in accordance with the requirements set forth in this Section 23 of the Technical Provisions. Developer's O&M Annual Report shall contain the following information:

- a summary of all O&M Monthly Reports from the preceding year;
- statement of all adjustments to the O&M Monthly Reports from the preceding year (if any);

- the results and recommendations of the most recently completed independent third party inspection and NCDOT asset condition assessment;
- updated Table 2-01 and Table 2-02 of Attachment 2 of Exhibit 14 of the Agreement reflecting the adjusted liquidated damages amounts rounded to the nearest dollar and detailed calculations and any backup information associated with such update; and
- a summary of the information requested by NCDOT (corrected if necessary), by month during the preceding year (if any).

23.1.7 Pavement and Structure Inspections, Asset Condition Assessment, and Renewal Work on NCDOT Retained Elements

23.1.7.1 Pavement and Structure Inspections

Beginning at the first Substantial Completion Date, NCDOT will enlist a qualified independent third party, at NCDOT's expense, to undertake detailed inspections of pavement and Bridges within the Project Right of Way, including NCDOT Retained Elements. Developer and NCDOT shall both agree upon and approve of the independent third party inspector to be used. Inspections shall be carried out annually for all pavement and every two years for all Bridges, at a minimum. For pavement, at least one lane in each direction of both the HOT Lanes and General Purpose Lanes will be evaluated annually for the Pavement Condition Survey Manual rating.

Pavement inspections will be performed by Professional Engineers registered in the State of North Carolina with at least ten years of experience performing such inspections for highway projects. Bridge inspections will be conducted in accordance with FHWA's National Bridge Inspection Program (using the National Bridge Inspection Standards).

In accordance with FHWA guidelines and NCDOT policies, NCDOT will perform inspections of structural supports for signs, luminaries and signals.

The results of the inspections in this Section 23.1.7.1 of the Technical Provisions and necessary Renewal Work (including work on NCDOT Retained Elements to be performed by NCDOT) or other O&M Work to be performed by Developer in order to meet the minimum Performance Requirements in Table 23.2, shall be included in the O&M Annual Report and programmed by Developer into the Planned Maintenance Schedule and five-year Renewal Work Plan as appropriate.

23.1.7.2 Renewal Work on NCDOT Retained Elements

As a condition precedent to NCDOT's obligation to commence Renewal Work on NCDOT Retained Elements based on the results of the independent inspections as per Section 23.1.7.1 of the Technical Provisions, the inspections shall verify that Developer has diligently conducted all Routine Maintenance and Planned Maintenance activities on the NCDOT Retained Elements in accordance with the CA Documents. Proof of Developer's due diligence shall include, at a minimum, Developer's O&M Records and O&M Monthly Reports and shall be submitted to NCDOT prior to meeting with NCDOT to discuss potential NCDOT Retained Work after the inspections have been conducted each year.

After Substantial Completion for each Project Section, NCDOT will perform no more than four flexible pavement Renewal Work cycles on each Project Section and no more frequently than once every ten years, on the General Purpose Lane pavement as defined under clause (a) of the definition of NCDOT Retained Elements in Exhibit 1 of the Agreement as recommended by the third party inspector but limited to the extent outlined in Table 23.5. However, if the independent third party inspector determines that the major rehabilitation on a Project Section is

required at any time during the first twenty years of the Operating Period, then NCDOT will perform an additional minor rehabilitation on that Project Section, if required during the Term, for a total of four minor rehabilitations on each Project Section.

After Substantial Completion for each Project Section, NCDOT will perform no more than one rigid pavement Renewal Work cycle on each Project Section, on the General Purpose Lane pavement as defined under clause (a) of the definition of NCDOT Retained Elements in Exhibit 1 of the Agreement and as recommended by the independent third party inspector but limited to the extent outlined in Table 23.5.

If additional Renewal Work cycles are required on the General Purpose Lane pavement before the end of the Term to meet either the minimum Performance Requirements in Table 23.2 or the Handback Requirements in Table 23.3 of the Technical Provisions, as identified in the independent inspections, Developer shall be responsible for the performance of such Work.

If the inspection results show that an NCDOT Retained Element does not require Renewal Work by NCDOT, then NCDOT will not be obligated to perform Renewal Work on such NCDOT Retained Element.

NCDOT shall commence performance of the NCDOT Retained Work within three years after being identified in the inspection, based on the recommended scope identified by the third party performing such inspection and perform such Work using Good Industry Practice to the extent necessary. NCDOT will allow Developer unrestricted access to observe or inspect NCDOT's performance of the NCDOT Retained Work upon reasonable notice from Developer.

The same independent inspection procedures and methodology shall be used at Handback, with the exception that all other Project Elements, in addition to pavement and Bridges, shall be inspected at Handback and all necessary Work shall be programmed into the Handback Renewal Work Plan as appropriate.

Table 23.5

Existing Pavement Type	Renewal Work
Flexible	One major rehabilitation and three minor rehabilitations as defined in Section 11.2.4 of the Technical Provisions and in accordance with the requirements set forth in Section 11.4 of the Technical Provisions
Rigid	polymer patching cracks; replacement of rigid pavement slabs; rigid pavement joint construction, repair and sealing; diamond grinding

23.1.7.3 NCDOT Asset Condition Assessments

In addition to the inspections of pavement and Bridges as specified in Section 23.1.7.1 of the Technical Provisions and consistent with standard NCDOT practice and asset management procedures, NCDOT will periodically undertake asset condition assessments of Project Elements, including but not limited to NCDOT Retained Elements, within the Project Right of Way.

The asset condition assessments will be performed by randomly selecting samples of Project Elements. The sample will be large enough to be representative of the condition of the Project and shall include all types of Project Elements (e.g. Bridges, culverts, pavements, drainage, toll system components, ITS components, etc.). The results of the asset condition assessments will be used by NCDOT to evaluate the overall asset performance of the Project relative to other

NCDOT facilities, independently of the minimum Performance Requirements set forth in the CA Documents.

However, throughout the course of the asset condition assessments, if NCDOT detects any Noncompliance Events resulting from the failure to meet the minimum Performance Requirements set forth in Table 23.2 of the Technical Provisions, NCDOT will notify Developer of the observed Noncompliance Events and Developer shall cure such Noncompliance Events and shall document accordingly in the O&M Monthly Report, O&M Annual Report and/or Renewal Work Report.

23.1.8 Renewal Work Plans

Developer shall produce the following plans and reports related to Renewal Work performed by Developer.

23.1.8.1 Renewal Work Plan

Developer shall develop and implement a five-year Renewal Work Plan. Developer shall submit a five-year Renewal Work Plan to NCDOT in accordance with Section 8.5 of the Agreement within 45 days prior to the first Substantial Completion Date. The Renewal Work Plan shall be completed in accordance with the requirements set forth in this Section 23 of the Technical Provisions. Within 45 days of the beginning of each Fiscal Year after the first Substantial Completion Date, Developer shall update the Renewal Work Plan and submit it to NCDOT in accordance with Section 8.5 of the Agreement.

The Renewal Work Plan shall include the following, at a minimum:

- Renewal Work Schedule of rehabilitation works to be conducted over the following five years including anticipated timing of each planned Work on an annual basis;
- Quality System for all Renewal Work contained within the Renewal Work Schedule;
- the results and required work based on the most recently completed independent third party inspections, including NCDOT Retained Elements, as set forth in Section 23.1.7.1 of the Technical Provisions;
- details of any structural alterations to Bridges;
- results of asset condition inspections that have been used to develop the Renewal Work Plan; and
- planned approach to each Renewal Work project including quality management, quality control and quality assurance.

23.1.8.1.1 Renewal Work Schedule

The Renewal Work Schedule shall set forth, by Element:

- the estimated Useful Life;
- the estimated Residual Life;
- a brief description of the type of Renewal Work for both Developer and NCDOT anticipated to be performed at the end of the Element's Residual Life;
- the estimated cost in current Fiscal Year dollars of Developer's Renewal Work;
- the total estimated cost in current Fiscal Year dollars of Renewal Work in each of the years Renewal Work is anticipated to be performed under the Renewal Work Schedule; and

- a schedule of anticipated Closures and Work windows for the performance of the Renewal Work covered by the Renewal Work Schedule during the upcoming five Fiscal Years and in accordance with the CA Documents.

23.1.8.2 Renewal Work Reports

Beginning from the first Substantial Completion Date, Developer shall deliver the Renewal Work Report, including any As-Built Record Plans, to NCDOT, no later than 45 days after the end of the prior Fiscal Year for review and comment. The Renewal Work Report shall be completed in accordance with the requirements set forth in this Section 23 of the Technical Provisions. The Renewal Work Report shall, at minimum, include the following:

- a summary of the preceding year's completed Renewal Work performed, including the location, the type of Work performed for each Element listed on the Renewal Work Schedule and any other component, including the dates of commencement and completion and the final cost (for both the specific task and for all Renewal Work performed during the Fiscal Year);
- As-Built Record Plans;
- any updated inventory data as a result of the Renewal Work; and
- a list of any Developer's Renewal Work which was included in the previous year's Renewal Work Schedule, but was not conducted and an explanation of why Developer did not conduct this Renewal Work.

23.1.9 Emergency Reporting

Developer shall provide to NCDOT a detailed damage report after the occurrence of an Emergency, natural or otherwise, excluding those events which only meet clause (a) under the definition of Emergency in Exhibit 1 of the Agreement. This report shall include, but not be limited to, an individual analysis of the site or sites affected by the Emergency with the following information:

- date and time of Emergency event;
- cause and description of damage including damages to the assets of the Project (third party information, if applicable);
- description of failure or issue and system impacts;
- description of site conditions supported by photo documentation (digital only);
- list of damaged assets with damage assessment; and
- traffic impact.

The damage report by Developer shall include all impacted Project Elements. This Work shall be coordinated by Developer with NCDOT to establish time frames for these reports to be delivered to NCDOT depending on the severity of the Emergency, but shall not exceed 24 hours following conclusion of the Emergency.

23.1.10 Hazardous Materials/Fuel Spills

23.1.10.1 Third Party Hazardous Materials/Fuel Spills

For all Hazardous Material or fuel spill events by third parties other than a Developer-Related Entity that originate within the Project Right of Way, Developer shall assess the affected area(s), and notify NCDOT immediately upon detection or notification. NCDOT shall investigate,

oversee, manage, treat, handle, store, remediate, remove, transport (where applicable), deliver and dispose of such Hazardous Materials in accordance with the Technical Provisions.

23.1.10.2 Developer Hazardous Materials/Fuel Spills

For all Hazardous Material or fuel spill events by Developer or a Developer-Related Entity that originate within the Project Right of Way, Developer shall respond and take remedial actions as per the minimum Performance Requirements set forth in Table 23.1 and Table 23.2 of the Technical Provisions. Developer shall provide all qualified staff with the appropriate levels of training and certification and equipment necessary to mitigate impacts that contain contamination and manage all cleanup operations and any monitoring of the affected area(s) in accordance with all Laws and Governmental Approvals. Upon the Release of Hazardous Materials, time is of the essence. Developer shall be required to respond promptly to assess the affected area(s), contain and mitigate the contamination, clean-up the affected area(s) and inform NCDOT. Developer shall further develop and implement a comprehensive plan for the long-term cleanup and monitoring of any Hazardous Materials as needed. This plan shall be submitted to NCDOT for review and comment.

23.1.11 Staff Conduct and Appearance

All persons engaged in O&M Work by Developer shall exercise sound judgment in carrying out their duties and conduct themselves in such a manner that will reflect favorably upon NCDOT. NCDOT also reserves the right to require removal of any Person engaged in Developer's O&M Work from the Project who cannot perform his or her duties or who damages the reputation of NCDOT. Developer shall ensure that all persons engaged in O&M Work by Developer shall:

- wear clean and neat uniforms; and
- wear a State-issued picture ID and a Developer-issued picture ID.

23.1.12 Use of Pesticides

Developer shall use pesticides, including herbicides, in accordance with all Laws and Governmental Approvals, permits, and regulations as set forth in Table 23.1 and Table 23.2. Developer shall comply with all NCDOT standards within the Project Right of Way.

23.1.13 Winter Maintenance

Developer shall not be required to carry out Winter Maintenance activities on either the General Purpose Lanes or HOT Lanes. Such activities will be provided by NCDOT, following NCDOT Snow Clearing Policy and the Emergency Response and Procedures Manual in Book 3 for Priority 1 therein. Current NCDOT policy provides for the direct application of deicing chemicals. However, it is not the policy to maintain a "bare pavement" throughout the course of all storms. Developer shall be responsible for repairing and/or replacing any pavement markings, markers or delineators that are damaged as a result of Winter Maintenance activities, in order to meet the minimum Performance Requirements in Table 23.2.

23.1.14 Technology Enhancements

Due to the prospect of continuous technology evolution, NCDOT will likely adopt new standards and/or substantial revisions of existing standards during the Term for technology-related Elements. If at any time NCDOT revises and/or adopts new standards and upgrades, replaces or changes its systems and infrastructures, Developer shall do the same in accordance with the new standards, and the same will constitute Technology Enhancements in accordance with the CA Documents. Developer shall perform these Technology Enhancements on an implementation schedule compatible with its Renewal Work Schedule for the impacted Elements and in accordance with Section 12.1 of the Agreement.

23.1.15 Stormwater Management

Capitalized terms in Section 23.1.15 of the Technical Provisions not otherwise defined in the CA Documents shall have the meaning in the General Permit NCG 010000.

23.1.15.1 General

The North Carolina Department of Environmental and Natural Resources (NCDENR) issued a National Pollutant Discharge System (NPDES) Stormwater Permit NCS000250 to NCDOT. Activities conducted by Developer under the Agreement on NCDOT owned property must meet the requirements of Stormwater Permit NCS000250 provided in Book 3 or subsequent NPDES stormwater permits.

Stormwater management associated with the NPDES stormwater permit includes both design requirements and operation and maintenance requirements. Design requirements are addressed through the Stormwater Management Plan (SMP) and operation and maintenance requirements are addressed through the Stormwater Management Program (SMPr) in Section 23.1.15.3 of the Technical Provisions.

Stormwater management shall also comply with the rule for Catawba River Basin: Protection and Maintenance of Riparian Buffers. The current version is available at the following Web address: http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environment%20and%20natural%20resources/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0243.html.

Considering that Developer is operating under NCDOT's NPDES Individual Permit issued by NCDENR, NCDOT shall retain operational authority to perform the following:

- identify special needs for the Project;
- mandate special details to be included in the design plans or special provisions;
- conduct on site plan reviews for compliance and require design and operational changes to accommodate field changes, new environmental regulations and NPDES permit requirements;
- inspect all construction sites including waste and borrow pits and haul roads and industrial sites located on NCDOT right of way or property;
- issue violation notifications or cease and desist orders; and
- rescind authorization for performing Work under this program due to negligence in NPDES Permit implementation and/or compliance.

NCDOT retains authority in plan, detail, and special provision review and acceptance.

23.1.15.2 Stormwater Management Plan – Post-Construction Stormwater Program NPDES Requirements

Developer shall submit a completed SMP and design plans to NCDOT for approval by NCDOT and NCDENR Division of Water Quality Regional Office.

As part of the Developer Management Plan, Developer shall complete a SMP using most current Best Management Practices. The SMP along with the design plans shall document stormwater control measures to the maximum extent practicable in accordance with the NPDES Stormwater Permit NCS000250. The SMP is required per the Post Construction Controls – Post-Construction Stormwater Program (PCSP), Part II Section B5, of the NPDES permit. The SMP along with the design plans shall document stormwater control measures to the maximum

extent practicable in accordance with the NPDES Stormwater Permit. Stormwater Management Plan Version 1.2 or subsequent versions shall be used and supplemented with other Project specific requirements. The current version is available at the following Web address:

http://www.ncdot.org/doh/preconstruct/highway/hydro/Forms/SMP_v1-2-Project_or_TIP_No_Date.xls

The SMP shall be developed by a firm that has experience preparing Stormwater Management Plans for comparable projects, preferably for the NCDOT. Developer shall provide NCDOT a list of projects for which the firm has developed Stormwater Management Plans, including a description and similarity with the Project.

23.1.15.3 NPDES Operation and Maintenance Compliance – Stormwater Management Program

Eighteen months prior to Substantial Completion Developer shall identify a point of contact to manage and provide oversight of NPDES Stormwater Permit requirements and submit a SMPr. The SMPr identifies how Developer shall comply with the NPDES permit requirements that are required after completion of construction and indemnify NCDOT. The SMPr, at a minimum, will include the following NPDES Permit compliance areas:

- **Illicit Discharge Detection and Elimination Program:** Developer must ensure that all illicit discharges, spills, and illegal dumping occurrences are detected and eliminated. Appropriate reporting procedures and actions must be developed for enforcement by the NCDENR.
- **Post-Construction Controls:** Developer must identify and implement appropriate strategies for system inventory, hazardous spill basin inspection and maintenance consistent with the NCDOT memorandum dated December 18, 2003 regarding Hazardous Spill Basin Maintenance Policy, BMP inspection and maintenance and vegetation management activities and any other requirements agreed upon in the SMP.
- **Program for Encroachment:** Developer must develop programs to ensure that all encroachments comply with NCDOT policies and procedures.
- **Construction Program:** Strategies must be implemented to ensure that all land disturbing activities comply with the NCDOT Delegated Erosion and Sedimentation Control program.
- **Industrial Facilities:** Stormwater Pollution Prevention Plans (SW3P) must be developed for industrial facilities (such as, but not limited to, fueling stations, loading and unloading areas, vehicle or equipment maintenance areas, waste disposal areas, storage areas) located on Project ROW.

The SMPr shall include the requirement to submit an annual compliance report. The SMPr shall be submitted to NCDOT for review and approval by NCDOT and the Division of Water Quality. Developer shall have an approved SMPr in place prior to operating the facility.

23.1.15.4 Additional Requirements

In addition to NPDES permit compliance activities, Developer shall adhere to all environmental regulations including but not limited to the following:

- Spill Prevention, Control, and Countermeasure Plan: Per U.S. Environmental Protection Agency regulations, Developer shall prepare and implement a Spill Prevention, Control, and Countermeasure Plan for activities that store greater than 1,320 gallons of oil and have a reasonable potential to discharge into or upon navigable waters of US or adjoining shorelines; and

- Concrete and Asphalt Production Facilities: Concrete and asphalt production plants are not permitted through NCDOT's NPDES permit. Developer shall obtain applicable permits for those operations being conducted on Project ROW.

23.2 Maintenance Requirements

23.2.1 Roadway Maintenance Requirements

O&M During Construction and O&M After Construction will be subject to all requirements and Cure Periods or Fast Cure Periods set forth in Table 23.1 and Table 23.2 of the Technical Provisions.

Developer shall coordinate Closures with NCDOT for all O&M Work performed by Developer. Developer shall notify NCDOT immediately when closing any lane for an unplanned Lane Closure when the circumstances arise.

23.2.1.1 Routine Maintenance

Developer shall provide all Routine Maintenance activities within the Project Right of Way to maintain a safe and reliable Highway system. Developer shall provide properly trained staff to perform all Routine Maintenance activities.

23.2.1.2 Developer Planned Maintenance Scheduling

Developer shall prepare Planned Maintenance Schedules on a monthly and annual basis in accordance with the requirements set forth in this Section 23 of the Technical Provisions and the CA Documents. The Planned Maintenance Schedules shall describe all of the Planned Maintenance for the given period and shall include at a minimum the expected dates, locations, times, durations of each Planned Maintenance activity, and impact on traffic, including any planned Closure.

Developer shall issue a Lane Closure Notice (LCN) in accordance with Section 22 of the Technical Provisions for any Closure associated with a Planned Maintenance activity. When changes occur in Developer's Planned Maintenance Schedule and Planned Maintenance activity requires a Closure for which a LCN has not been issued, Developer shall not undertake the Closure without NCDOT prior approval.

Developer shall schedule a Planned Maintenance activity only when a traffic analysis performed by Developer indicates that a Traffic Backup will not occur. If a Traffic Backup does occur during the execution of a Planned Maintenance activity as a result of the activity, the activity shall be discontinued and the lane or lanes reopened for traffic immediately. The Planned Maintenance shall be rescheduled at a later time, to the extent feasible. If Developer fails to comply with this requirement, any such Closure associated with the Planned Maintenance activity shall result in an Unavailability Event.

Prior to undertaking any Planned Maintenance Activity, Developer shall prepare a contingency plan to expedite reopening of closed lanes in the event of a Traffic Backup.

When Developer implements a Shoulder Closure for performance of Work that is scheduled to exceed or that exceeds 30 minutes, Developer shall also implement a Lane Closure for the adjacent lane. When Developer implements a Shoulder Closure for performance of Work that utilizes a moving operation or a Mobile operation, a Lane Closure for the adjacent lane is not required.

The Closure restrictions below in this Section 23.2.1.2 of the Technical Provisions shall be applicable to all Work performed after Substantial Completion of all Project Sections through the

end of the Term. Developer shall be restricted from scheduling Planned Maintenance for specific Travelway or portions of Travelway or a Shoulder during the following times:

For Lane Closures:	6:00 a.m. to 9:00 p.m., Monday through Friday
	9:00 a.m. to 6:00 p.m., Saturday and Sunday
For Shoulder Closures:	6:00 a.m. to 9:00 a.m., Monday through Friday
	4:00 p.m. to 9:00 p.m., Monday through Friday

In addition, Developer shall not close or narrow a lane or Shoulder, detain and/or alter the traffic flow during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy, including the following schedules:

- for New Year's, between the hours of 6:00 a.m. December 31st and 9:00 p.m. January 2nd. If New Year's day is on a Saturday or a Sunday, then until 9:00 p.m. the following Tuesday;
- for Easter, between the hours of 6:00 a.m. Friday and 9:00 p.m. Monday;
- for Memorial Day, between the hours of 6:00 a.m. Friday and 9:00 p.m. Tuesday;
- for Independence Day, between the hours of 6:00 a.m. the day before Independence Day and 9:00 p.m. the day after Independence Day. If Independence Day is on Friday, Saturday or Sunday, then between the hours of 6:00 a.m. the Thursday before Independence Day and 9:00 p.m. the Tuesday after Independence Day;
- for Labor Day, between the hours of 6:00 a.m. Friday to 9:00 p.m. Tuesday;
- for Thanksgiving, between the hours of 6:00 a.m. the Tuesday before Thanksgiving and 9:00 p.m. the Monday after Thanksgiving;
- for Christmas, between the hours of 6:00 a.m. the Friday before the week of Christmas day and 9:00 p.m. the following Monday after the week of Christmas;
- for any NASCAR event at the Lowes Motor Speedway, between the hours of 6:00 a.m. the Thursday the week of the event until 8:00 p.m. the following Monday after the race;
- for any Carolina Panthers Football game in Charlotte and any games at the Bobcats Arena, from three hours before the game until three hours after the game; and
- for any event which creates high traffic volumes, between the hours of 7:00 a.m. the Friday of the week of the event and 8:00 p.m. the Monday after the week of the event. Such events may be at Bank of America Stadium, Charlotte Convention Center or other arenas. NCDOT will provide guidance on what events constitute unusually high traffic volumes.

For any time other than that listed above, Developer may schedule Planned Maintenance provided that:

- Developer shall make reasonable efforts to close only one lane at a time on any given portion of Highway when performing Planned Maintenance; and
- to the extent that Planned Maintenance involves Closures, Developer shall implement and execute such Closures in accordance with the lane Closure and traffic management requirements.

Notwithstanding the foregoing, in the event that any lane is a Permitted Closure, and a Closure that is not a Permitted Closure occurs in any lane remaining in service, then the lanes subject to the Permitted Closure shall also be deemed to be a Closure, which is not a Permitted Closure.

23.2.1.3 NCDOT Work Scheduling and Closures of GP Lanes, HOT Lanes and Shoulders

For any Work undertaken by NCDOT, either within or outside the Project Right of Way, Closure of the Shoulders by NCDOT shall be permitted at all times without any restriction. Such Closures of the Shoulders shall not be claimed by Developer as a cause for a Relief Event or a Compensation Event.

For any Work undertaken by NCDOT, either within or outside the Project Right of Way, that would otherwise require the Closure of any portion of the HOT Lanes, NCDOT shall have the right to shift traffic from the HOT Lanes onto the General Purpose Lanes for the duration of such Work to avoid Closure of the HOT Lanes. NCDOT will be responsible for the direct cost associated with such traffic shift including changing the pavement marking to accommodate temporary traffic patterns and restore the pavement marking of the HOT Lanes to the conditions existing prior to such Work.

For any Work undertaken by NCDOT, either within or outside the Project Right of Way, that requires the Closure of any portion of a GP Lane or HOT Lane, NCDOT shall notify Developer of the expected dates, locations, times, and durations of each Closure at least ten Business Days in advance of the beginning of the Closure.

NCDOT shall be restricted from scheduling Closures for specific HOT Lanes or portions of HOT Lanes during the following times:

For Lane Closures:	6:00 a.m. to 9:00 p.m., Monday through Friday
	9:00 a.m. to 6:00 p.m., Saturday and Sunday

Closures of the GP Lanes or HOT Lanes by NDCOT shall be permitted for necessary Work at all other times as long as a Traffic Backup does not occur in the HOT Lanes, as a result of the Work activity, in the GP Lanes or HOT Lanes that remain open during the execution of the Work activity.

In the event NCDOT performs Work at locations where a Noncompliance Event has been identified and to the extent that such Work prevents or impedes Developer's actions to cure the Noncompliance Event, the Cure Period shall be extended until such time that NCDOT can provide reasonable access to Developer to cure the Noncompliance Event.

Any such shift in traffic or Closure pursuant to this Section 23.2.1.3 of the Technical Provisions shall not be claimed by Developer as a cause for a Relief Event or a Compensation Event.

23.2.1.4 Renewal Work

Developer shall diligently perform its Renewal Work as and when necessary to maintain compliance with all Performance Requirements and performance standards. Developer shall perform its Renewal Work according to the CA Documents, Governmental Approvals, and all applicable Laws. Developer shall use the Renewal Work Schedule, as updated from time to time, for scheduling and performing Renewal Work.

As per Section 23 of the Technical Provisions, Developer shall not be responsible for Renewal Work on the NCDOT Retained Elements, but shall still be responsible for Routine Maintenance activities on the General Purpose Lane pavement, including but not limited to crack sealing and pothole patching, as set forth in Table 23.2 of the Technical Provisions.

Developer shall use the same or similar materials for permanent pavement repairs as the materials in place. In particular, Developer shall not use bituminous materials for permanent repair of rigid pavement.

23.2.1.5 Compliance Work

If Developer is required to perform compliance Work, Developer shall exercise commercially reasonable efforts to perform such Work concurrently with previously scheduled Planned Maintenance. If the compliance Work cannot be performed concurrently, Developer may schedule additional Planned Maintenance for compliance Work in consultation with NCDOT and subject to the requirements for Planned Maintenance Scheduling set forth in this Section 23 of the Technical Provisions.

23.2.2 Structure Inspections and Maintenance

Except as otherwise provided in Section 23.1 of the Technical Provisions, Developer shall be responsible for all O&M Work on all Bridges and roadways within the Project Right of Way from March 31, 2015 until the end of the Term.

23.2.2.1 Bridge Inspections

Bridge inspections shall be carried out by an independent third party as detailed in Section 23.1.7.1 of the Technical Provisions.

23.2.2.2 Bridge Maintenance

Developer shall perform Routine Maintenance, minor repair and major repairs on Bridges, including collision damage repairs, defined as follows:

- Routine Maintenance: The preservation and upkeep of a Structure and all its appurtenances, including all sloped areas under the Structure's end supports, including slope protection and rip rap, in its original condition or as subsequently improved. Routine Maintenance includes any activity intended to maintain an existing condition or to prevent deterioration. Examples include but are not limited to: cleaning, lubrication, spot painting, dirt and debris removal, and application of protective systems;
- repair of minor damage: Minor repairs include any activity intended to correct the effects of minor material deterioration by restoring the damaged Bridge Elements. Minor repairs are generally defined as repairs to Bridge Elements that are structurally sound (i.e., no loss of strength), but may have minor section loss, cracking, spalling, or scour. Minor repairs are typically unanticipated maintenance Work as identified by Bridge inspections. Minor damage repair Work also includes but is not limited to repairing:
    - damaged or misplaced clearance markers;
    - damaged or missing advisory and warning signs;
    - damaged or deteriorated railings and curbs;
    - uneven or cracked approach and deck surfacing;
    - accumulated drift adjacent to bents and piers;
    - minor erosions;
    - accumulated dirt or debris on decks, near stringer ends at supports, adjacent to bearings;
    - plugged drains;

    - settlement or roughness of approach;
    - fire hazards; and
    - faulty electrical contact.
- repair of major damage: Some damages are considered major because they affect structural integrity of an entire span, thus requiring underpinning of the span or supplementing of a member, pier, or bent before repair in place or removal and replacement. Other damages are categorized as major damages because the causes of the damage, and thus the measures needed to correct the damage, are numerous and varied with the potential to lead to the failure of load-bearing components and therefore require engineering evaluation (such as structural, geotechnical, hydraulic, or other). Conditions requiring major repairs include loss of section, deterioration, spalling, or scour that affect the strength of a load bearing Bridge Element. Developer shall perform engineering analysis to determine the extent of the lost strength and the Work to be performed to remedy the damage. Major damage repair Work includes, but is not limited to repairing:
    - bent or damaged steel beams, girders, or truss members;
    - cracked or spalled concrete members, other than curb and railing;
    - defective bearings on substructure or in deck at expansion joints;
    - settled bents or piers;
    - major erosion or scour;
    - extensive fire damage; and
    - loose bolts.
- rehabilitation: The repair or rehabilitation of a Structure, including all its appurtenances, to a condition meeting or exceeding current design standards, insofar as practical shall be considered Renewal Work; and
- Bridge painting: Developer shall maintain all paint systems on Structures to the original condition as intended in the design. Spot painting is only acceptable for active corrosion areas as a preventive measure. For aesthetic reasons, the paint system shall always be of uniform color and appearance.

23.2.3 Other Structures Inspection and Maintenance

Other Structures such as culverts and retaining walls, including walls that support embankments at Bridge end bents, shall be inspected and maintained in accordance with the provisions set forth in the CA Documents.

23.2.4 ITS Systems Maintenance

23.2.4.1 General

The scope of ITS systems maintenance shall include any activities necessary to keep the systems fully operational and functional and to comply with the minimum Performance Requirements for all ITS system components set forth in Table 23.1 and Table 23.2.

All equipment and component parts that are furnished shall be new, unused and shall otherwise meet all requirements of the CA Documents. All parts shall be of high quality workmanship and no part or attachment shall be applied contrary to the manufacturer's recommendations or

standard practice. Developer shall maintain and have readily available an up to date inventory of all ITS equipment and/or parts. The inventory shall contain, at a minimum:

- manufacturer;
- model number;
- descriptive name;
- manufacturer serial number;
- spare or newly ordered part;
- location where installed including stationing, if possible;
- date of purchase;
- date of repair;
- date when scrapped;
- calibration status & date;
- manufacturer's Routine Maintenance schedule; and
- warranty status if applicable.

23.2.4.2 Troubleshooting Work, Repair, and Parts and Materials

Upon the observation or a notification of a malfunction or problem with the ITS system, Developer shall dispatch qualified personnel to provide diagnostic and troubleshooting services as required, to identify the problem and, if possible, perform minor repairs to fix the problem while at the site.

Developer shall conduct the minor repairs that are needed during Developer's diagnostic Work. Minor repairs include, but are not limited to, replacement of any spare parts in the current spare parts inventory, reset of electric, electronic or electromechanical devices, reset of the device or PC/PLC controllers, reset programs, replace missing screws or clamps, loose connection of any wires, cables, or harnesses, replacement of fuses and/or circuit breakers.

Developer shall conduct Routine Maintenance and repair or replace damaged, missing, or malfunctioning equipment in order to maintain the system operation and functionality in order to meet the minimum Performance Requirements set forth in Table 23.1 and Table 23.2.

Developer shall provide replacement parts as needed for the maintenance of the ITS system. The replacement part shall be the latest compatible technology, equal to or better in function and quality to meet or exceed the original equipment manufacturer's standards for the existing system component or equipment, and by its use, does not cause a system upgrade. Developer shall maintain inventory control of all replacement equipment.

23.2.4.3 Existing Communication Links

Developer shall protect any existing communication links within the Project Right of Way. If any communication link is damaged, it is the responsibility of Developer to repair or replace the damaged communications equipment (fiber optic cable, conduit, pull boxes, splice cabinets, hubs, etc.). Damaged fiber optic cable may be temporarily spliced to restore communications; however, any damaged fiber optic cable will be replaced from termination point to termination point with the same type of cable as set forth in Table 23.1 and Table 23.2.

23.2.4.4 ITS Maintenance Service Descriptions

Developer shall provide the following ITS Emergency maintenance, non-scheduled maintenance, and Routine Maintenance services as part of the overall Project infrastructure maintenance program. The response time is defined as the time allowed Developer to mobilize its personnel, equipment, tools, parts, and materials at the Work site.

23.2.4.4.1 Emergency Maintenance Repair

Emergency maintenance response will be required when: a device or component of the device, results in the complete failure to critical operational Elements of the ITS system; or any ITS system infrastructure item that is in a condition that is unsafe and/or may present a life threatening condition. Typical Emergency maintenance response will be required for, but not be limited to:

- system-wide communication outage;
- structural failure or potential Structure failure due to Incident or weather damage;
- message being stuck on an electronic message sign;
- fiber/cable cuts, electrical risks, or potential fire risks; and
- Incident detection system failure.

Developer's maintenance staff shall arrive at the site of the Emergency within 30 minutes during the period of 6:00 a.m. to 9:00 p.m., Monday through Friday, and within one hour at all other times, once Developer detects or is notified of the Emergency maintenance related system failure.

Upon arrival at the site, Developer shall update NCDOT of the status of the Emergency maintenance. Developer shall then analyze the situation and develop an estimate of the time required for repairs and analyze if a Lane Closure or Road Closure is necessary. Developer shall determine if the repair should be initiated immediately or if the situation should be monitored through the period of 6:00 a.m. to 9:00 p.m., Monday through Friday, and repaired outside of such period. If the repair time will exceed two hours, Developer shall notify NCDOT immediately and begin preparation of a contingency plan. A work-around should be considered if it would not negatively impact any part of the Project operations. Developer shall notify NCDOT when the maintenance actions have been completed and describe any resulting operational restrictions.

23.2.4.4.2 Non-Scheduled Maintenance Work

Non-scheduled maintenance will be required when a device or component of the device, has failed and must be repaired in order for the ITS system to function as required. Developer's maintenance staff shall arrive at the Work site within 24 hours once Developer detects or is notified of the non-scheduled maintenance related system failure.

Upon arrival at the site, Developer shall update NCDOT of the status and estimated time required for repairs. If the repair time will exceed 24 hours, Developer shall notify NCDOT immediately and begin preparation of a contingency plan. A work-around should be considered if it would not negatively impact any part of the Project operations. Developer shall notify NCDOT when the maintenance actions have been completed and describe any resulting operational restrictions.

23.2.4.4.3 Routine Maintenance Work

Developer shall perform all Routine Maintenance within the periodic intervals as recommended and specified by the equipment manufacturer, and based on the equipment's operating condition over the duration of the Term. Routine Maintenance shall consist of Developer performing necessary inspections, electrical and mechanical tests and repairs of the device sites to maintain the ITS system.

Developer shall provide a standard Routine Maintenance schedule/checklist of the items to be checked or changed on the ITS system. Such plans shall be updated periodically to reflect any future system renewals during the Term. Developer shall submit a sample Routine Maintenance schedule/checklist as part of the O&M Plan.

Power and communications service runs shall be kept cleared for easy recognition of the pull boxes and easy access to the service run. Dirt, plants, weeds, etc. shall be removed from pull box covers. Developer shall maintain areas surrounding the controller cabinet's utility service poles, camera/device poles, and sign Structures to allow safe and convenient access to the Elements. The interior of all ITS controller and system cabinets shall be free of excess dust, dirt, debris, cobwebs, etc. The exterior of the ITS system devices shall be cleaned as needed and shall be performed in conjunction with the Routine Maintenance.

Developer shall ensure that the cable plant markers are in place and that they are in good condition. This service shall be provided each as part of the Routine Maintenance, for each marker, for the entire ITS system. If a need arises for Developer to purchase replacement cable plant markers, such markers shall be similar to the existing markers and Developer shall ensure that the same markings are used to identify the cable route.

23.2.5 Developer Relief of Routine Maintenance

When NCDOT or NCDOT's agent undertakes construction within a portion of the Project after Substantial Completion of all Project Sections and NCDOT determines, at its sole discretion, it to be in the best interest of NCDOT, Developer may be temporarily relieved of its responsibility for Routine Maintenance of NCDOT Retained Elements. After NCDOT or NCDOT's agent completes such construction and NCDOT notifies Developer, Developer shall resume Routine Maintenance of NCDOT Retained Elements as required by the CA Documents on such portion of the Project.

23.3 Operations Requirements

Developer shall operate the Project with the main objectives of maximizing safety and reliability, minimizing disturbances to motorist, and protecting the Environment. Developer shall provide the appropriate number of properly trained operations staff to perform the operating duties specified herein. Developer's O&M Work will be subject to all requirements set forth in Table 23.1 and Table 23.2 for the General Purpose Lanes and HOT Lanes.

Developer shall maintain at all times staffing levels required to ensure the Project's operating requirements are met. A minimum of one staff member assigned by Developer shall be fully certified by the manufacturer in the maintenance and repair of the deployed device model, qualified and trained to handle all System requirements for O&M During Construction and O&M After Construction.

Commencing on March 31, 2015, NCDOT will conduct reviews of the various phases of Developer's operation. Developer shall cooperate and assist NCDOT throughout this review process.

Developer shall procure, install, configure, operate, maintain, and support its own permanent management center that is completely separate from NCDOT. This permanent management center may be physical or virtual but will handle the operations and maintenance of all ITS systems, including monitoring.

23.3.1 ITS Operations

Developer shall use the data from the monitoring systems to satisfy the requirements in Table 23.1 and Table 23.2 and in the O&M Monthly Reports and O&M Annual Reports. The performance measures reported shall be the accountability assessment of Developer's overall performance. NCDOT will have the right to disseminate any and all data and video collected by ITS systems located on the Project. Refer to Section 21 of the Technical Provisions for information on the ITS design requirements.

23.3.1.1 ITS System Monitoring and Availability

Developer shall develop a system uptime matrix and submit it as part of the O&M Monthly Reports. The matrix shall include all device systems and subsystems for all existing ITS devices, and temporary and the permanent ITS deployments provided by Developer, including but not limited to a fiber optic communication network subsystem, traffic monitoring subsystem, vehicle detection system, Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), AM/FM rebroadcast/override, closed circuit television (CCTV) cameras, security cameras, 800 MHz radio, Incident detection, roadway weather information system (RWIS), Developer TMC security system and visibility sensor.

Developer's ITS operating procedures shall indicate the operational status of each ITS system device and shall create an event to indicate when each device is inoperable and an event to indicate when each ITS system device has returned to service. The system event log and timeline for this system shall be included in the reports. This matrix shall be included with the O&M Monthly Report and as a stand-alone annual report documenting the total uptime and percentage available (ex: 98%) for that year per device with a weighted average for the total equipment percentage reported. This percentage available shall include downtime related to maintenance and repair. Downtime related to Incidents or natural disasters shall be recorded separately from all other ITS system failures.

23.3.1.2 Network and Utility Services

Developer shall deploy, operate and maintain a Geographic Information System (GIS) and relational database based fiber optic network management software such as OSP Insight or similar. Developer shall populate the database and update promptly the latest detailed information about Developer's fiber optic network. Such a tool/database shall be fully populated and the system shall be fully operational within three months of Substantial Completion of all Project Sections. Developer shall have the necessary equipment and personnel capable of performing various types of fiber optic repair needed in the field including, but not limited to: mid-span fiber splicing, fiber trunk splicing, OTDR testing, fiber enclosure /fiber distribution panel installations, and terminations.

23.3.1.3 Data and Video Sharing

Developer shall provide to NCDOT in real time all ITS data collected as well as all live streaming video. Real time shall be defined as the transmission of data and video by Developer to NCDOT within one second of collection by Developer. Developer shall not record video obtained through the use of ITS cameras without prior written permission from NCDOT.

Developer shall not provide data or live video feeds to any person, organization, or entity without prior written permission from NCDOT.

23.3.1.4 ITS Standards

Developer shall perform the O&M Work by Developer in accordance with the requirements set forth in the CA Documents. If there is any conflict in standards, Developer shall adhere to the higher Submittal standard. If there is any unresolved ambiguity in standards, it is Developer's responsibility to obtain clarification before proceeding with O&M Work by Developer and Renewal Work.

23.3.2 Traffic Incident Management

Developer shall detect and respond to all traffic or Highway-related Incidents within the Project Right of Way as set forth in Table 23.1 and Table 23.2. This includes all required notifications, traffic and facility controls systems activations and the arrival, on the scene of the Incident, of appropriate equipment and personnel from Developer's field response team for the Incident level. Developer shall log and record the sequence of all actions taken by all in response to the Incident.

23.3.2.1 Event Process

Developer shall have four basic tasks with regard to Incident Response:

- Incident detection;
- confirmation and gathering of information;
- notification; and
- response.

23.3.2.1.1 Incident Detection

Incidents can be detected either by Developer or by various external sources, including but not limited to motorists, members of the general public, law enforcement personnel, or NCDOT personnel.

23.3.2.1.2 Confirmation and Gathering of Information

Confirmation by Developer may be accomplished primarily through the use of the CCTV camera system. Design of the system will facilitate the confirmation process by automatically providing Developer with location information, such as mile marker or other relevant location information, that be confirmed via CCTV camera coverage or by response staff in the field. Design of the system will also include automatic camera selection, where CCTV coverage of a detected Incident is automatically provided from the nearest camera in the vicinity of the Incident and displayed at Developer's traffic operations center.

23.3.2.1.3 Notifications

Developer will notify the appropriate Emergency Response personnel of the detected Incident. These notifications may include law enforcement, NCDOT, and other third parties as appropriate.

23.3.2.1.4 Response

Responses to Incidents will involve both automatic system responses and manual actions invoked by Developer. Automatic system responses include any actions initiated by the various hardware and software systems that do not require direct intervention by Developer. These actions shall be predetermined to invoke the appropriate system based response for the situation at hand.

Manual responses include any actions initiated by Developer in response to an Incident. Developer shall manually prepare and activate response plans in accordance with established procedures in response to a detected and confirmed Incident.

23.3.2.1.4.1 Incident Response in HOT Lanes

For the HOT Lanes, with respect to the Incident Response requirements set forth in Table 23.1 and Table 23.2, clearing an Incident shall mean removing and towing all disabled vehicles from the Travelway and Shoulders, removing all spill, debris or other encumbrance from the Travelway and Shoulders, and restoring traffic flow on the Travelway. Developer shall remove and tow all disabled vehicles to a location as specified in the Traffic Incident Management Plan. With respect to the Incident Response activities requiring clearing of Incidents as set forth in Table 23.1 and Table 23.2, the Cure Period or Fast Cure Period shall commence after public law enforcement and/or Emergency Response officials provide notification to begin clean-up activities in accordance with applicable Law.

Any Incident that blocks, partially blocks, or otherwise directly impacts operation of the HOT Lanes shall be considered to have originated in the HOT Lanes and be subject to the requirements of this Section 23.3.2.1.4.1.

23.3.2.1.4.2 Incident Response in General Purpose Lanes

For the General Purpose Lanes, with respect to the Incident Response requirements set forth in Table 23.1 and Table 23.2, clearing an Incident shall mean removing all disabled vehicles from the Travelway, removing all spill, debris or other encumbrance from the Travelway and Shoulders, and restoring traffic flow on the Travelway. With respect to the Incident Response activities requiring clearing of Incidents as set forth in Table 23.1 and Table 23.2, the Cure Period or Fast Cure Period shall commence after public law enforcement and/or Emergency Response officials provide notification to begin clean-up activities in accordance with applicable Law.

NCDOT will be responsible for towing of all disabled vehicles once Developer has moved such vehicles from the Travelway and onto the Shoulder to restore traffic flow on the Travelway.

23.3.2.2 Traffic Incident Management Plan

As part of the O&M Plan, Developer shall develop and implement a Traffic Incident Management Plan for dealing with major accidents and Incidents. The objective of the plan is to make sure that Developer has coordinated such Plan with NCDOT and the North Carolina Department of Public Safety or other public law enforcement and has the available resources to respond to the requests from NCDOT, law enforcement, and other designated agencies for first response, vehicle recovery, and clearance services. The need for additional trucks and heavy equipment shall be jointly determined at the Incident scene by law enforcement and Developer's representatives. The Plan shall also include locations to which disabled and towed vehicles will be towed to by Developer in accordance with Book 3.

23.3.2.2.1 Traffic Incident Management and Clearance Requirements

Developer shall provide appropriately trained staff and equipment to enable them to respond to Incidents as set out in Table 23.1 and Table 23.2.

23.3.2.2.2 Staffing Certifications and/or Licenses

Developer shall ensure that the Incident management staff are trained and qualified, prior to the start of their service, to perform the following activities:

- Incident management and command;
- advanced maintenance of traffic;
- Incident documentation and report writing;
- Emergency vehicle operation;
- first response; and
- handling of Hazardous Materials.

23.3.2.3 Communications/Media Relations

At all times, NCDOT will serve as the primary contact for all media relations on traffic Incidents except as provided in Section 3 of the Technical Provisions. Developer shall direct all media inquiries to NCDOT.

At no time will Developer staff offer the media an opinion on the cause of an Incident, supply tag numbers, or detailed descriptions of vehicles involved in an Incident. Developer shall not discuss information gathered from other agencies on a scene. If there is any conflict in standards, Developer shall adhere to the higher Submittal standard. If there is any unresolved ambiguity in standards, it is Developer's responsibility to obtain clarification before proceeding with O&M Work by Developer and Renewal Work. In addition, the requirement of *NCDOT Maintenance / Utility Traffic Control Guidelines* in Book 3 shall be applicable to the MOT for the performance of O&M Work.

23.3.2.4 Traffic Management Plan

Developer shall submit a TMP as per Section 22.1.1 of the Technical Provisions. Developer shall implement the TMP for all Work performed throughout the duration of the Term.

23.3.3 Traffic Operation Systems (TOS)

Developer's traffic operators will monitor and control the TOS devices. Developer will monitor and control the following systems and devices:

- traffic monitoring system;
- message sign system;
- Highway Advisory Radio (HAR) system (if provided by Developer);
- AM/FM Rebroadcast/Override System;
- Incident Detection System;
- Roadway Weather Information Station (RWIS) system (if provided by Developer) ;
- vehicle detectors;
- security/maintenance cameras;
- communications system; and
- Developer TMC security system.

Developer shall create and submit detailed minor and major preventative procedures for each sub-system Element. The procedure shall be based on manufacturer and NCDOT's recommendations and industry standards. Developer shall perform visual inspection, check the operation, and monitor electronically the functionality of each of the ITS sub-system

components. Developer shall regularly inspect for fatigue of materials of each system and the associated Elements.

23.3.4 Emergency Management

Emergency management can be classified into two categories:

- Governor Declared Emergencies; and
- Other Emergencies.

For Governor Declared Emergencies, Developer shall perform pre-event preparation and provide initial response post-event to protect the traveling public from hazards created by the event. For other Emergencies, Developer shall perform all aspects of responding to the Incident/event, including pre-event preparation, post-event initial response, and post-event cleanup and repair. For both classifications of Emergency management, Developer shall perform the following activities before every foreseeable Emergency management Incident/event:

- contact vendors and subcontractors to verify quantity, availability, and priority of appropriate equipment and personnel (e.g. variable message boards, chainsaws, and sand spreaders). Develop a complete up-to-date list of equipment resources and staging locations and of all stockpiled materials and their locations;
- in case of possible area evacuations, prepare for implementation of contraflow, including the pre-staging of necessary contraflow resources;
- if directed by NCDOT, implement contraflow and remove contraflow devices when complete; and
- in preparation for high winds, rains, and other impending Elements, secure all areas within the Project Right of Way associated with Developer's O&M Work.

For all Emergency management activities, NCDOT reserves the right to take control of the Incident and/or perform recovery Work with its own forces or other contracted forces when NCDOT determines it is in NCDOT's best interest to do so.

23.3.4.1 Emergency Response Plan

Developer shall be fully conversant with NCDOT's applicable comprehensive Emergency management plan as well as the FHWA and FEMA guidelines for federal reimbursement, ensure compliance with all State and Federal Emergency management requirements, and administer all response and recovery efforts in accordance with the CA Documents.

As part of the O&M Plan, Developer shall develop an Emergency Response Plan for Highway assets and ITS systems that sufficiently replicate the intent of NCDOT's comprehensive Emergency management plan. The Emergency Response Plan shall include, but not be limited to:

- Emergency communications plan with call lists;
- procedures for Incident/event management;
- agency & public notifications;
- assurance of motorist safety;
- handling of Hazardous Materials;
- coordination with public law enforcement and other appropriate agencies;

- assurance of compliance with NFPA requirements for roads, Bridges, and other Limited Access Highways;
- traffic control;
- coordination with NCDOT and other agencies to establish or implement pre-established detour routes;
- maintenance of detour routes;
- making Emergency repairs;
- debris removal;
- evacuation/contraflow response;
- submission of Incident/event reports; and
- detailed organizational Structure with the functions, qualifications, experience level, and contact information of staff assigned to respond to Incidents/events.

Developer shall comply with all NCDOT's plans and applicable Law concerning evacuation routes and the handling and disposal of Hazardous Materials.

Developer shall update the Emergency Response Plan annually by engaging in an iterative process of discussion with NCDOT whereby lessons learned from past experience can be implemented for future use.

23.3.4.2 Specific Developer Responsibilities for Governor Declared Emergencies

Developer shall perform the following five post-event activities following a Governor Declared Emergency:

- search all roadways covered by the Agreement for grievous hazards (roadway washouts/cave-ins, downed electrical lines, non-traversable Bridges, etc.). This may include clearing some debris from the Travelway and Shoulders in order to access such areas;
- immediately respond to perform traffic control, set up safety devices, and layout established or improvised detour routes in order to protect the traveling public from grievous hazards created by the Incident/event. When detour routes are required due to an Incident/event occurring on a Highway covered by this Contract, manage and maintain the entire detour route within the vicinity, even if the route extends onto roadways not covered by this Contract (State or non-State). For portions of a detour route extending outside the State's right-of-way, coordinate detour setup and maintenance with NCDOT and appropriate third parties;
- notify NCDOT's designated contact Person immediately upon occurrence of all major Incidents/events and immediately upon Road Closure for all Road Closures exceeding one hour and notify NCDOT again upon road reopening;
- inspect and perform any repairs as directed by NCDOT that are not eligible for Federal reimbursement; and
- assist NCDOT in performing damage assessment reviews.

Developer shall not initiate or perform debris removal, cleanup, or federally reimbursable repair Work necessitated by a Governor Declared Emergency Incident/event, with the exception of minimal clearing as required when searching for grievous hazards, until authorized to do so by

NCDOT. Developer shall provide an initial damage assessment and repair plan as soon as possible after assessing the scene.

23.3.4.3 Specific Developer Responsibilities for Other Emergencies

Other Emergencies are Incidents/events that do not prompt the Governor of North Carolina to declare a State of Emergency in response to the Incident/event. Other Emergencies may most commonly consist of, but not limited to, traffic crashes, guardrail hits, severe potholes or pavement damage, debris within Travelways, attenuator hits, Travelway Shoulder wash-outs Travelway cave-ins, and downed light poles but can also include natural disasters/events/storms, acts of God, and Incidents/events resulting from human interactions.

Developer shall arrive on-site, be prepared to take necessary action with necessary manpower and Emergency Response equipment and be available to relieve law enforcement personnel of traffic control functions.

Developer shall manage all aspects of traffic control related to an Incident, including coordination with Governmental agencies when Incidents impact other roads outside the Project Right of Way. When detour routes are required due to an Incident within the Project Right of Way, Developer shall, upon notification by NCDOT or other agencies, manage and maintain the portions of the detour route within the Project Right of Way.

Developer shall notify NCDOT's designated contact Person immediately upon occurrence of any major Incident or event resulting in a Road Closure. Developer shall provide an initial damage assessment and repair plan as soon as possible after assessing the scene. Developer shall subsequently notify NCDOT again upon road reopening.

When an Incident or event causes damage to any Project Element, Developer may pursue claims against any responsible party for reimbursement of expenses incurred as per NCDOT's procedures.

23.3.5 Traffic Operations

NCDOT's traffic engineering and operations personnel will evaluate and review safety and operations issues on the Project. Such reviews do not relieve Developer from its responsibilities with respect to traffic operations and safety. When such safety reviews are conducted, Developer shall cooperate with NCDOT's requests for data and provide relevant staff support as necessary. When corrections or mitigations are required based on the safety review, Developer shall comply with such corrective or mitigation measures for such safety review. Corrective measures include the development of traffic/safety studies, providing access to data, access to the project resources and implementation of recommended safety related mitigation recommendations.

Developer shall work with NCDOT to resolve any issues related to revisions or modifications, including but not limited to:

- advising speed limit changes on the mainline;
- speed limit changes to the ramps within the Project;
- signing and pavement marking improvements;
- regulatory, overhead and ground mounted signs;
- safety lighting;
- request to experiment with new products;

- special event coordination;
- safety studies; and
- fatal crash reporting.

23.3.5.1 Lane Closures

In response to Incidents, Developer may be required to close lane(s), depending on the severity of the Incident and the required remediation Work. If a Lane Closure is required in response to an Incident, Developer shall implement and execute such Closure in accordance with all applicable Lane Closure and traffic management requirements. If a Closure is not a Permitted Closure, then Developer shall be assessed liquidated damages in accordance with Exhibit 14 of the Agreement.

23.4 Minimum Requirements Subject To Construction Noncompliance Events

Developer shall meet the minimum Performance Requirements set forth in Table 23.1 of the Technical Provisions from March 31, 2015 to the Substantial Completion Date for each Project Section, respectively. Failure to meet these minimum Performance Requirements shall results in Construction Noncompliance Events as set forth in the CA Documents.

Developer shall develop and detail in the O&M Plan the approach to be used in order to achieve the minimum Performance Requirements as detailed in Table 23.1 and implement this approach.

Developer's performance shall be evaluated with respect to these minimum Performance Requirements specified herein; however, to acknowledge Developer's ability to utilize design innovation, there may be circumstances in which Developer's Final Design or other Project requirements impact the performance categories to be monitored or the minimum performance levels required. Developer, under these circumstances, shall submit the equivalent system and the proposed minimum performance level to NCDOT for its good faith approval prior to Substantial Completion of the applicable Project Section.

23.4.1 Construction Noncompliance Events with Temporary Cures

Construction Noncompliance Events that have been rectified through the use of temporary repairs or other temporary means shall be subject to the minimum Performance Requirements set forth in Table 23.1 and deemed a Construction Noncompliance Event if the temporary repair or other temporary action does not meet the applicable minimum Performance Requirements. Developer shall develop procedures to track the rectification means of Construction Noncompliance Events to identify the rectification means as temporary or permanent and shall document such rectification means in the O&M Monthly Reports. For those Construction Noncompliance Events with temporary rectification means, Developer shall develop a plan for providing permanent rectification means.

23.4.2 Notification of Construction Noncompliance Events and Closures During Construction

Developer shall, at a minimum, notify NCDOT of Construction Noncompliance Events, and Closures, within 48 hours of the event. There is no Cure Period for this failure to notify. Developer's operations procedures shall include the process for notification to NCDOT of such events. Developer shall include copies of the related information to confirm compliance with this requirement in the O&M Monthly Reports.

23.5 Minimum Requirements Subject To O&M Noncompliance Events

Developer shall meet the minimum Performance Requirements set forth in Table 23.2 of the Technical Provisions from the Substantial Completion Date for each Project Section, respectively, until the end of the Term. Failure to meet these minimum Performance Requirements shall results in O&M Noncompliance Events are set forth in the CA Documents

Developer shall develop and detail in the O&M Plan the approach to be used in order to achieve the minimum Performance Requirements as detailed in Table 23.2 and implement this approach.

Developer shall operate and maintain the Project in a safe manner at all times regardless of these minimum Performance Requirements. Developer's performance shall be evaluated with respect to the minimum Performance Requirements specified herein; however, to acknowledge Developer's ability to utilize design innovation, there may be circumstances in which Developer's Final Design or other Project Requirements impact the performance categories to be monitored or the minimum performance levels required. Developer, under these circumstances, shall submit the equivalent system and the proposed minimum performance level to NCDOT for its good faith approval.

23.5.1 Notification of O&M Noncompliance Events and Closures during Operations

Developer shall, at a minimum, notify NCDOT of O&M Noncompliance Events and Closures within 48 hours of the event. There is no Cure Period for this fault. Developer's operations procedures shall include the process for notification to NCDOT of these events. Developer shall include copies of the related information to confirm compliance with this requirement in the O&M Monthly Reports.

23.5.2 Mandatory Spare Parts

Developer shall determine the spare parts required to meet its maintenance obligations under the CA Documents. However, due to their nature and associated long lead time, Developer shall, at a minimum, store spare parts including, but not limited to, attenuator parts, guardrail panels, ITS components, regulatory signs and equipment.

23.6 Handback

23.6.1 Handback Renewal Work Plan

Developer shall submit a Handback Renewal Work Plan to NCDOT for approval in its good faith discretion 60 months prior to the end of the Term. The Handback Renewal Work Plan shall set out Developer's proposed processes for:

- assessment of the condition, performance and Residual Life of the Project assets at the Termination Date;
- Renewal Work through maintenance, repair, reconstruction, rehabilitation, restoration, renewal or replacement of Project assets such that the assets comply with the acceptance criteria that measures the condition, performance, and specified life of the respective Project assets remaining at the end of the Term;
- plan for the transition of operation and maintenance responsibilities to NCDOT and acceptance of the Project assets and operation and maintenance responsibilities upon satisfaction of the acceptance criteria; and
- NCDOT staff training on all O&M manuals, systems, and procedures.

Developer shall coordinate all aspects of the development of the Handback Renewal Work Plan with NCDOT, including conducting operation and maintenance as agreed, independent or joint inspections of the assets and performance of the acceptance tests that measure the condition, performance, and specified life of the respective Project Elements remaining at the end of the Term.

23.6.1.1 Assessment of Condition, Performance and Residual Life

The Handback Renewal Work Plan shall detail the methods and tests that will be used during the condition and performance assessments, the acceptance criteria, the acceptance measures or limits that must be satisfied, and the conditions and data that will be used to calculate the residual lives of all Project Elements. The Handback Renewal Work Plan shall also include the scope, schedule, detailed tests and inspection procedures, processes and evaluations required, acceptance criteria, and acceptance measures that will be used to verify and demonstrate to NCDOT that all facilities, equipment and systems function as specified; that they comply with the applicable codes and standards set forth in the Technical Provisions; and that they meet the Residual Life requirements as specified in Table 23.3.

The test and inspection procedures detailed in the Handback Renewal Work Plan shall indicate any particular reference standards, or other information used to support the testing, inspection, and asset evaluation process, including updates to standards that occur during the Term.

The same procedures and methodology for inspection and determination of Renewal Work used in the independent third party inspections detailed in Section 23.1.7 of the Technical Provisions shall be used at Handback, with the exception that all Project Elements shall be inspected. The determination as to whether a Bridge requires rehabilitation or replacement shall be in accordance with the Highway Bridge Replacement and Rehabilitation Program (23 CFR 650.409).

Developer shall prepare the initial Residual Life calculation methods for each Project Element and shall utilize applicable current industry standards, manufacturer's life expectancy, equipment Mean Time Between Failures, and equipment/asset histories in addition to criteria listed in the Handback Evaluation Criteria column of Table 23.3 to determine the condition, performance and the Residual Life for each Element.

Developer shall use the Elements identified in Table 23.3 together with any further Elements incorporated into the Project as a result of Developer's Final Design configuration and Elements in place at the time of the evaluation when determining the required inspections and tests. Developer and NCDOT shall mutually develop a more detailed table and proposal based upon Developer's Design Documents configuration and Project Elements in place at the time of the Handback Renewal Work Plan's preparation.

23.6.1.2 Renewal Work

The Handback Renewal Work Plan shall detail Developer's approach to maintenance, repair, reconstruction, rehabilitation, restoration, renewal, and replacement of Project Elements such that they meet the operational, performance, and life-remaining requirements as specified in Table 23.3, based upon Developer's Design Documents configuration and Elements in place at the time of the Handback Renewal Work Plan's preparation.

Developer's Renewal Work proposals shall be developed:

- on the basis of the assessment of the operation, performance, and Residual Life of the Project Elements; and
- on the assumption that the Project Elements will be maintained in accordance with the

Technical Provisions for the remainder of the Term.

The Handback Renewal Work Plan shall contain Developer's proposed schedule for implementation of maintenance, repair, reconstruction, rehabilitation, restoration, renewal, or replacement of Project Elements.

The Handback Renewal Work Plan shall contain details of the cost, the "Handback Renewal Amount," of executing the Handback Renewal Work.

The Handback Renewal Work Plan shall include any areas that are under remedial Work. Developer shall retain all remediation responsibility (and liability) until such time that Developer submits to NCDOT a full description of the remedial Work and the results of such Work, and receives from NCDOT acceptable documentation indicating that Developer has complied with all directives and fulfilled and completed their remediation obligations as directed by the Governmental Entity with jurisdiction, whether it be a Federal, State, County or Local government.

23.6.1.3 Training & Transition

The third component of the Handback Renewal Work Plan shall be a Training and Transition Plan. The Training and Transition Plan shall detail how Developer will work with NCDOT to ensure a seamless transfer of O&M responsibilities and safe traffic operations back to NCDOT.

At least six months prior to the Termination Date, Developer shall provide a comprehensive O&M training session for NCDOT's staff which shall cover in detail all operations and maintenance functions of the Project, and an on-the-job transition project plan and schedule. The training session shall include a review of certain Project records as well as all O&M Manuals, and other plans and procedures. The complete curriculum for this training session shall be contained in the Training and Transition Plan component of the Handback Renewal Work Plan.

23.6.2 Execution of the Handback Renewal Work Plan

Upon receipt of approval of the Handback Renewal Work Plan by NCDOT, including the Renewal Work Schedule and the Handback Renewal Amount, Developer shall execute the Renewal Work in accordance with the Handback Renewal Work Plan and the CA Documents. All references to Work in other Sections of the Technical Provisions shall also apply to the Renewal Work.

Developer's Handback Renewal Work Plan shall be financed in accordance with the requirements of Section 8.10 of the Agreement.

23.6.3 Annual Handback Renewal Work Plan Updates

The Handback Renewal Work Plan shall include provisions for annual evaluation reports of the Project Elements for the remainder of the Term. After the preparation of the first annual evaluation report and prior to the commencement of each year remaining in the Term, Developer, upon consultation with NCDOT, shall update the Handback Renewal Work Plan, as needed, to reflect changes in conditions of the Project Elements or evaluation methodology determined following an inspection of the Project Elements by NCDOT or its designee. Each subsequent Handback Renewal Work Plan prepared after the first plan shall be subject to the approval of NCDOT. As well as including the results from the last annual evaluation report, the Handback Renewal Work Plan shall include the estimated cost and schedule of implementation of the remaining Handback Renewal Work.

The successive versions of the Handback Renewal Work Plan shall incorporate the results from the last annual inspection report and include the estimated cost and a schedule of the Renewal

Work (from the then-current date until the end of the Term). Developer shall submit a copy of each successive version of Handback Renewal Work Plan to NCDOT for approval. The Handback Renewal Work Plan shall include all Project Elements, without limitation.

23.6.4 Handback Requirements

Project assets, Structures, systems, and equipment shall meet the minimum Handback Requirements and criteria set forth in Table 23.3. Developer shall prepare a revised table based upon Developer's actual design configuration and Project Elements as part of the Handback Renewal Work Plan.

23.7 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 23 of the Technical Provisions:

- Draft Operations & Maintenance Plan for approval no later than 45 days after NTP1;
- Final Operations & Maintenance Plan for approval no later than 90 days after NTP1;
- Annual Operations & Maintenance Plan Updates for approval within 45 days prior to the beginning of each Fiscal Year after NTP1;
- O&M Monthly Report Format for approval 60 days prior to March 31, 2015;
- O&M Monthly Report for review and comment by the 15th day of each month beginning on March 31, 2015;
- O&M Annual Report for review and comment no later than the 30th day of each Fiscal Year beginning on March 31, 2015;
- Renewal Work Plan for approval no later than 45 days prior to the first Substantial Completion Date;
- Annual Renewal Work Plan Updates for approval no later than 45 days prior to beginning of Fiscal Year after the first Substantial Completion Date;
- Renewal Work Report for review and comment no later than 45 days after the end of each Fiscal Year beginning at the first Substantial Completion Date;
- Damage report within 24 hours after Emergency;
- Handback Renewal Work Plan for approval 60 months prior to the end of the Term; and
- Annual Handback Renewal Work Plan Updates for approval prior to the commencement of each year remaining in the Term.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Inspection & Reporting								
O&M Plan	Initial O&M Plan.	1	Submit the draft O&M Plan to NCDOT for review and approval within 45 days after NTP1.	A	N/A	N/A	24 Hours	
		2	Submit the final O&M Plan to NCDOT for review and approval within 90 days after NTP1.	A	N/A	N/A	24 Hours	
	Annual updates to the O&M Plan.	3	Within 45 days prior to the beginning of each Fiscal Year after NTP 1, update the O&M Plan and submit it to NCDOT for review and approval.	A	N/A	N/A	24 Hours	
O&M Monthly and Annual Reports	O&M Monthly Reports.	4	Beginning from March 31, 2015, deliver the O&M Monthly Report to NCDOT no later than the 15th day of the subsequent month.	A	N/A	N/A	24 Hours	
	O&M Annual Reports.	5	Beginning from March 31, 2015, deliver the O&M Annual Report to NCDOT no later than the 30th day of the subsequent Fiscal Year.	A	N/A	N/A	24 Hours	
Renewal Work Plan	Initial Renewal Work Plan.	6	Submit the five-year Renewal Work Plan to NCDOT for review and approval within 45 days prior to the first Substantial Completion Date.	A	N/A	N/A	24 Hours	
	Annual updates to the Renewal Work Plan.	7	Within 45 days prior to the beginning of each Fiscal Year after the first Substantial Completion Date, update the Renewal Work Plan and submit it to NCDOT for review and approval.	A	N/A	N/A	24 Hours	
Renewal Work Report	Renewal Work Reports.	8	Beginning from the first Substantial Completion Date, deliver the Renewal Work Report, including any as-built drawings, to NCDOT no later than the 45th day of the subsequent Fiscal Year.	A	N/A	N/A	24 Hours	
Emergency Reporting	Emergency reports.	9	Provide NCDOT with a detailed damage report within 24 hours after the occurrence of an Emergency, as detailed in Section 23.1.9 of the Technical Provisions.	B	N/A	N/A	24 Hours	
Maintenance Patrols	Conduct maintenance patrols to detect any issues on the facility that need to be addressed.	10	Conduct a daily maintenance patrol and visual inspection of the entire facility to identify any Incidents or deficiencies. Submit an Incident/deficiency report to NCDOT by 7:00 a.m. the following day.	B	N/A	N/A	8 Hours	
Noncompliance Event and Closure Reporting	Notification of Construction Noncompliance Events and Closures to NCDOT.	11	Notify NCDOT of Construction Noncompliance Events and Closures within 48 hours of the event, as detailed in Section 23.4.2 of the Technical Provisions.	B	N/A	N/A	8 Hours	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Remedial Plan	Delivery of Remedial Plan to NCDOT.	12	Deliver Remedial Plan to NCDOT in accordance with Article 17.3.6.1 of the CA.	E	N/A	N/A	24 Hours	
Flexible Pavement								
Flexible Pavement	Maintain flexible pavement at acceptable condition and level of safety for traveling public.	13	Repair all pot holes and slippage areas greater than 1.0 square feet in area and/or between 1.0 inches and 2.0 inches deep.	C	48 Hours	N/A	24 Hours	
		14	Repair all pot holes and slippage areas greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	
Rigid Pavement								
Rigid Pavement	Maintain rigid pavement acceptable condition and level of safety for traveling public.	15	Repair all spalls, pot holes, and punchouts greater than 1.0 square feet in area and/or between 1.0 inches and 2.0 inches deep.	C	48 Hours	N/A	24 Hours	
		16	Repair all spalls, pot holes, and punchouts greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	
Slopes, Drainage and Vegetation								
Vegetation Control	Continually monitor walls, slopes, and barriers for vegetation growth. Monitor roadside vegetation on Shoulders, under guardrail, attenuators, and other areas.	17	No tree and shrub overhanging Traffic Lanes and Shoulders.	C	7 Days	N/A	24 Hours	
		18	Maintain mowable areas at a height between 4 and 18 inches and in accordance with Exhibit 23-01.	C	7 Days	N/A	24 Hours	
		19	Slope - No washouts or ruts greater than 6 inches deep and 2 feet wide, or erosion showing a pattern that will endanger the stability of the slope creating an unsafe recovery area.	D	15 Days	5 Days	5 Days	
		20	Repair all areas of off-site siltation caused by Developer actions.	D	7 Days	3 Days	3 Days	
		21	Repair all slope failures caused by Developer actions.	E	24 Hours	12 Hours	60 Minutes	
		22	Unpaved Shoulder - No drop-offs greater than 2.0 inches within 10 feet of the edge of Travelway, no Shoulders higher than 2.0 inches within 10 feet of the edge of Travelway, and no Shoulders that cause water to drain back within the Travelway.	C	3 Days	24 Hours	24 Hours	
		23	Use pesticides in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
Fencing	Maintain fence in acceptable condition and level of safety for the traveling public.	24	Repair or replace all damaged and/or broken fences that no longer provide access control and/or a physical barrier, as instructed to by NCDOT, in response to motorist/citizen requests.	C	30 Days	5 Days	5 Days	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Retaining Walls	Maintain retaining walls at acceptable level of safety for the traveling public (structural damage).	25	Complete all emergency/temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system.	E	24 Hours	12 Hours	12 Hours	
Causeways	Prevent erosion and maintain slope stability and ensure safety.	26	Complete all temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system.	E	48 Hours	24 Hours	24 Hours	
Litter and Debris								
Debris and Encumbrances Removal	Removal of tire casings, automobile wreckage, animal carcasses, and other debris from travel lanes and Shoulder.	27	Remove debris or encumbrances, carcasses, and other roadway obstructions in the Travelways that constitute a safety hazard or eminent danger.	E	30 Minutes	15 Minutes	15 Minutes	
		28	Remove debris or encumbrances, carcasses, and other obstructions on the Shoulders and other areas not on the Travelway.	C	8 Hours	4 Hours	4 Hours	
		29	Dispose of collected debris, carcasses, and other roadway obstructions in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
Litter Removal	Removal of litter within Project Right of Way.	30	Start one litter collection cycle every two weeks.	B	N/A	N/A	48 Hours	
		31	Finish each litter collection cycle within one week after starting.	B	N/A	N/A	48 Hours	
		32	Collect excessive litter upon notification or discovery.	B	2 Hours	60 Minutes	60 Minutes	
		33	Dispose of collected litter/debris in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
Graffiti Removal	Continually monitor and maintain assets free of graffiti.	34	Remove graffiti from traffic devices where it is a safety hazard.	E	24 Hours	8 Hours	8 Hours	
		35	Remove other graffiti that is not a safety hazard.	B	48 Hours	12 Hours	12 Hours	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Hazardous Materials/Fuel Spills	Inspect the area impacted after a fuel spill or other contamination event and remove any contamination in accordance with Section 23.1.10 of the Technical Provisions.	36	Respond to the scene upon notification and document situation and report to NCDOT.	D	30 Minutes	20 Minutes	15 Minutes	
		37	Begin implementation of clean-up/containment efforts in accordance with the O&M Plan.	E	60 Minutes	45 Minutes	30 Minutes	
		38	Complete initial containment and removal efforts to maintain public safety in accordance with the O&M Plan and notify NCDOT of initial assessment of affected area(s).	E	2 Hours	90 Minutes	60 Minutes	
		39	Manage mitigation and removal Work. Restore contaminated area to its initial condition in accordance with the O&M Plan.	D	3 Days	48 Hours	24 Hours	
		40	Conduct contamination removal Work in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
Sound and Privacy Walls	Maintain sound and privacy walls at acceptable level of safety for the traveling public (structural damage).	41	Complete all emergency/temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system.	E	24 Hours	12 Hours	12 Hours	
Storm water								
Drains & Drainage	Maintain drainage system in acceptable condition and level of safety for the traveling public.	42	Clear obstructed culverts, drains, ditches, inlets, etc. or sediment, vegetation and debris when they are greater than 50% blocked.	C	48 Hours	N/A	24 Hours	
		43	Maintain Travelways free of standing water.	E	30 Minutes	N/A	30 Minutes	
		44	No damage due to cracking, joint failures, or corrosion that affects performance. No water infiltration causing sub base erosion, pavement failures, Shoulder failures, or roadway settlement.	D	30 Days	N/A	5 Days	
Retention/Hazardous Spill Basins	Ensure that all retention/hazardous spill basins are working properly and free of functional defects.	45	Meet all technical requirements for inspection and maintenance of retention/hazardous spill basins in accordance with NCDOT memorandum dated December 18, 2003 regarding Hazardous Spill Basin Maintenance Policy.	D	7 Days	N/A	3 Days	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Erosion & Sedimentation Control	Ensure that all erosion and sedimentation control measures comply with Developer's Stormwater Pollution Prevention Plan and Stormwater Management Program.	46	Ensure that all erosion and sedimentation control measures comply with Developer's Stormwater Pollution Prevention Plan and Developer's Stormwater Management Program.	D	At NCDOT sole discretion			
Permits	Maintain all facilities in line with permits.	47	Comply with Governmental Approvals and permit requirements, monitoring, and reporting.	D	30 Days	N/A	5 Days	
Bridges								
Major Damage	Repair major damage.	48	Complete temporary repairs to restore safe travel conditions (to the extent physically feasible) for any major damage as defined in Section 23.2.2.2 of the Technical Provisions.	E	24 Hours	12 Hours	4 Hours	
Minor Damage	Repair minor damage.	49	Repair minor damage as defined in Section 23.2.2.2 of the Technical Provisions, and Work identified from the latest NBIS inspection reports dated 2013 or before, as submitted to Proposers as Reference Documents.	C	60 Days	N/A	5 Days	
Bridge Deck	Maintain bridge deck at acceptable condition and level of safety for traveling public.	50	No exposed reinforcing steel on bridge deck.	C	60 Days	N/A	5 Days	
		51	Repair all spalls and pot holes greater than 1.0 square feet in area and/or between 1.0 inches and 2.0 inches deep.	C	48 Hours	N/A	24 Hours	
		52	Repair all spalls and pot holes greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
ITS & Communications Systems								
Existing Communication Links	Maintaining existing communication links within the Project Right of Way.	53	Repair or replace damaged communications equipment caused by Developer actions (fiber optic cable, conduit, pull boxes, splice cabinets, hubs, etc.). Damaged fiber optic cable may be temporarily fusion spliced.	D	4 Hours	N/A	2 Hours	
		54	Replaced any damaged fiber optic cable caused by Developer actions from termination point to termination point with the same type of cable.	D	90 Days	N/A	30 Days	
Electrical								
Highway Lighting	Maintain functionality of highway lighting system.	55	Maintain full functionality of all luminaires and provide maintained illuminance to meet the design standards to Section 20 of the Technical Provisions.	A	5 Days	48 Hours	24 Hours	
Sign Lighting	Maintain functionality of highway sign lighting.	56	Maintain full functionality of all sign luminaires.	C	48 Hours	24 Hours	24 Hours	
Traffic Guidance								
Pavement Markings / Delineators	Repair and replacement of line striping and pavement reflectors.	57	Pavement markings, snowplow able pavement markers and reflectors shall be replaced when they are missing or no longer straight, continuous, or visible under all lighting conditions and when pavement is wet - April to October.	B	30 Days	N/A	5 Days	
		58	Pavement markings, snowplow able pavement markers and reflectors shall be replaced when they are missing or no longer straight, continuous, or visible under all lighting conditions and when pavement is wet - November to March.	B	60 Days	N/A	5 Days	
		59	Replace all damaged or missing delineation posts/reflectors. All delineation posts and reflectors shall be free of functional defects and visible to the travelling public.	B	30 Days	N/A	5 Days	
Signage	Maintain signs at acceptable level of safety for the traveling public.	60	Repair all damaged overhead signs and sign structures that pose imminent risk to the public.	E	2 Hours	30 Minutes	30 Minutes	
		61	Repair/replace all non-functional or non-legible Stop, Do Not Enter, Wrong Way, Yield and Hospital signs.	E	8 Hours	4 Hours	60 Minutes	
		62	Repair/replace all other signs, including posts that are damaged or missing.	B	5 Days	48 Hours	24 Hours	
Guardrail	Maintain guardrail at acceptable level of safety for the traveling public (structural damage).	63	Complete all emergency/temporary repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	12 Hours	6 Hours	60 Minutes	
		64	Complete all permanent repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	5 Days	48 Hours	24 Hours	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Barrier Wall	Maintain barrier walls at acceptable level of safety for the traveling public (structural damage).	65	Complete all emergency/temporary provisions and/or repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	12 Hours	12 Hours	60 Minutes	
		66	Complete all permanent repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	5 Days	48 Hours	24 Hours	
Attenuators	Maintain attenuators at acceptable level of safety for the traveling public (structural damage).	67	Complete all emergency/temporary repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	12 Hours	12 Hours	60 Minutes	
		68	Complete all permanent repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	5 Days	48 Hours	24 Hours	
Storm and Other Major Damage								
Storm Maintenance / Major Damage	Response to damage caused by strong winds, heavy rains, slides, slip-	69	Place regulatory and warning devices, delineation signs, etc on the facility at conclusion of event.	D	24 Hours	N/A	60 Minutes	
		70	Begin planning/implementation of remediation Work.	C	24 Hours	N/A	24 Hours	
Disaster Recovery	Mitigation of disruption of operation of the Project and restoring operations post-disaster.	71	Comply with all disaster recovery requirements and procedures.	E	N/A	N/A	24 Hours	
Lane Closures								
Lane Closures	Closure of Traffic Lanes during the Term (at least two Traffic Lanes remaining open).	72	Comply with the time restrictions for Permitted Closures set forth in Section 23.2.1.2 of the Technical Provisions. Request approval 24 hours prior.	D	N/A	N/A	15 Minutes	Refer to Exhibit 14 of the Agreement
	Closure of Traffic Lanes during the Term (less than two Traffic Lanes remaining open).	73	Comply with the time restrictions for Permitted Closures set forth in Section 23.2.1.2 of the Technical Provisions. Request approval 24 hours prior.	E	N/A	N/A	15 Minutes	Refer to Exhibit 14 of the Agreement

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Incident Response								
Incident Response	Response to sites of incidents, emergencies, accidents, and other events that that result in a condition that is unsafe and/or may present a life threatening condition.	74	Respond to scene within 45 minutes after detection or notification on Shoulders.	C	N/A	N/A	30 Minutes	
		75	Respond to scene within 45 minutes after detection or notification in Travelway.	D	N/A	N/A	30 Minutes	
	Clearing of incidents and reopening of closed travel lanes and Shoulders after police/emergency response officials provide notification to begin clean-up in accordance with Section 23.3.2.1.4 of the Technical Provisions.	76	Reopen and clear the closed Shoulder to traffic after Closure resulting from an Incident that involves a breakdown, minor accident (passenger vehicles only, no overturned vehicles), non-hazardous material spill or debris and only resulting in a Shoulder closure/blockage within 60 minutes.	C	N/A	N/A	30 Minutes	
		77	Reopen and clear the closed travel lane to traffic after Closure resulting from an Incident that involves a breakdown, minor accident (passenger vehicles only, no overturned vehicles), non-hazardous material spill or debris and resulting in up to one closed travel lane within 30 minutes.	N/A	N/A	N/A	N/A	Refer to Exhibit 14 of the Agreement
		78	Reopen and clear the closed travel lanes to traffic after Closure resulting from an Incident that involves a multiple vehicle accident (passenger vehicles/light trucks, one overturned vehicle), but no fire and resulting in up to all travel lanes closed in one direction within 60 minutes.	N/A	N/A	N/A	N/A	
		79	Reopen and clear the closed travel lanes to traffic after Closure resulting from an Incident that involves a multiple vehicle accident (passenger vehicles /light trucks, two or more overturned vehicles) with or without fire and resulting in up to all travel lanes closed in one direction within two hours.	N/A	N/A	N/A	N/A	
		80	Reopen and clear the closed travel lanes to traffic after Closure resulting from an Incident that involves a heavy transport vehicles or lost cargo loads, with or without fire and resulting in up to all travel lanes closed in one direction and one or more travel lanes closed in the opposite directior within three hours.	N/A	N/A	N/A	N/A	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**O&M Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Inspection & Reporting								
O&M Plan	Annual updates to the O&M Plan.	1	Within 45 days prior to the beginning of each Fiscal Year, update the O&M Plan and submit it to NCDOT for review and approval.	A	N/A	N/A	24 Hours	
O&M Monthly and Annual Reports	O&M Monthly Reports.	2	Deliver the O&M Monthly Report to NCDOT no later than the 15th day of the subsequent month.	A	N/A	N/A	24 Hours	
	O&M Annual Reports.	3	Deliver the O&M Annual Report to NCDOT no later than the 30th day of the subsequent Fiscal Year.	A	N/A	N/A	24 Hours	
Renewal Work Plan	Annual updates to the Renewal Work Plan.	4	Within 45 days prior to the beginning of each Fiscal Year, update the Renewal Work Plan and submit it to NCDOT for review and approval.	A	N/A	N/A	24 Hours	
Renewal Work Report	Renewal Work Reports.	5	Deliver the Renewal Work Report, including any as-built drawings, to NCDOT no later than the 45th day of the subsequent Fiscal Year.	A	N/A	N/A	24 Hours	
Emergency Reporting	Emergency reports.	6	Provide NCDOT with a detailed damage report within 24 hours after the occurrence of an Emergency, as detailed in Section 23.1.9 of the Technical Provisions.	B	N/A	N/A	24 Hours	
Maintenance Patrols	Conduct maintenance patrols to detect any issues on the facility that need to be addressed.	7	Conduct a daily maintenance patrol and visual inspection of the entire facility to identify any Incidents or deficiencies. Submit an Incident/deficiency report to NCDOT by 7:00 a.m. the following day.	B	N/A	N/A	8 Hours	
Noncompliance Event and Closure Reporting	Notification of O&M Noncompliance Events and Closures to NCDOT.	8	Notify NCDOT of O&M Noncompliance Events and Closures within 48 hours of the event, as detailed in Section 23.5.1 of the Technical Provisions.	B	N/A	N/A	8 Hours	
Remedial Plan	Delivery of Remedial Plan to NCDOT.	9	Deliver Remedial Plan to NCDOT in accordance with Article 17.3.6.1 of the CA.	E	N/A	N/A	24 Hours	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**O&M Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Flexible Pavement								
Flexible Pavement	Maintain flexible pavement at acceptable condition and level of safety for traveling public.	10	For any continuous one mile segment, maintain a Pavement Condition Survey Manual rating of 80 or higher for HOT Lane pavement.	C	12 Months	N/A	30 Days	
		11	For any continuous one mile segment, maintain a Pavement Condition Survey Manual rating of 80 or higher for General Purpose Lane pavement.	C	12 Months (if remedial actions identified in the independent inspections are deemed as Developer's responsibility under Section 23.1.7 of the Technical Provisions)	N/A	30 Days (if remedial actions identified in the independent inspections are deemed as Developer's responsibility under Section 23.1.7 of the Technical Provisions)	
		12	Repair all pot holes and slippage areas greater than 1.0 square feet in area and/or between 1.0 inches and 2.0 inches deep.	C	48 Hours	N/A	24 Hours	
		13	Repair all pot holes and slippage areas greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	$3,300
		14	Seal all cracks greater than 0.1 inches if there are greater than 50 linear feet of such cracks in any continuous 1/10 of a lane mile segment.	B	30 Days	N/A	10 Days	
		15	Meet all other technical requirements for flexible pavement set forth in the Maintenance Operations Manual.	A	60 Days	N/A	10 Days	
Rigid Pavement								
Rigid Pavement	Maintain rigid pavement at acceptable condition and level of safety for traveling public.	16	For any continuous one mile segment, maintain a Pavement Condition Survey Manual rating of 80 or higher for HOT Lane pavement.	C	12 Months	N/A	30 Days	
		17	For any continuous one mile segment, maintain a Pavement Condition Survey Manual rating of 80 or higher for General Purpose Lane pavement.	C	12 Months (if remedial actions identified in the independent inspections are deemed as Developer's responsibility under Section 23.1.7 of the Technical Provisions)	N/A	30 Days (if remedial actions identified in the independent inspections are deemed as Developer's responsibility under Section 23.1.7 of the Technical Provisions)	
		18	Repair all spalls, pot holes, and punchouts greater than 1.0 square feet in area and/or between 1.0 inches and 2.0 inches deep.	C	48 Hours	N/A	24 Hours	
		19	Repair differential lane-shoulder drop-offs greater than ½ inches.	B	7 Days	N/A	24 Hours	
		20	Repair differential lane-lane drop-offs greater than 1/4 inches.	D	7 Days	N/A	24 Hours	

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		21	Repair all spalls, pot holes, and punchouts greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	$3,200
		22	Seal all joints and cracks and repair damaged joints.	C	30 Days	N/A	10 Days	
		23	Repair or replace all slabs where movement is evident, regardless of the number of pieces the slab is broken into, including but not limited to corner breaks.	C	60 Days	N/A	10 Days	$3,900
		24	Meet all other technical requirements for rigid pavement set forth in the Maintenance Operations Manual.	A	60 Days	N/A	10 Days	
Slopes, Drainage and Vegetation								
Vegetation Control	Continually monitor walls, slopes, and barriers for vegetation growth. Monitor roadside vegetation on Shoulders, under guardrail, attenuators, and other areas.	25	No tree and shrub overhanging Traffic Lanes and Shoulders.	C	7 Days	N/A	24 Hours	
		26	Maintain mowable areas at a height between 4 and 18 inches and in accordance with Exhibit 23-01.	C	7 Days	N/A	24 Hours	
		27	No trees or woody growth greater than 1.0 inches in diameter within the established cleared area.	B	7 Days	N/A	24 Hours	
		28	Maintain all portions of the travel lanes, Shoulders, curbs, gutters, and drainage structures free of plant growth and vegetation.	C	7 Days	N/A	24 Hours	
		29	Maintain all walls, barriers, and other roadway features free of undesirable vegetative growth.	C	7 Days	N/A	24 Hours	
		30	Turf - no continuous brown-out areas greater than 50 square feet.	C	60 Days	N/A	5 Days	
		31	No bare or erodible areas.	D	15 Days	5 Days	5 Days	
		32	Slope - No washouts or ruts greater than 6 inches deep and 2 feet wide, or erosion showing a pattern that will endanger the stability of the slope creating an unsafe recovery area.	D	15 Days	5 Days	5 Days	$400
		33	No off-site siltation.	D	7 Days	3 Days	3 Days	$400
		34	No slope failures.	E	24 Hours	12 Hours	60 Minutes	$1,200
		35	Unpaved Shoulder - No drop-offs greater than 2.0 inches within 10 feet of the edge of Travelway, no Shoulders higher than 2.0 inches within 10 feet of the edge of Travelway, and no Shoulders that cause water to drain back within the Travelway.	C	3 Days	24 Hours	24 Hours	
		36	Use pesticides in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
		37	Meet all other technical requirements for vegetation control set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Fencing	Maintain fence in acceptable condition and level of safety for the traveling public.	38	Repair or replace damaged and/or broken fences that no longer provide access control and/or a physical barrier.	C	30 Days	5 Days	5 Days	
		39	Fences shall be functional, visible and accessible. Fences and fence posts shall be plumb and fence shall have no sags or deflections greater than six inches.	B	30 Days	N/A	5 Days	
		40	Meet all other technical requirements for fencing set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	

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Retaining Walls	Maintain retaining walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	41	Keep weep holes in walls open. No wash-outs or separation at top of wall.	C	30 Days	N/A	5 Days	
		42	Prevent erosion at base on walls.	C	30 Days	N/A	5 Days	
		43	Seal cracks or joints in accordance with the Bridge Maintenance Manual.	C	30 Days	N/A	5 Days	
		44	Repair all spalls greater than 1.0 inches deep with a surface area greater than 1.0 square feet.	C	30 Days	N/A	5 Days	
		45	Meet all other technical requirements for retaining walls set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
	Maintain retaining walls at acceptable level of safety for the traveling public (structural damage).	46	Complete all emergency/temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system.	E	24 Hours	12 Hours	12 Hours	$1,000
		47	Complete all permanent repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system.	E	7 Days	4 Days	3 Days	
Causeways	Prevent erosion and maintain slope stability and ensure safety.	48	Complete all temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system, as directed by NCDOT through a Change Order.	E	As agreed upon by Developer and NCDOT			
		49	Complete all permanent repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system, as directed by NCDOT through a Change Order.	E	As agreed upon by Developer and NCDOT			
Litter and Debris								
Debris and Encumbrances Removal	Removal of tire casings, automobile wreckage, animal carcasses, and other debris from travel lanes and Shoulder.	50	Remove debris or encumbrances, carcasses, and other roadway obstructions in the Travelways that constitute a safety hazard or eminent danger.	E	30 Minutes	15 Minutes	15 Minutes	$6,700
		51	Remove debris or encumbrances, carcasses, and other obstructions on the Shoulders and other areas not on the Travelway.	C	8 Hours	4 Hours	4 Hours	
		52	Dispose of collected debris, carcasses, and other roadway obstructions in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
		53	Meet all other technical requirements for debris removal set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	

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Litter Removal	Removal of litter within Project Right of Way.	54	Start one litter collection cycle every two weeks.	B	N/A	N/A	48 Hours	
		55	Finish each litter collection cycle within one week after starting.	B	N/A	N/A	48 Hours	
		56	Collect excessive litter upon notification or discovery.	B	2 Hours	60 Minutes	60 Minutes	
		57	Dispose of collected litter/debris in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
		58	Meet all other technical requirements for litter removal set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Graffiti Removal	Continually monitor and maintain assets free of graffiti.	59	Remove graffiti from traffic devices where it is a safety hazard.	E	24 Hours	8 Hours	8 Hours	
		60	Remove other graffiti that is not a safety hazard.	B	48 Hours	12 Hours	12 Hours	
		61	Meet all other technical requirements for graffiti removal set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Hazardous Materials/Fuel Spills	Inspect the area impacted after a fuel spill or other contamination event and remove any contamination in accordance with Section 23.1.10 of the Technical Provisions.	62	Respond to the scene upon notification and document situation and report to NCDOT.	D	30 Minutes	20 Minutes	15 Minutes	
		63	Begin implementation of clean-up/containment efforts in accordance with the O&M Plan.	E	60 Minutes	45 Minutes	30 Minutes	
		64	Complete initial containment and removal efforts to maintain public safety in accordance with the O&M Plan and notify NCDOT of initial assessment of affected area(s).	E	2 Hours	90 Minutes	60 Minutes	
		65	Manage mitigation and removal Work. Restore contaminated area to its initial condition in accordance with the O&M Plan.	D	3 Days	48 Hours	24 Hours	
		66	Conduct contamination removal Work in accordance with all Laws and Governmental Approvals, permits, regulations and as set forth in the CA Documents.	D	N/A	N/A	N/A	
		67	Meet all other technical requirements for hazardous materials set forth in the Maintenance Operations Manual.	C	30 Days	N/A	5 Days	

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Landscaping								
Landscaping	Continually monitor landscaped areas.	68	Landscaped areas and plantings are to be maintained in healthy conditions (and free of disease and pests) in accordance with Developer's Corridor Landscaping and Aesthetics Plan.	B	30 Days	N/A	24 Hours	
		69	Meet all other technical requirements for landscaping set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Sound and Privacy Walls	Maintain sound and privacy walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	70	Prevent erosion at base on walls.	C	30 Days	N/A	5 Days	
		71	Seal cracks or joints in accordance with the Bridge Maintenance Manual.	C	30 Days	N/A	5 Days	
		72	Repair all spalls greater than 1.0 inches deep with a surface area greater than 1.0 square feet.	C	30 Days	N/A	5 Days	
		73	Meet all other technical requirements for sound/privacy walls set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
	Maintain sound and privacy walls at acceptable level of safety for the traveling public (structural damage).	74	Complete all emergency/temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system.	E	24 Hours	12 Hours	12 Hours	
		75	Complete all permanent repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system.	E	7 Days	4 Days	3 Days	
Storm water								
Drains & Drainage	Maintain drainage system in acceptable condition and level of safety for the traveling public.	76	Clear obstructed culverts, drains, ditches, inlets, etc. or sediment, vegetation and debris when they are greater than 50% blocked. Conduct culvert inspection and video culverts as necessary.	C	48 Hours	N/A	24 Hours	
		77	Maintain Travelways free of standing water.	E	30 Minutes	N/A	30 Minutes	$8,000
		78	No damage due to cracking, joint failures, or corrosion that affects performance. No water infiltration causing sub base erosion, pavement failures, Shoulder failures, or roadway settlement.	D	30 Days	N/A	5 Days	
		79	No eroded area at the inlet or outlet that is wider or longer than 1.5 times the pipe diameter and greater than 6 inches deep. No pipe shall be perched more than 12 inches.	D	30 Days	N/A	5 Days	
		80	Meet all other technical requirements for drainage set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Retention/Hazardous Spill Basins	Ensure that all retention/hazardous spill basins are working properly and free of functional defects.	81	Meet all technical requirements for inspection and maintenance of retention/hazardous spill basins in accordance with NCDOT memorandum dated December 18, 2003 regarding Hazardous Spill Basin Maintenance Policy.	D	7 Days	N/A	3 Days	

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Erosion & Sedimentation Control	Ensure that all erosion and sedimentation control measures comply with Developer's Stormwater Pollution Prevention Plan and Stormwater Management Program.	82	Ensure that all erosion and sedimentation control measures comply with Developer's Stormwater Pollution Prevention Plan, Developer's Stormwater Management Program and the Maintenance Operations Manual.	D	At NCDOT sole discretion			
Permits	Maintain all facilities in line with permits.	83	Comply with Governmental Approvals and permit requirements, monitoring, and reporting.	D	30 Days	N/A	5 Days	
Bridges								
Major Damage	Repair major damage.	84	Complete temporary repairs to restore safe travel conditions (to the extent physically feasible) for any major damage as defined in Section 23.2.2.2 of the Technical Provisions.	E	24 Hours	12 Hours	4 Hours	$2,200
		85	Begin implementation of remediation Work for permanent repairs .	D	5 Days	3 Days	24 Hours	
		86	Complete permanent repairs to major damage as defined in Section 23.2.2.2 of the Technical Provisions and Work identified from NBIS inspections.	D	As agreed upon by Developer and NCDOT			
		87	Meet all other technical requirements for Structures set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Minor Damage	Repair minor damage.	88	Repair minor damage as defined in Section 23.2.2.2 of the Technical Provisions, and Work identified from NBIS inspections.	C	60 Days	N/A	5 Days	
Bridge Deck	Maintain bridge deck at acceptable condition and level of safety for traveling public.	89	Repair all cracks greater than or equal to 1/8 of an inch in width if there are greater than 50 linear feet of such cracks in any 500 square foot section of bridge deck.	B	60 Days	N/A	5 Days	
		90	Repair or replace all bearings or joint seals that no longer function properly.	C	60 Days	N/A	5 Days	
		91	No exposed reinforcing steel on bridge deck.	C	60 Days	N/A	5 Days	
		92	Repair all spalls and pot holes greater than 1.0 square feet in area and/or between 1.0 inches and 2.0 inches deep.	C	48 Hours	N/A	24 Hours	
		93	Repair all spalls and pot holes greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	

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ITS & Communications Systems								
ITS Systems Operability	Highway advisory radio (HAR).	94	Maintain monthly HAR system performance (up time) above 98%.	C	N/A	N/A	N/A	
		95	Rectify each individual HAR defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		96	Rectify each individual HAR defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	Traffic monitoring stations.	97	Maintain monthly traffic monitoring station system performance (up time) above 95%.	C	N/A	N/A	N/A	
		98	Rectify each individual traffic monitoring station defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		99	Rectify each individual traffic monitoring station defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	Message sign system (excluding toll rate signs).	100	Maintain monthly message sign system performance (up time) above 95%.	C	N/A	N/A	N/A	
		101	Rectify each individual message sign defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		102	Rectify each individual message sign defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	Incident detection system.	103	Maintain monthly incident detection system performance (up time) above 98%.	C	N/A	N/A	N/A	
		104	Rectify each individual CCTV camera/incident detection system defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		105	Rectify each individual CCTV camera/incident detection system defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	Developer TMC Security system.	106	Maintain monthly Developer TMC security system performance (up time) above 99%.	C	N/A	N/A	N/A	
		107	Rectify each individual security camera/system defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		108	Rectify each individual security camera/system defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	

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	Roadway weather information station system (RWIS).	109	Maintain monthly RWIS performance (up time) above 95%.	C	N/A	N/A	N/A	
		110	Rectify each individual RWIS defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		111	Rectify each individual RWIS defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	Two-way radio system.	112	Maintain monthly two-way radio system performance (up time) above 99%.	C	N/A	N/A	N/A	
		113	Rectify each individual two-way radio system defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		114	Rectify each individual two-way radio system defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	Call boxes.	115	Maintain monthly call box system performance (up time) above 95%.	C	N/A	N/A	N/A	
		116	Rectify each individual call box defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		117	Rectify each individual call box defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	All other ITS systems.	118	Maintain monthly system performance (up time) above 95% for all other ITS systems.	C	N/A	N/A	N/A	
		119	Rectify each individual other ITS system defect to restore full functionality during the observation period defined in Section 21.6.	D	8 Hours	N/A	8 Hours	
		120	Rectify each individual other ITS system defect to restore full functionality after the observation period defined in Section 21.6.	D	24 Hours	N/A	24 Hours	
	Emergency maintenance repair.	121	Implement emergency maintenance repairs in accordance with Section 23.2.4.4 of the Technical Provisions.	E	N/A	N/A	10 Minutes	
ITS Maintenance	Inspection, testing, maintenance, etc. of all ITS system components.	122	Conduct routine inspections, testing, and maintenance in accordance with all Laws and equipment manufacturer's recommendations.	D	N/A	N/A	5 Days	

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Existing Communication Links	Maintaining existing communication links within the Project Right of Way.	123	Repair or replace damaged communications equipment (fiber optic cable, conduit, pull boxes, splice cabinets, hubs, etc.). Damaged fiber optic cable may be temporarily fusion spliced.	D	4 Hours	N/A	2 Hours	
		124	Replaced any damaged fiber optic cable from termination point to termination point with the same type of cable.	D	90 Days	N/A	30 Days	
Tolling								
HOT Lanes Operations	Manage Lanes Speed Monitoring.	125	Maintain daily Traffic Monitoring Station performance uptime 99.8%, per calendar month.	E	N/A	N/A	N/A	
	Operating Speed Performance Standard.	126	Maintain compliance with the Operating Speed Performance Standard per part VII.C(2) of Exhibit 4 to the Agreement. This requirement applies monthly when the HOT Lanes are in compliance with the OSPS, every seven days when the HOT Lanes are not in compliance with the OSPS per VII.E(7) of Exhibit 4 to the Agreement.	E	N/A	N/A	7 Days	
	Federal Minimum Average Speed Standard.	127	Maintain compliance with the Federal Minimum Average Speed Standard per part VII.C(1) of Exhibit 4 to the Agreement. This requirement applies monthly when the HOT Lanes are in compliance with the Federal Minimum Average Speed Standard, every seven days when the HOT Lanes are not in compliance with the Federal Minimum Average Speed Standard per VII.E(7) of Exhibit 4 to the Agreement.	E	N/A	N/A	7 Days	
	Performance Reporting.	128	Provide monthly reports on HOT Lanes performance as per Part E of Exhibit 4 to the Agreement; if one monthly report identifies Degradation, then the frequency of reporting shall be increased to every seven days as per Part E of Exhibit 4 to the Agreement.	D	N/A	N/A	48 Hours	
	Degraded Facility.	129	If the monthly report identifies a Degradation, Developer shall submit a rectification plan to the NCDOT for approval.	D	N/A	N/A	72 Hours	
	Publicity of Toll Rates.	130	Publicize, make available or otherwise provide the current or prevailing toll rate in accordance with Exhibit 4 of the Agreement and the CA Documents.	D	N/A	N/A	24 Hours	
	Toll rate sign system.	131	Maintain monthly toll rate sign system performance (up time) above 95%.	C	N/A	N/A	N/A	
		132	Rectify each individual toll rate sign defect to restore full functionality.	D	24 Hours	N/A	24 Hours	

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ETCS Performance	ETCS availability.	133	The ETCS shall be available at least 99.6% of time. The success rate shall mean, for a given day, the total number of hours for which the ETCS is available divided by the total number of hours in the day (excluding hours for scheduled down time and loss of power).	E	N/A	N/A	N/A	
	Transaction creation success rate .	134	For all vehicles passing through the tolling zone, the ETCS shall produce an appropriate Transponder Transaction or Video Transaction, complete with vehicle occupancy declaration information. The success rate shall mean the total number of correct toll Transactions recorded by the ETCS expressed as a percentage of the total number of vehicles passing through each tolling zone, individually, each day. Success rate shall be at least 99.80%.	E	N/A	N/A	N/A	
	Transponder read success rate .	135	For all vehicles passing through the tolling zone and carrying a valid, properly-mounted transponder, the ETCS shall correctly read each transponder. The success rate shall mean the number of correct transponder reads, expressed as a percentage of all vehicles passing through the tolling zone and carrying a valid, properly-mounted transponder, each day. Success rate shall be at least 99.90%.	E	N/A	N/A	N/A	
	Legible image capture reliability success rate.	136	For all Video Transactions, the license plate images produced by the image capture system shall be human legible and reliably contain images of the correct vehicle and its region of interest. Region of interest is defined by the mounting area of a license plate required by Law. The success rate shall mean the number of Video Transactions including at least one human-legible image where the vehicle region of interest is in focus and reliably discernible, expressed as a percentage of the total number of Video Transactions, each day. Success rate shall be at least 99.00%	E	N/A	N/A	N/A	
	License plate image readability and reliability success rate.	137	For all Video Transactions legible images, the license plate images produced by the image capture system shall be readable by the human eye and reliably contain images from which both plate number and issuing jurisdiction can be read by the human eye. The success rate shall mean the number of Video Transactions legible images including at least one plate image readable by the human eye from which both plate number and jurisdiction of issue are reliably discernible, i.e. can be converted unambiguously to text by an operator, expressed as a percentage of the total number of Video Transactions legible images (excluding plate images for ineligible vehicles, see Note 1 below), each day. Success rate shall be at least 99.90%.	E	N/A	N/A	N/A	
	HOV status declaration data transmission success rate .	138	For all HOV Transactions, the ETCS shall transmit the HOV status declaration data to enforcement personnel prior to or as the respective vehicle passes through an enforcement zone. The success rate shall mean the number of HOV Transactions declaration data sets correctly transmitted and readily usable to an enforcement terminal, expressed as a percentage of the total number of HOV Transaction declaration data sets transmitted, each day. Success rate shall be at least 99.90%.	E	N/A	N/A	N/A	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**O&M Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
	Transmittal of transponder transactions.	139	Developer shall send transponder transactions to the NCDOT CCH within 24 hours of the transaction trip occurrence with at least 99% success rate, and within 72 hours with 100% success rate, calculated daily.	E	N/A	N/A	N/A	
	Transmittal of video transactions.	140	Developer shall send video transactions to the CCH within seven calendar days of the transaction trip occurrence with at least 99% success rate, and within 60 calendar days with 100% success rate, calculated daily.	E	N/A	N/A	N/A	
	Storage of User Transaction Information.	141	Developer shall maintain a record of User Transactions for a minimum of 365 days, reported monthly.	B	N/A	N/A	30 Days	
	Transmission of User Transaction Information to Customer Service Center.	142	Developer shall make User Transaction Information available to Customer Service Center within 24 hours of request if such information has not been transmitted to the CCH by the Developer.	D	N/A	N/A	24 Hours	
Back Office Services	Customer Service Level 2 Request for information.	143	Developer shall respond to User request for Information within five days, reported monthly.	E	N/A	N/A	24 Hours	
	Customer Service Level 2 Phone Response Time.	144	Developer shall address call issues within one day, reported monthly.	E	N/A	N/A	24 Hours	
	Customer Service Level 2 Call Efficiency.	145	Developer shall answer all calls during call center business hours within 60 seconds with a success rate of 98.00%, measured monthly.	E	N/A	N/A	24 Hours	
	Privacy of User information.	146	Developer shall maintain the travel records of Users as confidential information and in compliance with all applicable Laws and according to the terms of the Agreement. The success rate shall mean that there shall be no disclosure of Patron Confidential Information to any third party or the general public for any purpose, except the purposes described in this Agreement. Success rate shall be 100%.	E	N/A	N/A	N/A	
Electrical								
Highway Lighting	Maintain functionality of highway lighting system.	147	Maintain full functionality of all luminaires and provide maintained illuminance to meet the design standards to Section 20 of the Technical Provisions.	A	5 Days	48 Hours	24 Hours	
Sign Lighting	Maintain functionality of highway sign lighting.	148	Maintain full functionality of all sign luminaires.	C	48 Hours	24 Hours	24 Hours	
Traffic Guidance								
Pavement Markings / Delineators	Repair and replacement of line striping and pavement reflectors.	149	Pavement markings, snowplow able pavement markers and reflectors shall be replaced when they are missing or no longer straight, continuous, or visible under all lighting conditions and when pavement is wet - April to October.	B	30 Days	N/A	5 Days	
		150	Pavement markings, snowplow able pavement markers and reflectors shall be replaced when they are missing or no longer straight, continuous, or visible under all lighting conditions and when pavement is wet - November to March.	B	60 Days	N/A	5 Days	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**O&M Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
		151	Replace all damaged or missing delineation posts/reflectors. All delineation posts and reflectors shall be free of functional defects and visible to the travelling public.	B	30 Days	N/A	5 Days	
		152	Meet all other technical requirements for pavement markings and delineators set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Signage	Maintain signs at acceptable level of safety for the traveling public.	153	Repair all damaged overhead signs and sign structures that pose imminent risk to the public.	E	2 Hours	30 Minutes	30 Minutes	$3,300
		154	Repair/replace all damaged but functional and clearly legible overhead signs and sign structures.	C	60 Days	7 Days	5 Days	
		155	Repair/replace all non-functional or non-legible Stop, Do Not Enter, Wrong Way, Yield and Hospital signs.	E	8 Hours	4 Hours	60 Minutes	$3,300
		156	Repair/replace all other signs, including posts that are damaged or missing.	B	5 Days	48 Hours	24 Hours	
		157	Meet all other technical requirements for signage set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Guardrail	Maintain guardrail at acceptable level of safety for the traveling public (non-structural damage or deterioration).	158	Guardrail is maintained to meet the current design criteria and safety standards.	D	5 Days	N/A	24 Hours	
		159	Guardrail shall be free of excessive wear, unsightly rust and vegetation.	B	30 Days	N/A	5 Days	
		160	Meet all other technical requirements for guardrail set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
	Maintain guardrail at acceptable level of safety for the traveling public (structural damage).	161	Complete all emergency/temporary repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	12 Hours	6 Hours	60 Minutes	$800
		162	Complete all permanent repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	5 Days	48 Hours	24 Hours	
Barrier Wall	Maintain barrier walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	163	Barrier is maintained to meet the current design criteria and safety standards.	D	5 Days	N/A	24 Hours	
		164	Barrier shall be free of vegetation.	B	30 Days	N/A	5 Days	
		165	Meet all other technical requirements for barrier walls set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
	Maintain barrier walls at acceptable level of safety for the traveling public (structural damage).	166	Complete all emergency/temporary provisions and/or repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	12 Hours	12 Hours	60 Minutes	$800
		167	Complete all permanent repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	5 Days	48 Hours	24 Hours	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**O&M Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Attenuators	Maintain attenuators at acceptable level of safety for the traveling public (non-structural damage or deterioration).	168	Attenuators are maintained to meet the current design criteria and safety standards.	D	5 Days	N/A	24 Hours	
		169	Attenuators shall be free of vegetation.	B	30 Days	N/A	5 Days	
		170	Meet all other technical requirements for attenuators set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
	Maintain attenuators at acceptable level of safety for the traveling public (structural damage).	171	Complete all emergency/temporary repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	12 Hours	12 Hours	60 Minutes	$2,400
		172	Complete all permanent repairs of damage to structural integrity that creates a traffic hazard or compromises the system to the extent it will not function properly if it was to sustain another hit.	E	5 Days	48 Hours	24 Hours	
Storm and Other Major Damage								
Storm Maintenance / Major Damage	Response to damage caused by strong winds, heavy rains, slides, slip-outs and other major damage.	173	Place regulatory and warning devices, delineation signs, etc. on the facility at conclusion of event.	D	24 Hours	N/A	60 Minutes	
		174	Begin planning/implementation of remediation Work.	C	24 Hours	N/A	24 Hours	
		175	Meet all other technical requirements for storm damage set forth in Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Disaster Recovery	Mitigation of disruption of operation of the Project and restoring operations post-disaster.	176	Comply with all disaster recovery requirements and procedures.	E	N/A	N/A	24 Hours	
Lane Closures								
Lane Closures	Closure of Traffic Lanes during the Term (at least two Traffic Lanes remaining open).	177	Comply with the time restrictions for Permitted Closures set forth in Section 23.2.1.2 of the Technical Provisions. Request approval 24 hours prior.	D	N/A	N/A	15 Minutes	Refer to Exhibit 14 of the Agreement
	Closure of Traffic Lanes during the Term (less than two Traffic Lanes remaining open).	178	Comply with the time restrictions for Permitted Closures set forth in Section 23.2.1.2 of the Technical Provisions. Request approval 24 hours prior.	E	N/A	N/A	15 Minutes	Refer to Exhibit 14 of the Agreement

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**O&M Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Incident Response								
Incident Response	Response to sites of incidents, emergencies, accidents, and other events that that result in a condition that is unsafe and/or may present a life threatening condition.	179	Respond to scene within 45 minutes after detection or notification on Shoulders.	C	N/A	N/A	30 Minutes	
		180	Respond to scene within 45 minutes after detection or notification in Travelway.	D	N/A	N/A	30 Minutes	
	Clearing of incidents and reopening of closed travel lanes and Shoulders after police/emergency response officials provide notification to begin clean-up in accordance with Section 23.3.2.1.4 of the Technical Provisions.	181	Reopen and clear the closed Shoulder to traffic after Closure resulting from an Incident that involves a breakdown, minor accident (passenger vehicles only, no overturned vehicles), non-hazardous material spill or debris and only resulting in a Shoulder closure/blockage within 60 minutes.	C	N/A	N/A	30 Minutes	
		182	Reopen and clear the closed travel lane to traffic after Closure resulting from an Incident that involves a breakdown, minor accident (passenger vehicles only, no overturned vehicles), non-hazardous material spill or debris and resulting in up to one closed travel lane within 30 minutes.	N/A	N/A	N/A	N/A	Refer to Exhibit 14 of the Agreement
		183	Reopen and clear the closed travel lanes to traffic after Closure resulting from an Incident that involves a multiple vehicle accident (passenger vehicles/light trucks, one overturned vehicle), but no fire and resulting in up to all travel lanes closed in one direction within 60 minutes.	N/A	N/A	N/A	N/A	
		184	Reopen and clear the closed travel lanes to traffic after Closure resulting from an Incident that involves a multiple vehicle accident (passenger vehicles /light trucks, two or more overturned vehicles) with or without fire and resulting in up to all travel lanes closed in one direction within two hours.	N/A	N/A	N/A	N/A	
		185	Reopen and clear the closed travel lanes to traffic after Closure resulting from an Incident that involves a heavy transport vehicles or lost cargo loads, with or without fire and resulting in up to all travel lanes closed in one direction and one or more travel lanes closed in the opposite direction within three hours.	N/A	N/A	N/A	N/A	

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (Years)**
Flexible Pavement	Pavement section within the Project Right of Way.	Flexible pavement condition survey shall be conducted in accordance with the Pavement Condition Survey Manual and Maintenance Operations Manual within 180 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	For any continuous one mile segment, have a Pavement Condition Survey Manual rating of 80 or higher for HOT Lane and General Purpose Lane pavement (Renewal Work on General Purpose Lane pavement to be performed by NCDOT or Developer as determined by Section 23.1.7 of the Technical Provisions); No pot holes; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	10 Years
Rigid Pavement	Pavement section within the Project Right of Way.	Rigid pavement condition survey shall be conducted in accordance with the Pavement Condition Survey Manual and Maintenance Operations Manual within 180 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	For any continuous one mile segment, have a Pavement Condition Survey Manual rating of 80 or higher for HOT Lane and General Purpose Lane pavement (Renewal Work on General Purpose Lane pavement to be performed by NCDOT or Developer as determined by Section 23.1.7 of the Technical Provisions); Repair or replace all slabs where movement is evident, regardless of the number of pieces the slab is broken into; No pot holes; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	10 Years

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (Years)**
Guardrail	Guardrail systems within the Project Right of Way.	Final inspection in accordance with the Maintenance Operations Manual shall be conducted within 45 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	All guardrail systems must be within 0.75 inches of plumb and grade; Surface materials are smooth, undamaged and free of defects; Rails and terminal elements are not warped or otherwise deformed; Posts are installed square to the rail; Painted rail shall be free of surface defects; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	8 Years
Attenuators	Attenuator systems within the Project Right of Way.	Final inspection in accordance with the Maintenance Operations Manual shall be conducted within 45 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	System is free of obstructions and fully capable of functioning as designed and intended; System components are free of damage which impairs the ability of the attenuator to serve its function; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	8 Years

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (Years)**
Signs and Beacons	Single-post, multi-post & overhead within the Project Right of Way.	Final inspection and reflectivity tests shall be conducted in accordance with the Maintenance Operations Manual within 120 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	No damaged or missing warning signs, guide signs, regulatory signs, or posts thereof. All signs and posts shall be plumb and level, free of defects, visible to the travelling public. Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	7 Years
		Final inventory and condition assessment shall be conducted within 90 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	Replace sign panels that do not meet NCDOT's standard current at the time; No signs in a condition that includes but is not limited to the following: a) Sign that is not flat (planar) and properly oriented to the travelling public or other intended audience; b) Sign that has more than four (4) square inches or 1% (whichever is greater) of the sign panel face area containing the deficiencies; c) Sign that, in the opinion of NCDOT, is otherwise damaged or contains a message to the travelling public or other audience that is unclear, improper, or confusing; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	7 Years
Stripings and Markings	Striping, markings, lettering, symbols within the Project Right of Way.	Inspect pavement markings/delineation in accordance with the Maintenance Operations Manual. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	No damaged delineation posts/reflectors; No faded, worn, debonded, damaged, non-reflective and/or missing pavement striping and markings; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	2 Years

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (Years)**
Drainage Systems	Drainage systems elements (side/cross drains, roadside ditches, inlets, and miscellaneous drainage structures).	Conduct a final video inspection of all drainage pipes and other drainage systems elements (side/cross drains, inlets and miscellaneous drainage structures) within 90 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	No blockages in slots or grates. Defective materials cleaned and repaired or replaced as necessary. Slot drains cleaned; No spalled or cracked concrete that has damage to structural integrity; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	20 Years
Highway Lighting	Includes Roadway, under-deck, signing and high mast within the Project Right of Way.	Final inspection shall be conducted within 30 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	100% of lights must be operational; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	N/A
High Mast Light Poles	Structural within the Project Right of Way.	Final inspection, including x-rays of the lighting bases, shall be conducted within 180 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	All High Mast Light Poles must be in an overall condition that is in accordance with the criteria set forth in NCDOT's Manuals and Guidelines current at the time of inspection; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	15 Years
Over-Lane Sign Structures	Structural within the Project Right of Way.	Final inspection of over-lane sign Structures shall be conducted within 180 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	All over-lane sign structures must be in an acceptable condition according to NCDOT's Manuals and Guidelines current at the time of inspection; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	15 Years

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (Years)**
Bridges/Culverts	Within the Project Right of Way.	Final inspection of all structures shall be conducted in accordance with NBIS within 180 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	If any new Bridge/Culvert under the responsibility of the Developer is found to have an overall condition rating, or condition rating of any element (deck, superstructure, substructure, etc.) of less than six (6) "Satisfactory Condition", or equivalent rating on the FHWA's NBIS Rating scale, for the Handback year, the Developer shall be responsible for making any and all repairs necessary to improve the overall and element condition rating of the Bridge/Culvert to a six (6) "Satisfactory Condition" or better. All repairs shall be of a substantial and permanent nature; If any existing Bridge/Culvert under the responsibility of the Developer is found to have an overall condition rating, or condition rating of any element (deck, superstructure, substructure, etc.) of less than five (5) "Fair Condition", or equivalent rating on the FHWA's NBIS Rating scale, for the Handback year, the Developer shall be responsible for making any and all repairs necessary to improve the overall and element condition rating of the Bridge/Culvert to a five (5) "Fair Condition" or better. All repairs shall be of a substantial and permanent nature; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining required overall or element condition rating at the end of the Term for both new Bridges/Culverts (or portions thereof) that are constructed by Developer throughout Term and existing Bridges/Culverts (or portions thereof) that are not replaced by the Developer throughout the Term.	N/A

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (Years)**
Retaining Walls	Within the Project Right of Way.	Final inspection of all structures shall be conducted within 180 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	All walls meet necessary standards in NCDOT's Highway Design Manual or successor; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	20 Years (Retaining Walls) 50 Years (Abutment Walls)
Landscaping & Irrigation	To be determined at Handback.			
Fencing	Within the Project Right of Way, all fencing along or within the Project used to preserve a property boundary, control pedestrian and animal access, and maximize the safety and security of project users .	Final inspection of all fencing shall be conducted within 90 calendar days before the end of the Term. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	All fencing must be within 0.75 inches of plumb and grade and repaired or replaced in accordance with the criteria set forth in NCDOT's Manuals and Guidelines current at the time of inspection; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	20 Years
Other Mechanical & Electrical Systems	To be determined at Handback.			
ITS	ITS functionalities.	Review and test system functionalities, including roadside equipment and back office hardware and software.	Verify that all ITS performance requirements are met for all system components.	7 Years
Electronic Toll Collection System	Electronic toll collection functionalities.	Review and test system functionalities, including speed monitoring equipment in the managed lanes, roadside equipment and back office.	Verify that all performance requirements are met by the tolling system.	7 Years

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (Years)**
Loop Detectors	Loop with Amplifier Controllers, Controller Cabinet, Fiber Optic Cable, and other Ancillary Equipment.	100% system functionality. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	Developer shall no sooner than 90 days prior to end of term demonstrate that the systems are fully functioning with no defects or failed components; All cabinets and other systems components must not show signs of corrosion; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	N/A
All Project Aspects Not Specifically Addressed	N/A	Meet or exceed the minimum performance requirements specified in Table 23.2. Complete all tests in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	Curing of all deficiencies identified in the final annual O&M inspection as outlined in the O&M Plan (to be done within 180 days before the end of the Term) in accordance with NCDOT's current standards and procedures; and Achievement of standards in the Handback Renewal Work Plan to demonstrate the achievement of the required life remaining at the end of the Term.	N/A

24 ELECTRONIC TOLL COLLECTION SYSTEM

24.1 General Requirements

Developer shall design, develop, fabricate, test, integrate, deploy and/or construct, operate, maintain, and upgrade from time to time an Electronic Toll Collection System (ETCS) supporting Open Road Tolling (ORT) on the HOT Lanes in accordance with the requirements of this Section 24 of the Technical Provisions and the CA Documents, including but not limited to the applicable provisions of Book 2 and Book 3.

Developer shall set forth an approach, procedures, and methods for the management of the Electronic Toll Collection System in the DMP.

Developer shall include the ETCS design as part of Developer Design Documents in accordance with Section 2 of the Technical Provisions and shall submit it in accordance with the DMP and the requirements of Section 2 of the Technical Provisions. Developer shall demonstrate that the ETCS design is capable of serving the maximum traffic volumes expected.

The ETCS shall accurately detect and classify (according to the User Classification) all vehicles using the HOT Lanes and calculate and assign tolls due for the use of the HOT Lanes based on the User Classification and the Toll Rate determined according to Exhibit 4 of the Agreement, and do so without stopping or slowing down any vehicle using the Project.

The ETCS shall document and provide proof of use of the HOT Lanes for and corresponding toll for all Users, prevent data and/or images from being tampered with after the fact, protect User privacy, and ensure the traceability of all operations necessary for the accurate generation of proof of passage and toll calculation by Transaction, by Toll Segment, and by Trip, as well as billing and invoicing of tolls and Incidental Charges to Users.

24.2 Design Requirements

Developer shall design and construct the ETCS in accordance with the requirements of this Section 24 of the Technical Provisions and all applicable NCDOT Standards, including but not limited to toll equipment, equipment cabinets, communications systems, gantries and signs, power supply, supporting conduits, splice vaults, pull boxes, junction boxes, and wiring.

In the DMP, Developer shall set forth its approach, procedures, and methods for the implementation of the ETCS supporting ORT on the HOT Lanes. Developer shall specifically identify in the DMP how the performance requirements of this Section 24 of the Technical Provisions and Exhibit 4 of the Agreement are met and proposed Deviations from the requirements of this Section 24 of the Technical Provisions and NCDOT Standards. See Section 10.2.7 of the Technical Provisions for other requirements.

24.3 ETCS Operational Requirements

24.3.1 ETCS Systems Requirements

Developer shall determine the components of the ETCS needed to satisfy the ETCS functional requirements set forth in Section 24.3.2 of the Technical Provisions. The ETCS equipment and infrastructure shall provide for safe and secure access to all ETCS components for maintenance and repairs without Closure of the GP Lanes.

24.3.2 ETCS Functional Requirements

24.3.2.1 General

For each and every vehicle using the HOT Lanes, whether equipped with a Transponder or not, the ETCS shall at a minimum:

- provide ORT service to Users on the HOT Lanes;
- detect vehicles;
- inform Project corridor motorists in real-time of the applicable Toll Rates, including the suspension of tolls, using Toll Rate Signs before they use the HOT Lanes, including the suspension of tolls, using Toll Rate Signs before they use the HOT Lanes;
- classify vehicles per the User Classification;
- create a proof of passage by Toll Segment and Trip in accordance with applicable Law;
- generate accurate Transactions, for both Toll Segment and Trip, and maintain proper records of such Transactions and supporting information resulting in the creation of each Transaction;
- transmit accurate and certified Trip Transaction data to the CCH host server;
- maintain a database of all the displayed Toll Rates by Toll Segment, direction, and time of day;
- accurately calculate and assign the toll for the use of the HOT Lanes; with any subsequent Incidental Charges calculated and assigned as applicable pursuant to Exhibit 18 of the Agreement;
- collect audit data by means of a Digital Video Auditing System (DVAS) with data and event logger attached to monitoring cameras and indexed to the Transactions;
- provide traffic counts sufficient to verify and audit the performance of the ETCS;
- manage Irregular Transactions;
- provide accurate accounting in U.S. dollars and according to U.S. GAAP;
- manage and store all data transfers among the ETCS functions and between ETCS and the NCDOT Central Clearing House (CCH);
- provide image management and verification system;
- provide Customer service, including telephone assistance, for escalated Level Two Customer Service;
- measure and monitor ETCS performance;
- provide preventive and curative maintenance management systems;
- monitor, track, and control quality of ETCS maintenance performed; and
- produce and provide to NCDOT in acceptable format all reports in accordance with the CA Documents.

ETCS functional and Performance Requirements are further defined in this Section 24 of the Technical Provisions.

24.3.2.2 Vehicle Detection, Identification, and Classification

The ETCS shall detect and classify according to the User Classification in Exhibit 4 of the Agreement all vehicles traveling in the HOT Lanes, identify in which lane the vehicle traveled, and produce the data necessary to accurately calculate the toll and any Incidental Charges, bill and invoice Users, whether or not vehicles are equipped with a valid Transponder. All Exempt Vehicles shall be required to have a Transponder.

Developer shall be responsible for purchasing certain Transponders pursuant to Exhibit 18 of the Agreement and delivering them to the NCDOT Customer Service Center (CSC) and/or at a storage location designated by NCDOT in a timely manner and in quantities sufficient to meet demand for such Transponders so that the Users may accurately declare their vehicle as HOV or LOV according to the User Classification in Exhibit 4 of the Agreement. NCDOT CSC will distribute Transponders to motorist upon request. Developer shall be responsible for ensuring that such Transponders are equipped with a user-friendly and convenient means to self declare the occupancy of the vehicle and allow at a minimum the User to identify themself as HOV or LOV Users. The use of Transponders with self declaration capabilities is acceptable.

24.3.2.3 User Transactions

The ETCS shall create exactly one Transaction for each User passing through a Toll Segment. The ETCS shall create exactly one Trip Transaction for each contiguous, directional vehicular travel on the HOT Lanes between an entry into and exit from the HOT Lanes by a User. The ETCS shall assemble Transactions at the Toll Segment level into a Trip Transaction. A Trip Transaction may include travel across any number of continuous Toll Segments. The ETCS shall transmit Trip Transactions to the CCH.

A Transaction consists of at least:

- a video image set (rear license plate and rear of the vehicle), license plate number and jurisdiction of issue (as a string of characters) and matching Transponder ID, if the vehicle has a Transponder and it is properly placed;
- a timestamp of the date and time of the Transponder read or video capture at a toll zone, including direction of travel and lane travelled;
- the Toll Segment number or numbers;
- the identification of the vehicle class as per the User Classification;
- a unique Transaction number; and
- the toll charged to the User for each Toll Segment of the Trip.

Time shall be recorded for each Transaction to within a millisecond.

The ETCS shall have the capability to calculate Toll Rates dynamically in real-time in the HOT Lanes to meet the requirements set out in Exhibit 4 of the Agreement.

The ETCS shall assign the toll due based on:

- the User Classification;
- the User's time of passage through each Toll Segment; and
- the corresponding Toll Rate for the respective Toll Segment.

The system shall charge each User no more than the last toll displayed to the User prior to the User's entry into such Toll Segment of the HOT Lanes.

If a User passes a Toll Rate Sign and the rate increases prior to their passing through the tolling zone, the User shall be charged a toll that is equal to, or less than, the toll that was displayed to him on the Toll Rate Sign.

All Transactions for motor vehicles, other than Motorcycles, without trailers, not larger than 20 feet in length, eight and a half feet in width and twelve feet in height, which do not have occupancy declaration information shall be LOV Transactions.

The ETCS shall not create a Transaction for vehicles, whether equipped with a Transponder or not, traveling in the GP Lanes.

The ETCS shall maintain a record of all applicable Toll Rates (to the millisecond), to serve as evidence of applicable rate at time of passage for Users. The ETCS shall maintain a record of all Toll Segment and Trip Transactions for a minimum of 365 days. This information shall be available to the Customer Service Center (CSC) within 24 hours of request if such information has not been transmitted to the Central Clearing House (CCH) within the 24 hour period.

Developer shall treat as an Irregular Transaction any Transaction, which does not generate a proper Transponder read and/or for which the vehicle license plate information cannot be identified. Developer shall implement a verification and management process with NCDOT and its CCH and CSC to properly address Irregular Transactions and shall not charge Users until such information is reconciled.

24.3.2.4 Image Capture

For Video Transactions, the system shall capture at a minimum images of the vehicle's rear license plate and rear of the vehicle. The system shall use Automatic License Plate Recognition (ALPR) software to identify the license plate number and jurisdiction of issue, supplemented with manual image review where the ALPR does not provide a result with sufficient confidence.

24.3.2.5 Interoperability

The ETCS shall meet NCTA Interoperability and compatibility standards, requirements, and protocols as outlined in Exhibit 18 of the Agreement.

Developer shall provide any and all reports required by third parties for Interoperability.

24.3.2.6 HOV Enforcement

Enforcement of HOV status shall be carried out by authorized law enforcement authorities pursuant to Section 8.8.1 of the Agreement.

Developer shall provide to such law enforcement authority all declaration data sufficient and necessary for legal enforcement including User Classification, time of entry, location of entry, and vehicle identification and occupancy data (per User Classification), and any other information as may be required by such law enforcement authority.

To the extent Developer provides enforcement zones, such enforcement zones shall consist of an area for occupancy enforcement technology and a parking area for at least one law enforcement vehicle. Enforcement vehicle shall mean an automobile unless otherwise approved by NCDOT. The enforcement zone shall be designed in accordance with the AASHTO Guidance for High Occupancy Vehicle Facilities.

The ETCS shall communicate vehicle occupancy declaration data to law enforcement personnel. The data shall be adequate and sufficient to enable law enforcement personnel to distinguish between vehicles declared as HOV and LOV.

The ETCS may use a variety of methods to communicate vehicle occupancy declaration data to law enforcement personnel. Such methods should be commercially reasonable and Good Industry Practice, such as (1) the use of beacon lights located at the enforcement zone, to indicate previous User declaration actions, (2) the use of personal digital assistant or similar technology by enforcement personnel to receive User declaration data from the ETCS, (3) the use of an automated occupancy detection system, and (4) manual, visual enforcement at the declaration zones.

24.3.2.7 Security, Protection, and Monitoring

Developer shall exercise caution, due diligence, and reasonable efforts to protect the ETCS against natural disaster, data and equipment tempering, and sabotage. Developer shall develop and implement a disaster recovery plan and procedures for maintaining service continuity in the event of a catastrophe or disaster impacting the ETCS, in order to prevent or minimize any service interruption.

The ETCS must log all database, file, and software application access and attempted access. Developer shall ensure duplicate data and image storage at a physically and geographically separate site in accordance with the North Carolina Statewide Information Security Manual. Developer shall supply means of auditing all ETCS data and records, directly produced by the ETCS.

The ETCS shall, at a minimum:

- track Incidents from occurrence to resolution;
- monitor Work from request to completion; and
- track system performance.

24.3.2.8 Maintenance Management System

Developer shall deploy a maintenance management system to:

- signal when preventive maintenance is required;
- detect faults and order corrective maintenance;
- track Work orders from inception to resolution;
- monitor configuration changes; and
- track the inventory of spare parts.

Developer shall execute O&M Work by Developer related to the ETCS with no Closure of the GP Lanes.

As part of the maintenance management system, Developer shall keep up to-date and available on-site a complete set of technical documentation (including but not limited to design, technical specifications, wiring diagram, as-built drawings) and procedures and manuals for executing the O&M Work.

24.3.2.9 Configuration Management Program

Developer shall implement a Configuration Management Program for the ETCS, which shall ensure proper management of the following Elements:

- the Source Code versions delivered by Developer, ensuring that they are sent to its testing team for testing;
- coordination of the activities of the testing and development teams during preparation of the versions; control of the Source Code versions;
- software tools (development environment and compilers) are available;
- controlling the Source Code and the engineering drawings after requests for engineering changes;
- storage and backup of the Source Code, versions, test banks, and test results;

- generating the list of components of each deliverable code;
- coordinating and following up on hardware and software; and
- controlling software updates.

The Configuration Management Program shall be submitted to NCDOT for approval before Developer becomes eligible for issuance of the interim acceptance certificate for the ETCS.

24.3.2.10 Customer Service

The primary Customer service shall be carried out by parties other than Developer, primarily NCDOT as outlined in Exhibit 18 of the Agreement. Customer service shall include Customer account and balance management, payment processing, voids and adjustments (including those approved by Developer's Level Two Customer Service support), Transponder distribution and management, violation processing, and handling general User inquiries. NCDOT will provide portals of Customer service through a Charlotte area walk-in Customer Service Center in addition to phone, email, mail, and web support. Developer shall arrange for and provide all Transaction data sufficient and necessary for NCDOT to proceed with Financial Clearing of all certified Transactions, to respond to general User inquiries, and at a minimum the information described as part of a properly formatted Transaction in accordance with Section 24.3.2.3 of the Technical Provisions.

Developer shall be responsible for Level Two Customer Service. Level Two Customer Service corresponds to those Customer services addressing a User disputing a toll charge that may require an adjustment to the toll previously charged or billed to a User for use of the HOT Lanes. For any disputed toll charge that has been previously charged or billed to a User that must be adjusted, Developer's Level Two Customer Service support shall notify and approve such adjustment prior to it being made as part of the Customer service.

The Level Two Customer Service support shall be co-located at any established NCTA's Customer Service Center in the Charlotte area during the Term. NCDOT will provide space and equipment for up to four Developer staff persons for the purpose of Level Two Customer Service at any such established Customer Service Center. At a minimum, Developer staff shall be available by phone to provide Level Two Customer Service during the same hours as the NCTA's CSC outside of the Charlotte area is open.

24.4 ETCS Performance Requirements

24.4.1 Roadside Performance Requirements

The ETCS Performance Requirements set forth in Table 23.2 shall apply at all times and throughout a vehicle speed range of one to 100 mph, with the exceptions of classification and image capture, for which the stated tolling Performance Requirements shall be achieved for a speed range of five to 100 mph. ETCS Performance Requirements shall apply to all vehicles whether they are traveling closely together or far apart.

For the purpose of assessing the license plate image readability and reliability success rate as presented in Table 23.2, Ineligible Vehicles shall be those for which a video image is obtained that due only to one or more of the following conditions the license plate cannot be reliably read by the human eye:

- the vehicle either has no license plate or it is not mounted in the legally required position;
- the license plate is covered by dirt or snow rendering it unreadable;
- the license plate is willfully obstructed by Users by a film or other means;

- the license plate is damaged, bent or broken rendering it unreadable;
- the license plate is blocked by an object carried by the vehicle (such as a plate frame, overhanging cargo or a trailer towing ball); or
- the license plate is blocked by something in the lane such as a Person or another vehicle.

24.4.2 ETCS and Customer Service Performance Requirements

The ETCS and Customer Service Performance Requirements set forth in Table 23.2 shall apply at all times for Level Two Customer Service.

24.5 ETCS Performance Monitoring, Auditing, and Reporting

24.5.1 General Requirements

Developer shall:

- deploy technical means to record, monitor, track, and audit the ETCS performance as specified in this Section 24 of the Technical Provisions;
- produce database extracts, analyses, and syntheses for verifying ETCS performance upon NCDOT's request; and
- supply the NCDOT with a monitoring terminal, at a location to be specified by NCDOT, to access the ETCS performance (including historical information and real time information), Transaction records, real-time display of vehicles passing through the Toll Segment, and real-time Toll Rates in every Toll Segment.

24.5.2 Data Security

Developer shall provide data security for the ETCS. Data security may include, but not be limited to:

- backup of all software and configuration following each release or upgrade of, or change to, the ETCS;
- daily back-up of all new and changed data held on the ETCS;
- the daily back-up files shall be audited every day to detect any possible system error or batch processing error;
- removal of the media used for the daily back-up to a secure off-site location within 24 hours (or other agreed timeframe); and
- storage of a minimum 90 days of the data back-ups in a secure off-site location; and
- verification, on a monthly basis, that the daily backups and stored data are retrievable and usable.

Backups shall not affect any ETCS functional requirements. For avoidance of doubt, the requirements of the North Carolina Statewide Information Security Manual shall be met.

24.6 Testing and Commissioning

Developer's Commissioning Agent shall conduct ETCS factory acceptance testing and on-site system acceptance testing as per the ETCS Testing Plan.

Testing activities for ETCS shall demonstrate that the ETCS meets the performance requirements defined in this Section 24 of the Technical Provisions and Exhibit 4 of the

Agreement. The testing activities may be conducted and completed at separate times for each of the three Project Sections. Prior to any testing, Developer shall provide 30 calendar days notice to the NCDOT of the time and location(s) for any testing. Testing shall be conducted by Developer with NCDOT being given the option to observe all tests.

Developer shall be required to demonstrate during the ETCS Demonstration Period that the ETCS reliably meets the performance requirements as defined in this Section 24 of the Technical Provisions and Exhibit 4 of the Agreement under normal operating conditions for a sustained period. The Demonstration Period for the ETCS may be conducted separately for each of the three Project Sections, as described in Section 24.6.3 of the Technical Provisions.

24.6.1 Testing Program for ETCS

Developer shall conduct both factory acceptance testing and on-site system acceptance testing. The objectives of the testing activities for ETCS are as follows:

- to verify the proper functioning of the equipment and of the systems and sub-systems, as described in the Design Documents;
- to demonstrate that the equipment, systems, and sub-systems meet the performance, and reliability requirements set out in the Design Documents, Exhibit 4 of the Agreement, and Table 23.2, and this Section 24 of the Technical Provisions; and
- to demonstrate that the mechanisms for the exchange of information between the Parties and between Developer and any third party (e.g. law enforcement authorities, etc.) function properly.

Factory acceptance testing shall be completed to demonstrate that the proposed equipment meets the ETCS performance requirements in a controlled environment.

For all proposed system Elements that meet factory acceptance testing criteria, on-site system acceptance testing shall be completed to demonstrate that:

- the entire system, equipment, and facilities are ready for commencement of operations,
- the equipment meets performance requirements with vehicles travelling at Highway speeds, including a full range of vehicle types;
- the equipment meets performance requirements when used in a wide range of lighting and weather conditions;
- all external interfaces operate properly;
- all aspects of Transaction collection and transmission meet performance requirements; and
- uninterrupted power supply (UPS) systems are operational.

24.6.2 Interface for ETCS Services

Developer shall notify NCDOT in writing at least 12 months' prior of the anticipated date of Substantial Completion of the first Project Section of such date in order for NCDOT to prepare to perform its ETC Services through NC Quick Pass. Developer shall accompany such notice with a workplan, including a schedule, for NCDOT to perform, at its expense, NC Quick Pass system interface Work and testing in accordance with such workplan. Upon NCDOT's receipt of such notice, Developer and NCDOT shall cooperate with each other in order to prepare for the system interface work and testing, the ETCS Demonstration Period, and subsequent normal operations of the HOT Lanes in accordance with the CA Documents.

24.6.3 Demonstration Period for ETCS

The objectives of the ETCS Demonstration Period are the same as those set forth for the testing program for ETCS, but the ETCS Demonstration Period will be carried out while the HOT Lanes are in normal operation conditions under load.

The ETCS Demonstration Period shall be initiated at the time of Substantial Completion for each Project Section.

In order to successfully complete the ETCS Demonstration Period, the ETCS shall meet the performance requirements in this Section 24 of the Technical Provisions and Exhibit 4 of the Agreement for 99.0% of the ETCS Demonstration Period.

The ETCS Demonstration Period shall be as follows:

- the ETCS Demonstration Period for the first Project Section that achieves Substantial Completion shall be 12 consecutive months at a minimum; if the initial ETCS Demonstration Period is not completed successfully, the period shall be extended until such time as the performance requirements have been met for a consecutive 12 month period;
- the ETCS Demonstration Period for the subsequent Project Sections shall be three months at a minimum, as long as that the end of the Demonstration Period for each subsequent Project Section shall not be before the end of the Demonstration Period for the first Project Section; and
- if the ETCS Demonstration Periods for the subsequent Project Sections are not completed successfully, the periods shall be extended until such time as the performance requirements have been met for a consecutive three month period for such Project Sections.

24.7 ETCS Design Documents

In addition to the ETCS plans, Developer's Design Document Submittals identified in Section 2.9 of the Technical Provisions shall include the documents provided in this Section 24.7 of the Technical Provisions.

24.7.1 Conceptual Design Documents

Conceptual Design Documents shall include at a minimum:

- Concept of Operations, prepared in conformance with IEEE Standard P1362 V3.2, http://www.ieee.org and ANSI/AIAA G-043-1992 Guide for the Preparation of Operational Concept Documents, http://global.ihs.com; and
- System overview and architecture:
    - General physical layout (including tolling zones and Toll Rate Signs locations)
    - Tolling zones:
        - Functionalities;
        - Configuration;
        - Equipment;
    - Host computer
        - Functionalities;

        - Hardware and software;
        - Communication;
    - Transaction consolidation (for sending to CCH);
    - Communication and interface with NCDOT; and
    - Maintenance and support.

24.7.2 Intermediate Design Document Submittal

Intermediate Design Documents shall include at a minimum the following Elements:

- lane configurations;
- Toll Zones configuration;
- gantry locations;
- Traffic Monitoring Station locations;
- curative maintenance management system equipment and locations;
- roadside system and technology;
- Toll Rate Signs;
- equipment installation locations;
- equipment quantities;
- performance specification traceability matrix;
- network design;
- system hardware and software;
- technical interface with existing NCDOT systems;
- technologies to be used for enforcement; and
- performance reporting and auditing tools.

All roadside ETCS components, including gantries and Toll Rate Signs, shall be developed in conformance with the requirements described in Section 14.2.9 of the Technical Provisions.

24.7.3 Final Design Document Submittal

Final Design Documents shall include at a minimum the following Elements:

- final detailed Design Documents, including any updates or revisions to the Intermediate Design Submittal, and reflecting NCDOT comments;
- product cut sheets for all ETCS equipment and communications gear;
- ETCS Testing Plan for factory acceptance testing and on-site system acceptance testing, including at a minimum Elements such as:
    - introduction:
        - purpose;
        - supporting documents;

    - traceability matrix; and
    - points of contact.
- testing process and methodology:
    - test plan objectives;
    - testing methods;
    - assumptions:
        - source documents;
        - environmental needs;
        - training needs; and
        - testers.
    - problem identification and resolution;
    - test script;
    - pass/fail criteria;
    - issue tracking;
    - disposition of signed scripts and ETCS final acceptance signature sheet; and
    - estimated schedule for testing and locations.
    - ETCS final acceptance sign off block (when all scripts are accepted).

24.7.4 Factory Acceptance testing

Developer shall submit to NCDOT certified documentation demonstrating successful completion of factory acceptance testing, including interoperability requirements within 15 days of passing test.

24.7.5 Substantial Completion

Developer shall submit documentation demonstrating successful completion of on-site system acceptance testing as a condition for achieving Substantial Completion of a Project Section in accordance with Section 7.7.1 of the Agreement.

Following Substantial Completion, additional submittals shall include:

- Operations and Maintenance Manuals as per Section 23.1.3.1 and Section 23.1.3.2 of the Technical Provisions, to include all of the ETCS Elements. The manuals and Planned Maintenance Schedules for the ETCS Elements shall be submitted to NCDOT for review and comment no less than 45 days prior to the first Substantial Completion date and updated within 30 days of each Substantial Completion date for each Project Section.

24.8 ETCS Reporting Requirements

Developer shall prepare a monthly report describing the ETCS activities and performance, traffic volumes, speeds, and revenue figures as described herein. Developer shall submit a template of each monthly activity report to NCDOT for review and comment no less than 30 days prior to Substantial Completion on any portion of the Project. Developer shall submit each report

required in this Section 24.8 for each calendar month to NCDOT not later than the 7th of the following month.

24.8.1 ETCS Activity Monthly Report

From the first Substantial Completion Date, for the current month, the ETCS Activity Monthly Report shall be submitted to NCDOT and include the following components:

- detailed presentation and explanation of all activities undertaken to ensure Interoperability;
- the following information with respect to Level Two Customer Service, in conformity with the requirements described in Section 24 of the Technical Provisions and Exhibit 18 of the Agreement:
  - calls to Customer Service Center that are Level Two Customer Service, average wait time and service time;
  - Interactive Voice Response system;
- the following information on Irregular Transactions recorded during the month:
  - the total number of Irregular Transactions;
  - the number of Irregular Transactions related to vehicles registered outside of North Carolina;
  - the number of Irregular Transactions associated with Exempt Vehicles (government, law enforcement, ambulance, Emergency vehicles, etc.);
  - the number of Irregular Transactions researched that became a Transaction;
  - the number of payments received and the corresponding actual Toll Revenue billed and collected for Irregular Transactions that became a Transaction; and
  - the number of Irregular Transactions and the theoretic Toll Revenue (vehicle count x toll value) not collected because the User could not be determined.
- detailed presentation and explanation of all instances of O&M Noncompliance Events respecting the ETCS performance, as required by Section 23 and Section 24 of the Technical Provisions, describing at a minimum: the corresponding name and ID number per Table 23.2, the commencement time, duration, entity who identified such events first, details regarding the cure of such O&M Noncompliance Events including the steps taken and the time it took to cure, applicable Cure Period, the reasons why the prescribed performance goals were not met, the status of such events as of the end of the month, Noncompliance Points incurred by Developer if any associated with each such O&M Noncompliance Event, and the changes (if any) made to the O&M Plan based upon such events;
- detailed calculations of Noncompliance Points associated with O&M Noncompliance Events related to the ETCS incurred by Developer and accrued for the past month and total balance for the past 365 days and 1095 days, and liquidated damages assessed, including details of each assessment;
- details on all instances of Noncompliance Events for Developer, the CCH and CSC pursuant to Exhibit 18 of the Agreement, describing at a minimum: the corresponding name and ID, the commencement time, duration, the status of each event as of the end of the month, Noncompliance Points and liquidated damages if any associated with each

event, and a description of any action taken by Developer as a consequence of such events; and

- detailed calculation of Noncompliance Points for the CCH and CSC pursuant to Exhibit 18 of the Agreement accrued for the past month and total balance for the past 365 days, and liquidated damages assessed, including details of each assessment; and
- summary of monthly ETCS maintenance activities, support activities for applications and databases, and Technology Enhancements if any.

24.8.2 Traffic and Revenue Monthly Reports

From the first Substantial Completion Date, for the current month, the Traffic and Revenue Monthly Report shall be submitted to NCDOT and include the following components:

- for the current month and the previous three months, the toll Schedule for each period of the day in the format presented in Table 4-2 of Exhibit 4 of the Agreement. If dynamic tolling is in effect, minimum and maximum toll values shall replace the fixed schedule tolls values in Table 4-2 of Exhibit 4 of the Agreement. The dynamic tolls are presented with the appropriate number of tables to cover the month;
- for the current month and the previous three months, the schedule of all toll discounts to Users, if any;
- traffic counts on the HOT Lanes for the current month and the previous 14 months, with such traffic counts performed at the same specific locations each month as agreed with NCDOT (at a minimum covering one location per Toll Segment in each direction);
- traffic counts on the GP Lanes for the current month and the previous 14 months, with such traffic counts performed at the same specific locations each month and in the same highway location as the traffic counts on the HOT Lanes;
- theoretical Toll Revenue (vehicles count x toll value) and actual Toll Revenue for the current month and the previous three months, reported per direction, per Toll Segment, , per Trip, and per vehicle class as per the User Classification, per type of Transaction (Video Transaction and Transponder Transaction), per Transponder emitting authority, if applicable (per hour, per day, for average weekday and weekend day, and totals per week, per month, the month, and for the entire Project per direction and total.);
- speed and degradation reporting requirements as per Section VII.E of Exhibit 4 of the Agreement; and
- detailed presentation and explanation of any suspension of tolls in accordance with Section 3.5 of the Agreement, including the following information on all such events:
    - the nature, location, direction, if applicable, date and time (rounded to the nearest minute) of the suspense of tolls;
    - description of the impact (location, magnitude and duration) on the traffic on the HOT Lanes and/or GP Lanes; and
- detailed presentation and explanation of any O&M Noncompliance Event, to the extent that such event affected traffic on the HOT Lanes and/or GP Lanes, including the following information on all such events:
    - the nature, location, direction, if applicable, date and time (rounded to the nearest minute) of the detection of each O&M Noncompliance Event;

- the name of the Person and, where appropriate, the agency that has identified the event;
- description of the impact (location, magnitude and duration) on the traffic on the HOT Lanes and/or GP Lanes; and
- the date and time (rounded to the nearest minute) of the cure of the O&M Noncompliance Event and return to normal traffic flow.

24.8.3 Traffic and Revenue Annual Reports

On an annual basis, Developer shall create a Traffic and Revenue Annual Report consolidating the Traffic and Revenue Monthly Reports and ETCS Activity Monthly Reports for the year and submit to NCDOT such report concurrently to the O&M Annual Report. The Traffic and Revenue Annual Report shall summarize all of the activities associated with Developer's O&M Work respecting the ETCS for the year, the actual maintenance and systems upgrades performed for the year, and confirmation that Developer performed all O&M Work by Developer in compliance with the CA Documents.

From Substantial Completion of the first Project Section, Developer shall deliver the Traffic and Revenue Annual Report to NCDOT no later than the 30th day of each Fiscal Year for review and comment. The Traffic and Revenue Annual Report shall be completed in accordance with the requirements set forth in Section 23 and Section 24 of the Technical Provisions. Developer's Traffic and Revenue Annual Report shall contain the following information:

- a summary of all Traffic and Revenue Monthly Reports and ETCS Activity Monthly Report from the preceding year;
- statement of all adjustments to the Traffic and Revenue Monthly Reports and ETCS Activity Monthly Reports from the preceding year (if any);
- calculation of the average annual daily traffic (AADT) on the HOT Lanes, on the GP Lanes, and for all lanes in the same highway location as the traffic counts reported monthly;
- calculation of the average annual daily traffic (AADT) for the Project; and
- a summary of the information requested by NCDOT (corrected if necessary), by month during the preceding year (if any).

From Substantial Completion of the first Project Section, Developer shall deliver the required information on Toll Revenue for incorporation into the NCTA annual revenue report pursuant to G.S. 136-89.193 in accordance with the schedule established by the NCTA.

24.9 Deliverables

Developer shall submit at a minimum the following Submittals to NCDOT in accordance with this Section 24 of the Technical Provisions:

- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions;
- reports required by third parties for Interoperability;
- Notice of anticipated Substantial Completion date of first Project Section and delivery of interface workplan;
- Configuration Management Program for ETCS for approval prior to interim acceptance certificate for the ETCS;

- ETCS Testing Plan For Factory Acceptance and On-Site Acceptance for review and comment as part of the Final Design Submittal;
- ETCS final acceptance sign off block for review and comment as part of the Final Design Submittal;
- certified factory acceptance testing, including interoperability requirements within 15 days of passing test;
- draft template for ETCS Activity Report for approval 30 days prior to Substantial Completion Date;
- ETCS Activity Monthly Report and Traffic and Revenue Monthly Reports submitted concurrently to the monthly O&M Report the first Substantial Completion Date; and
- Traffic and Revenue Annual Report.

Under no circumstances is this list of Submittals to be construed as exhaustive and Developer shall be solely responsible for meeting any and all Submittal requirements of the Technical Provisions and the CA Documents.

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Exhibit 2-01

Final Design Certificate

Certificate Seq. No...

Form of Certificate to be used for certifying the Final Design of the Work.

1. Element(s) of the Work ……

1.1 Description of the Element(s) of the Work.

……

……

1.2 We certify that the Final Design of .....
.....
Element(s) of the Work):

have been prepared in accordance with the CA Documents with the exception of (specify exceptions) .....

.....

have been accurately translated into drawings whose unique numbers are .....

.....

have been undertaken in accordance with the Quality System in force.

Signed by Engineer of Record on behalf of Developer

Name .....

Company .....

Date .....

Signed .....

1.3 We certify that the Final Design of (Element of Work) .....

.....

has been prepared in accordance with the Contractor's Construction Proposals with the exception of …….....

.....

Signed for Contractor

Name .....

Company .....

Date .....

Signed .....

1.4 We certify that the Final Design of (Element of the Work) .....

.....

have been prepared in accordance with the CA Documents, Developer's construction, operations and maintenance proposals and Developer's Quality System with the exception of (specify exception) .....

.....

Signed for Developer

Name .....

Company .....

Date .....

Signed .....

Exhibit 2-02

Released for Construction Certificate

Certificate Seq. No...

1. Element(s) of the Work …….

1.1 Description of the Element(s) of the Work.

…….

…….

1.2 We certify that the following design that has been Released for Construction (Element of Work) .....

has been prepared in accordance with the CA Documents with the exception of (specify exceptions).....

.....…….....;

have been accurately translated into drawings whose unique numbers are.....

.....;

have been undertaken in accordance with the Quality System.

Signed by Engineer of Record

Name .....

Company .....

Date .....

Signed .....

1.3 We certify that the following design that has been Released for Construction (Element of the Work) .....

.....

has been prepared in accordance with the Contractor's Construction Proposals with the exception of (specify exceptions) .....

…….....;

Signed for Contractor

Name .....

Company .....

Date .....

1.4 We certify that the following design that has been Released for Construction (Element of the Work) .....: have been prepared in accordance with the CA Documents with the exception of

(specify exceptions) .....

…….....

Signed for Developer

Name .....

Company .....

Date .....

Exhibit 2-03

Summary of Approved Design Exceptions

Note: The station locations provided on these Design Exceptions are based on the Reference Concept version dated October 11th, 2012.

DE01-Shldr – Design Exception dated May 1, 2013 (revised August 1, 2013) for median Shoulder width at existing overhead Bridges and sign structures, and at proposed toll gantries and toll signs as approved May 21, 2013 by the FHWA (re-approved August 19, 2013). These Structures may vary in size; however a Design Exception is approved for a median Shoulder width no less than 8 feet at the following locations (excluding Bridge No. 480049 Williamson Rd. and Bridge No. 480026 NC 150), including a 100 foot transition of the Shoulder width at the following locations:

Existing Overhead Sign Structures with Median Shoulder Width Less Than Minimum		
Section	**Roadway**	**Location**
Southern	I-277 WB	Sta. 164+00
	I-77 SB	Sta. 210+00, Sta. 233+00, Sta. 254+00, Sta. 286+50, Sta. 296+50, Sta. 324+50
	I-77 NB	Sta. 222+00, Sta. 238+00, Sta. 260+00, Sta. 286+50, Sta. 311+00
Central	I-77 SB	Sta. 350+00, Sta. 362+00, Sta. 378+00, Sta. 418+00, Sta. 431+00, Sta. 440+00, Sta. 492+50, Sta. 592+00, Sta. 669+50, Sta. 755+00
	I-77 NB	Sta. 360+00, Sta. 376+00, Sta. 426+50, Sta. 437+50, Sta. 477+00, Sta. 484+50, Sta. 514+50, Sta. 525+00, Sta. 625+50, Sta. 674+50, Sta. 691+50

Proposed Overhead Toll Signs with Median Shoulder Width Less Than Minimum				
Section	**Roadway**	**Location**	**½ mile advance**	**1 mile advance**
Southern	**I-277**	Sta. 125+00	½ mile east Sta. 125+00, Sta. 151+40	1 mile east Sta. 125+00, Sta. 177+80
	I-77 NB	Sta. 200+00	½ mile south Sta. 200+00	1 mile south Sta. 200+00
	I-77 SB		Sta. 226+40	Sta. 252+80
Central (Ingress/ Egress)	**I-77 SB**	Sta. 423+00, Sta. 1032+00	Sta. 449+40,Sta. 1058+40	Sta. 475+80, Sta. 1084+80
	I-77 NB	Sta. 468+00, Sta. 865+00	Sta. 441+60, Sta. 838+60	Sta. 415+20, Sta. 812+20
Northern	**I-77 NB**	Sta. 1450+00	Sta. 1423+60	Sta. 1397+20
	I-77 SB		Sta. 1476+40	Sta. 1502+80

Proposed Toll Gantry Structures with Median Shoulder Width Less Than Minimum		
Section	**Roadway**	**Location**
Southern	Begin/End HOT	**I-277:** Sta. 130+00, **I-77:** Sta. 220+00
Central	I-77 SB	Sta. 355+00, Sta. 965+00
Central	I-77 NB	Sta. 540+00, Sta. 933+00
Northern	Begin/End HOT Lane	Sta. 1450+00

Existing Bridge Piers with Median Shoulder Width Less Than Minimum				
Section	**Bridge No.**	**Route**	**Over**	**Proposed Median Shoulder Width**
Central	590323	Sunset Rd.	I-77	8 feet
	590334	Lakeview Rd.	I-77	8 feet
	590358	Sam Furr Rd.	I-77 NB	8 feet
	590359	Sam Furr Rd.	I-77 SB	8 feet
Northern	480028	Langtree Rd.	I-77	8 feet
	480049	Williamson Rd.	I-77	I-77 NB – 4.33 feet; I-77 SB – 4.25 feet
	480070	Brawley School Rd.	I-77	8 feet
	480026	NC 150	I-77	6 feet

DE02-Loop – Design Exception dated May 1, 2013 for the existing radius of the loop at the Graham/I-277 Interchange that is less than the specified minimum radius and will remain without improvement after I-277 is widened as approved May 21, 2013 by the FHWA.

DE03-SSD - Design Exception dated May 1, 2013 for Bridge Shoulder width that is less than the specified minimum width for Shoulder stopping sight distance in the I-77/I-85 and I-77/I-277 interchanges at locations specified herein as approved May 21, 2013 by the FHWA. The proposed Bridges shall have a Shoulder width of no less than ten feet on the inside of the radius.

Bridge Shoulder Widths for Stopping Sight Distance Less Than Minimum				
Section	**Bridge Number**	**Route**	**Over**	**Required Stopping Sight Distance (Inner Radius Shoulder Width)**
Southern	591037	I-77 SB HOV	I-85	19 feet
	N/A – new Bridge	I-77 NB HOV	I-85	19 feet
	N/A – new Bridge	I-77 NB HOV	I-77 SBL	12 feet
	N/A – new Bridge	I-277 Flyover	I-77	21 feet

DE04-277Shldr – Design Exception dated May 1, 2013 for existing median Shoulder width that is less than the specified minimum at locations herein to remain without improvement as approved May 21, 2013 by the FHWA. The existing roadway and Bridges on I-277 from Sta. 107+00 to Sta. 167+00 from N. Brevard St. to Hamilton St.

Existing Bridges with Median Shoulder Width Less Than Minimum			
Section	**Bridge Number**	**Route**	**Over**
Southern	590332	I-277	NC Music Factory Blvd., Norfolk Southern and CSXT Railroads
	590330	I-277	N. Graham St.
	590328	I-277	N. Church St.
	290327	I-277	N. Tryon St.
	590326	I-277	N. College St.
	590322	I-277	Railroad

DE05-VC – Design Exception dated May 1, 2013 (revised February 7, 2014) for existing Bridge vertical clearance that is less than the specified minimum at locations below to remain without improvement as approved May 21, 2013 by the FHWA (re-approved February 7, 2014):

Bridges with Vertical Clearance Less Than Minimum				
Section	**Bridge No.**	**Route**	**Over**	**Vertical Clearance**
Southern	590302	I-77 NB	I-85	15’ 9”
Central	590312	Cindy Lane	I-77	15’ 11”
	590356	SR 2136 (Gilead Rd)	I-77	15’ 10”
	590362	Westmoreland Ave.	I-77	15’ 11”
	590019	Catawba Ave. – SR 5544 (US 21)	I-77	15’ 7”

DE06-Ingress – Design Exception dated May 1, 2013 for median Shoulder width no less than four feet on the HOT Lanes which is less than the specified minimum width at four locations specified herein where HOT Lane ingress and egress is provided as approved May 21, 2013 by the FHWA.

HOT Lane Median Shoulder Widths Less Than Minimum at Ingress and Egress			
Section	**Location**	**Direction**	**Station Range**
Central	North of I-85 to North of I-485	I-77 SB	Sta. 361+00 to Sta. 418+00
		I-77 NB	Sta. 473+00 to Sta. 530+00
	North of I-485 to Catawba Ave (Exit 28)	I-77 NB	Sta. 870+50 to Sta. 927+50
		I-77 SB	Sta. 970+00 to Sta. 1027+00

DE07-485Shldr– Design Exception dated May 1, 2013 for outside Shoulder width no less than eight feet on the HOT Lanes from Sta. 630+00 to Sta. 645+00, including five Bridge underpasses specified below, which is less than the specified minimum width as approved May 21, 2013 by the FHWA.

HOT Lane Outside Shoulder Width Less Than Minimum at Bridge Underpasses			
Section	**Bridge No.**	**Route**	**Over**
Central	590963	I-485 WB Collector	I-77
	590964	I-485 WB	I-77
	590965	I-485 EB	I-77
	590969	I-77 SBL Ramp Flyover	I-77, I-485 and US 21
	590970	I-485 EBL Ramp	I-77

DE08-Cswy – Design Exception dated May 1, 2013 for Shoulder width that is less than the required minimum on three causeways at locations as approved May 21, 2013 by the FHWA. At such locations, the proposed median Shoulder width shall be no less than six feet and the proposed outside Shoulder width shall be no less than 12 feet to face of guardrail. This Design Exception applies to the following locations:

- Causeway #1: Sta. 1147+00 to Sta. 1168+00
- Causeway #2: Sta. 1189+00 to Sta. 1240+00
- Causeway #3: Sta. 1404+00 to Sta. 1426+00

Exhibit 2-06

Schedule of Values

This Exhibit does not constitute an all-inclusive list of the Work to be undertaken by Developer.

Cost item	Total	Month 1	Month 2	Month 3	…	Month X
NTP1 Work Pursuant to Section 1.5 of the Technical Provisions						
Provision of Developer Management Plan						
Submission of Protocols and Procedure for public outreach, stakeholder relations, Emergency management, media and marketing						
Preparation of Communications, Public Outreach and Community Education Plan						
Appointment and retention of a ROW Appraiser						
Submission of Project Baseline Schedule						
Submission of complete Schedule of Values						
Submission of Progress Report						
Maintenance of a full and complete copy of all CA documents						
Submission of O&M Plan(s)						
Provision of Traffic Management Phasing Concept						
Design Activities that are not Design Submittals						
Design Submittals						
Design						
Survey						
Engineering Design						
Landscape Design						
Specified Design Services						
Right of Way						
ROW Acquisition Costs						
Relocation Assistance						
Title and Escrow						
Appraisals						
Mobilization						
Mobilization						
Environmental						
Water Quality						
Hazardous material removal and disposal						
Stream Restoration/Relocation						
Roadway						
Erosion and Sedimentation Control						
Clearing and Grubbing						

Cost item	Total	Month 1	Month 2	Month 3	…	Month X
Earthworks (bulk excavation/bulk fill/backfill)						
Concrete Base and Pavement, Mainline						
Asphalt Base and Pavement, Mainline						
Base and Pavement, Ramps						
Base and Pavement, Cross Streets						
Drainage						
Signs, Delineation and Pavement Markings						
Traffic Control						
Landscaping						
Lighting						
Concrete Median and Barrier						
Concrete Curb and Gutter						
Guardrail						
Miscellaneous						
ITS and Communications Systems						
ITS Concept of Operations						
Vehicle Detection System						
CCTV System						
DMS, Arterial DMS and Toll Rate Signs						
Communications System						
ITS Integration and Testing						
Structures						
Modify or Widen Structures						
Remove Structures						
New Structures						
Concrete Box Culverts						
Retaining Walls						
Noise Walls						
Aesthetics and Landscaping and Allowance Scope						
Voluntary Aesthetic Elements						
Bicycle and Pedestrian Accommodations						
Tolling						
Building and Infrastructure						
Toll Equipment						
Toll Software						
Toll System Integration and Testing						
Other						
Railroad Track						
Site Facilities for NCDOT Staff						
Operations and Maintenance Facility						
Traffic Management Center (TMC)						
Utilities						
Utility Coordination						
Utility Design						
Utility Construction						

Cost item	Total	Month 1	Month 2	Month 3	…	Month X
O&M During Construction						
Pavement & Base						
Drainage						
Structures						
Landscaping and Vegetation Management						
Signs, Pavement Markings, Delineation, Lighting and other Roadside Elements						
Fleet Equipment and Facilities						

Exhibit 2-07

Requirements for CEI Services

I. General

A. The CEI Firm shall be responsible for providing a completely independent inspection, field materials sampling and testing of all construction activities during the period set forth in Section 9.3.1.1 of the Agreement.

B. The CEI firm shall utilize effective control procedures such that the construction of the Project is performed in accordance with Developer's Design Documents and the CA Documents.

C. The CEI firm shall be responsible for providing qualified technical personnel in appropriate numbers at the proper times such that all responsibilities are effectively carried out. Qualified staff shall have all NCDOT certifications necessary to perform the Work required under this CA Documents. It is the CEI Firm's responsibility to provide, at all times, an appropriate number of employees to perform the necessary CEI Work.

D. Work shall be performed in accordance with the established standard procedures and practices of NCDOT and the requirements of the CA Documents. The CEI Firm shall be familiar with NCDOT's standard procedures and practices as set forth in the NCDOT Construction Manual and associated manuals and with informal procedures and practices for construction contract administration used by NCDOT. This includes adhering to all safety policies and procedures established by NCDOT and Developer. Failure on the part of the CEI Firm to perform this Work as expected will result in suspension of all Work on the Project until adequate inspection processes are in place.

E. CEI Firm shall certify that the testing and sampling was conducted and the Project was constructed in accordance with the CA Documents.

F. The CEI Firm will be responsible for ensuring that the NPDES reviews are conducted at the required frequency by properly trained and certified personnel.

G. The CEI Firm is responsible for delivery of verification samples that are not field tested to the NCDOT laboratory.

H. Upon Final Acceptance of the last Project Section the CEI Firm shall provide a certificate to NCDOT, in a form acceptable to NCDOT, that all materials sampling and testing has been conducted in accordance with NCDOT policies and procedures and that results of the tests indicate that materials incorporated in the Work controlled by sampling and testing were in conformity with the design, plans and specifications. This certification shall be sealed by a North Carolina Registered Professional Engineer.

II. Work Standards

A. It shall be the responsibility of the CEI Firm to ensure that the Project is constructed in accordance with the CA Documents.

B. The CEI firm shall document any observed omissions, substitutions, Defects, and deficiencies noted in the Work, raise Nonconforming Work reports and confirm that Developer has taken the corrective action necessary, and advise NCDOT accordingly, including suspending the Work if necessary. The CEI Firm shall develop and submit to NCDOT a non-conformance report for any Defects or deficiencies noted in the Work. This report shall contain a detailed description of the Defect or deficiency, digital photos, original and subsequent testing, recommended corrective action, corrective Work performed, follow-up testing to ensure compliance and acceptability, and daily diaries of events associated with the Defect or discrepancy.

C. The CEI Firm shall undertake all functions required of the CEI Firm including reporting to NCDOT in a timely manner.

D. The CEI Firm shall make and record such measurements as are necessary to assure that minimum sampling and testing requirements are being met.

E. The CEI Firm shall monitor on-site and off-site construction manufacture and fabrication operations including tolling and ITS equipment manufacturing and inspect all materials that are to be incorporated into the Work as required such that the quality of workmanship and materials are such that the Project will be completed in accordance with the design, plans, specifications, and CA Documents. The CEI Firm shall keep detailed, accurate records daily of construction operations and significant events that affect the Work.

F. The standard procedures and practices of NCDOT for inspection of construction projects are set out in NCDOT's Construction Manual, the Minimum Sampling Guide and the CA Documents. The CEI Firm shall perform inspection, sampling and testing in accordance with these standard procedures and practices and other accepted practices as may be appropriate and approved by NCDOT as part of the approval of the DMP and any revisions to the DMP.

G. The CEI Firm shall perform field sampling and testing of component materials as described in the Minimum Sampling Guide, Acceptance Test Category, Project Personnel Sampling Responsibility and the CA Documents such that the materials and workmanship incorporated into the Project are in accordance with the plans, specifications, and CA Documents.

H. CEI Firm shall perform all density quality assurance for asphalt pavements in accordance with Section 609 of the Standard Specifications

I. CEI Firm personnel performing sampling and testing must have active NCDOT certifications for each test that is performed.

J. The CEI Firm shall maintain, on a daily basis, a complete and accurate record of all activities and events relating to the Project, including utility relocations, and a record of all Construction Work completed, including quantities of materials used and Work accomplished in conformity with NCDOT policies and procedures.

K. The CEI Firm shall prepare inspector's daily reports of the construction operations in accordance with the NCDOT Construction Manual. These shall be forwarded to NCDOT on a daily basis**.**

L. The CEI Firm shall maintain records of all sampling and testing accomplished and shall analyze such records such that acceptability of materials and completed Work can be confirmed to NCDOT. The CEI Firm shall furnish records on a weekly basis to NCDOT for inclusion into the HiCAMS computer system.

M. All records produced by or for the CEI Firm shall be retained for at least ten years after Final Acceptance.

N. The CEI Firm shall monitor each construction operation to the extent necessary to determine whether construction activities violate the requirements of any permits. The CEI Firm shall notify the Design-Build Team immediately of any violations or potential violations and require his immediate resolution of the problem. Permit violations shall be reported to NCDOT immediately.

O. The CEI Firm shall inspect all traffic control devices and the safety related items each working day to ensure that all measures are properly installed and maintained. Checks should also be made after significant storms and/or high winds. Traffic control should match the appropriate Work and/or conditions at all times and should be regulated by CEI Firm.

P. If ground disturbing activities are a part of this Project, the CEI Firm shall perform an erosion control inspection daily and/or after every significant rainfall event. The CEI Firm shall inspect all erosion and sediment control measures at the end of each working day to ensure all measures have been properly installed or reinstalled if the measures were removed to perform the Work. The list of deficiencies will be recorded as Nonconforming Work reports as well as being brought to the attention of Developer's Project Manager and NCDOT. The CEI Firm shall maintain an updated set of erosion control plans in accordance with NCDOT policy.

III. Miscellaneous Provisions

A. All Work performed by the CEI Firm shall be under the direction of a Professional Engineer.

B. Employees of the CEI Firm shall comply with the NCDOT's ethics policy.

C. NCDOT will have the right to approve or reject any CEI services personnel, assigned to the Project by the CEI Firm.

Exhibit 2-09

Design Documents

Submittal Guidelines

This Exhibit outlines the procedures to be followed by Developer and NCDOT in the Submittal, distribution, and review of Design Document Submittals. As used in this Exhibit, Submittal(s) means Design Document Submittals. As used in this Exhibit, a prerequisite Submittal is deemed to be "accepted" when Developer has responded to all of NCDOT's comments and NCDOT has not objected to such prerequisite Submittal.

GENERAL

Prior to any submittal of any Design Document Submittals, Developer shall provide NCDOT a list of key design and construction staff. NCDOT will reciprocate by providing Developer a list of NCDOT contacts to be used when submitting Design Document. The list of NCDOT contacts shall only be used to accurately complete the transmittal forms. All Submittal correspondence, both verbal and written, shall be directly among Developer and the NCDOT Transportation Program Management staff, unless otherwise approved.

Design Documents shall be provided NCDOT for review and comment in accordance with Developer's schedule and CA Documents, including this exhibit. Submittals shall be simultaneously delivered to the recipients specified herein. Submittals shall be made in the format (size, media, packaging and labeling) and number of copies as noted herein. Submittals may also require design calculations, files, specifications and special provisions. With the exception of Erosion Control Plans, all Release for Construction Plans shall be clearly labeled as RFC and signed and sealed by a Professional Engineer registered in the State of North Carolina. The term RFC shall be solely reserved for those plans for which NCDOT agrees that no further review is necessary.

All Submittals shall be accompanied with a standard color-coded transmittal form. Developer and NCDOT will agree on a color prior to the first Submittal.

The number of copies and the information transmitted shall be clearly noted on the transmittal form. A Submittal containing multiple copies of the same information shall be transmitted with the copies individually packaged and covered with the appropriate transmittal form. For example, a Submittal containing four sets of plans and cross-sections shall be submitted as four individual rolls each containing one set of plans and one set of cross-sections. Each roll shall have an identical color-coded transmittal form.

With each Final and RFC Design Document Submittal, Developer shall provide include executed certification Final Design Certificate (Exhibit 2-01) and Released for Construction (RFC) Certificate (Exhibit 2-02), respectively.

Each Submittal shall be assigned a Submittal number. Submittal number shall not have suffixes other than those reflecting re-submittals of the same information. Specifically, "Revise and Resubmit" Submittal responses require Developer to correct and re-submit the same information with the original Submittal number and an "R" suffix. For example, Submittal S-001 shall be revised to S-001R1 to reflect the first re-submittal and S-001R2 to reflect the second re-submittal of Submittal S-001.

Each Submittal shall be delivered for only one discipline together with any prerequisites. For example, if a Structure Submittal and a Traffic Control Submittal are delivered on the same day, two separate Submittals shall be required.

The recipient for each copy of a Submittal shall be clearly noted whether that individual received the attachments or simply a copy of the transmittal form.

As required by the FHWA Stewardship and Oversight Agreement, for FHWA Full Oversight Projects one additional set of plans and Project Special Provisions of all Submittals shall be provided. Except as noted herein, Developer shall deliver each copy to the specified recipient, including the FHWA.

As-Built Record Plans

As-Built Record Plans shall be in accordance with Section 2.9 of the Technical Provisions.

Review Time

Submittal review time is as specified in the CA Documents. Submittals delivered to the Transportation Program Management Director before 2 pm to start the specified review period on that day. If Submittals are delivered after 2 pm, the review period shall begin on the following Business Day.

NCDOT will respond to all Submittals by calling the contact Person specified by Developer and notifying them that plans and comments are available. Developer will have the option to (1) pick up plans / comments at Transportation Program Management; (2) receive plans / comments by regular mail at no charge; or (3) receive plans / comments by express mail carrier at Developer's expense. When practical, NCDOT will send comments by e-mail or facsimile and will send the original by one of the above methods.

Submittal Prerequisites

Developer shall provide Submittals to NCDOT in a logical order and in accordance with the Project Schedule. Developer shall provide NCDOT, when required, Conceptual Design Submittals, Intermediate Design Submittals, Final Design Submittals, or Released for Construction Submittals for a discipline sequentially. Developer shall provide the Conceptual Design Submittal for a discipline first to NCDOT unless specified otherwise herein or otherwise approved by NCDOT. Developer shall not submit any subsequent level Design Document for a discipline until NCDOT has returned each preceding level Submittal as provided in Section 2.1 of the Technical Provisions and Developer has documented all comments, if any, received from NCDOT and the corresponding resolution.

If Developer elects to provide a Submittal that requires review of prerequisite Submittals, Developer assumes all risks should a prerequisite Submittal review result in comments that impact the current Submittal. Depending on the Project complexity, NCDOT may waive the requirement for certain Submittals.

Developer has the option to divide the Project into segments for the purpose of Submittals. For example, the Project may be broken into North Section, Central Section, and South Section, resulting in three Submittals for each discipline Submittal. However, upon completion of the Project design, Developer shall provide one complete Submittal for each discipline.

Developer shall notify NCDOT of any changes to previously reviewed Submittals. For example, if NCDOT reviews and comments or asks to resubmit the Line and Grade Submittal, Developer shall be required to advise of any subsequent revisions made to the Line and Grade Submittal. A re-submittal of that item will generally be necessary. Similarly, any design /

construction changes made after submittal of RFC Plans shall require a Submittal for review and comment to ensure that dependent plan reviews are based on the most current and accurate information. At a minimum, Submittal shall follow the guidelines herein, as well as the appropriate discipline prerequisites and review.

Prerequisites and other documents provided with a Submittal that are for information only shall be noted as "FIO". For example, if the Roadway Plans are included to assist in reviewing the Signing Plans, they shall be noted with "FIO".

SUBMITTALS REQUIRED BY DISCIPLINE

Work within Railway Right of Way

In addition to Submittal requirements for the respective discipline, the following Design Documents shall be submitted for work within the railway right of way. Conceptual and Final Bridge Plans Submittal shall include all information required by the railway or transit.

Conceptual or Preliminary, Final and RFC

Prerequisites:
- N/A

Total Number	7 Half-size (22" x 34") and Electronic Files
Transportation Program Management	7 Half-size and Electronic Files

Design Criteria and Structure Recommendations

Design Criteria should be submitted on the NCDOT Design Assumption Form (https://connect.ncdot.gov/letting/Pages/Private-Engineering-Firm-Resources.aspx) and Structure Recommendations shall comply with the Structures Management Unit Manual.

Prerequisites:
- None

Total Number	2 Sets
Transportation Program Management	2 Sets

Line and Grade Plans

At the request of Developer, NCDOT will review Line and Grade Plans including the horizontal and vertical alignments but such review shall not eliminate the requirement to submit Preliminary Roadway Plans Submittal.

Prerequisites:
- Accepted Design Criteria
- Accepted Structure Recommendations

Total Number	4 – 6 Full-size (22" x 34"), 4 Half-size (11" x 17"), Electronic Files
Transportation Program Management	1 Full-size with design calculations
Utilities Coordination Unit	1 Full-size
Congestion Management Section	1 Half-size w/Capacity Analysis
Railroad Division, if applicable	1 Full-size
Location and Surveys Unit	1 Half-size
Area Roadway Construction Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size
Division Traffic Engineer	1 Half-size

Resident Engineer	2 Full-size

Roadway Design

The submittal of Roadway Plans will generally be comprised of five steps, beginning with design criteria and culminating with RFC Plans. Plans for right-of-way recordation are also required, if applicable. The various Roadway Plans also need to be submitted with plans for other disciplines, as noted throughout this exhibit. Any changes to a stage of the Roadway Plans made after that stage's initial review and comment by NCDOT shall require re-submittal to ensure that dependent plan reviews are based on the most current and accurate Roadway Plans.

For guidance in preparing these Submittals, see the document titled "Roadway Design Guidelines for Design-Build Projects" at the following URL:

http://www.ncdot.gov/doh/preconstruct/altern/design_build/RoadwayGuidelines080107.pdf

Developer shall develop plans in English units using the current version of Microstation and Geopak software required by NCDOT. The plans shall follow NCDOT's CADD standards including, but not limited to, file naming convention, leveling chart and file folder structure. These standards can be found at the following URL:

https://connect.ncdot.gov/resources/CADD/Pages/default.aspx/

In addition the Submittal copies specified herein, Developer shall submit electronic files of the Roadway Plans if requested by NCDOT.

Preliminary Roadway Plans

Prerequisites:

- Accepted Design Criteria
- Accepted Structure Recommendations
- Accepted Preliminary Bridge / Culvert Survey Reports when grade is hydraulically controlled or letter stating that grade is not hydraulically controlled

Total Number	5 – 7 Full-size, 5 Half-size, 7 – 9 x-sections, Electronic Files
Transportation Program Management	1 Full-size with x-sections & design calculations
Hydraulics Unit (Deliver to TPM)	1 Full-size with x-sections
Utilities Coordination Unit (Deliver to TPM)	1 Full-size with x-sections
Congestion Management Section (Deliver to TPM)	1 Half-size w/Capacity Analysis
Railroad Division, if applicable (Deliver to TPM)	1 Full-size with x-sections
FHWA, if applicable	1 Full-size with x-sections
Area Roadway Construction Engineer	1 Half-size with x-sections
Regional Traffic Engineer	1 Half-size with x-sections
Division Traffic Engineer	1 Half-size with x-sections
Roadway Lighting Section, if applicable	DVD of MicroStation and GeoPak files
Location and Surveys Unit	1 Half-size with DVD of MicroStation GeoPak & .gpk files,
Resident Engineer	2 Full-size with x-sections

Right of Way or Intermediate Roadway Plans

Developer shall provide either Right of Way or Intermediate Roadway Plans for review. Where Developer is acquiring the right of way, Submittal shall be titled Right of Way Plans, otherwise Submittal shall be titled Intermediate Roadway Plans.

Prerequisites:
- Accepted 100% Hydraulics Design Plans
- Accepted Preliminary Roadway Plans

Total Number	6 – 8 Full-size, 3 Half-size, 9 – 11 x-sections
Transportation Program Management	1 Full-size with x-sections
Utilities Coordination Unit (Deliver to TPM)	1 Full-size with x-sections
Railroad Division, if applicable (Deliver to TPM)	1 Full-size with x-sections
Right of Way (Branch Deliver to TPM)	1 Full-size with x-sections
Area Roadway Construction Engineer	1 Half-size with x-sections
Regional Traffic Engineer	1 Half-size with x-sections
Division Traffic Engineer	1 Half-size with x-sections
Division Right of Way Agent	1 Full-size with x-sections
FHWA, if applicable	1 Full-size with x-sections
Resident Engineer	2 Full-size with x-sections

Final Right of Way Plans

Submittal shall incorporate Right of Way or Intermediate Roadway Plans review comments and shall be submitted in hard and electronic format complying with the requirements of GS § 136-19.4. Final Right of Way Plans shall be certified by a Professional Engineer and Developer shall provide a copy of the Final Right of Way Plans for right of way recordation in both electronic and hard copy format.

Prerequisites:
- Accepted Right of Way or Intermediate Roadway Plans

Total Number	4 - 5 Half-size, 2Full-size and 3 electronic
Transportation Program Management	1 Half-size and 1 electronic
Right of Way Branch (deliver to TPM)	1 Half-size and 1 electronic
Division Right of Way Agent	1 Half-size, 1 Full-size and 1 electronic
FHWA, if applicable	1 Half-size
Resident Engineer	1 Half-size and 1 Full-size

Final Roadway Plans

Submittal does not require all summary and quantity sheets.

Prerequisites:
- Final Right of Way Plans if applicable

Total Number	3 - 4 Full-size with cross-sections
Transportation Program Management	1 Full-size with x-sections
FHWA, if applicable	1 Full-size with x-sections
Resident Engineer	2 Full-size with x-sections

RFC Roadway Plans

Prerequisites:
- Accepted Final Roadway Plans

Total Number	3 – 4 Full-size, 7 Half-size, 10 – 11 x-sections, Electronic Files
Transportation Program Management	1 Full-size & 1 Half-size with x-sections
Pavement Management Unit (Deliver to TPM)	1 Full-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size with x-sections
ITS Engineer, if applicable (Deliver to TPM)	1 Half-size with x-sections
FHWA, if applicable	1 Full-size with x-sections

Division Traffic Engineer	1 Half-size with x-sections
Regional Traffic Engineer	1 Half-size with x-sections
Division Construction Engineer	1 Half-size with x-sections
Area Roadway Construction Engineer	1 Half-size with x-sections
Resident Engineer	2 Full-size with x-sections

Temporary Roadway Alignments

Submittals for temporary roadway alignments shall adhere to the requirements for Preliminary and Final Roadway Plans except that prerequisites are Preliminary and Final Accepted Traffic Control Phase, respectively.

Pavement

The Pavement Submittals shall consist of pavement design report, typical sections, Shoulder drains and temporary pavement designs, including but not limited to the evaluation of existing Shoulders and roadways regarding their suitability for carrying traffic.

Typical Sections

Submittal shall include all typical sections, wedging details and pavement schedules required for Project that are signed and sealed by Developer's Roadway Design Engineer of Record.

Prerequisites:

- Accepted Final Roadway Plans

Total Number	1 Full-size with x-sections
Transportation Program Management	None
Pavement Management (Deliver to TPM)	1 Full-size with x-sections

Shoulder Drains

Submittal shall include the Shoulder drain locations, designs and outlet locations, including all required details.

Prerequisites:

- Accepted Final Roadway Plans
- Accepted 100% Hydraulic Design

Total Number	1 Full-size with x-sections
Transportation Program Management	None
Pavement Management (Deliver to TPM)	1 Full-size with x-sections

Temporary Pavement Design

Submittal shall include all information / calculations required to review the temporary pavement design, including but not limited to the temporary traffic volumes, duration of use, existing pavement structure and geotechnical details.

Prerequisites:

- Accepted Traffic Control Plans

Total Number	1 Full-size
Transportation Program Management	None
Pavement Management (Deliver to TPM)	1 Full-size

Structure Design

Plan Submittals for Bridges shall be delineated into two stages, preliminary and final. Culvert and sound barrier wall plans may be submitted in one stage. For retaining wall plan Submittals, see "Geotechnical Design" elsewhere in this Exhibit.

Preliminary General Drawings for Bridge / Culvert

Preliminary General Drawings shall contain sufficient details (drawings or narrative) to explain the scope of design and construction intended for the Bridge, and shall list all anticipated special provisions and notes describing design data and material properties. See Structures Management Unit Manual for additional information.

Prerequisites:

- Accepted Preliminary Roadway Plans
- Accepted Roadway Structure Recommendations
- Accepted Hydraulic Bridge / Culvert Survey Report

Total Number	2 Full-size, 6 – 8 Half-size and 1 Half-size of Prerequisites
Transportation Program Management	1 Half-size and 1 Half-size of Prerequisites
Structure Design Unit (Deliver to TPM)	2 Half-size
State Bridge Construction Engineer (Deliver to TPM)	1 Half-size
Geotechnical Engineering Unit (Deliver to TPM)	1 Half-size
Railroad Division, if applicable (Deliver to TPM)	1 Half-size
FHWA, if applicable	1 Half-size
Area Bridge Construction Engineer	1 Half-size
Resident Engineer	2 Full-size

Final Bridge Plans

Final Plans shall have all plan details and notes for final review. The Final Plans may be separated into substructure and superstructure or other Submittals as necessary to accommodate construction schedules.

Prerequisites:

- Accepted Bridge Geotechnical Foundation Recommendations

Total Number	2 Full-size, 4 - 6 Half-size
Transportation Program Management	1 Half-size
Structure Design Unit (Deliver to TPM)	2 Half-size
Railroad Division, if applicable (Deliver to TPM)	1 Half-size
Area Bridge Construction Engineer	1 Half-size
FHWA, if applicable	1 Half-size
Resident Engineer	2 Full-size

RFC Bridge or Culvert Plans

Structure Project Special Provisions (PSP) may be found through the NCDOT website (http://www.ncdot.gov/doh/preconstruct/highway/structur/psp/newpsp06/psp06.html). The record plan set, design files and Project Special Provisions shall bear the seal and signature of a North Carolina Registered Professional Engineer.

Prerequisites:

- Accepted Final Bridge or Culvert Plans

Total Number	2 Full-size, 6 – 10 Half-size, 8 – 10 sets of PSP

Transportation Program Management	1 Half-size and 1 set of PSP
Structure Design Unit (Deliver to TPM)	2 Half-size and 2 sets of PSP
Railroad Division, if applicable (Deliver to TPM)	1 Half-size and 1 set of PSP
State Bridge Construction Engineer (Deliver to TPM)	1 Half-size and 1 set of PSP
Materials and Tests Unit, if Prestressed Concrete Bridges (Deliver to TPM)	2 Half-size
FHWA, if applicable	1 Half-size and 1 set of PSP
Division Construction Engineer	1 Half-size and 1 set of PSP
Area Bridge Construction Engineer	1 Half-size and 1 set of PSP
Resident Engineer	2 Full-size and 2 sets of PSP

Working Drawing Submittals

Working drawing submittals shall be in accordance with Exhibit 2-10 of the Technical Provisions, "Submittal of Working Drawings". Sufficient data and one set of the applicable RFC Plans shall be submitted prior to, or with, the working drawings to facilitate review.

The submittal routing will be either Type "A" or Type "B" and will be consistently used for all working drawing submittals throughout the Project's duration.

Type "A" working drawing submittals shall be submitted directly to the Structure Design Unit as provided in Exhibit 2-10 of the Technical Provisions. These submittals will not be routed through the Transportation Program Management Director and need not have the color-coded transmittal form.

Type "B" working drawing submittals shall be submitted to the Transportation Program Management Director and shall be covered with a color-coded transmittal form and submitted as provided in Exhibit 2-10 of the Technical Provisions. All Type "B" working drawing submittals shall include a submittal number with the prefix "WD-"

Hydraulic Design

Developer's design plans shall exactly match those details included in the permit impact sheets.

Preliminary Bridge / Culvert Survey Reports

Prerequisites:

- Letter stating that proposed grade is not hydraulically controlled at Bridge / culvert location(s) **OR** reports that are clearly identified as preliminary documenting that the proposed grade is hydraulically controlled at Bridge / culvert location(s)

Total Number	2 Copies of Reports
Transportation Program Management	1 Copy of Reports
Hydraulics Unit (Deliver to TPM)	1 Copy of Reports

Final Bridge / Culvert Survey Reports

Prerequisites:

- Accepted Preliminary Roadway Plans and x-sections

Total Number	3 Copies of Reports
Transportation Program Management	1 Copy of Reports
Hydraulics Unit (Deliver to TPM)	1 Copy of Reports
Resident Engineer	1 Copy of Reports

RFC Bridge / Culvert Survey Reports

Prerequisites:
- Accepted Preliminary Roadway Plans and x-sections

Total Number	6 Copies of Reports
Transportation Program Management	1 Copy of Reports
Hydraulics Unit (Deliver to TPM)	1 Copy of Reports
Structure Design Unit (Deliver to TPM)	1 Copy of Reports
Geotechnical Engineering Unit Regional Office	1 Copy of Reports
Roadside Environmental Unit (If construction phasing is required)	1 Copy of Reports
Resident Engineer	1 Copy of Reports

Preliminary Hydraulic Plans

Submittal shall include the Title Sheet and all Plan Sheets. Two copies of each plan sheet shall be required, one with contour lines and one without. Submittal shall be delivered to NCDOT a minimum of five weeks prior to the meeting(s) to review such submittal.

Prerequisites:
- Accepted Preliminary Roadway Plans and x-sections

Total Number	3 Half-size and 1 Half-size Prerequisite
Transportation Program Management	1 Half-size
Hydraulics Unit (include red-line drawings) (Deliver to TPM)	1 Half-size
PDEA (Deliver to TPM)	1 Half-size

Upon acceptance from NCDOT, submit one set of half-size plans for each of the above Units and for each of the following agencies. Submittal shall provide adequate time for NCDOT to forward the plans to the agencies for their receipt a minimum of two weeks prior to the meeting.

US Army Corps of Engineers	NC Wildlife Resources Commission
US Fish and Wildlife Service	NCDENR - Division of Water Quality
EPA	All Other agencies and NCDOT personnel as needed

Final Hydraulic Design Plans

Submittal shall be delivered to NCDOT a minimum of five weeks prior to the meeting to review such design.

Prerequisites:
- Accepted Preliminary Roadway Plans and x-sections

Total Number	3 Full-size
Transportation Program Management	1 Full-size
Hydraulics Unit (include hydraulic calculations & red-line mark ups) (Deliver to TPM)	1 Full-size
Resident Engineer	1 Full-size

Permit Application or Permit Modification Review Submittal

The permit application or permit modification review Submittal shall include all necessary documents required for a permit application including, but not necessarily limited to a cover

letter, meeting minutes, plans, permit impact sheets and forms. Submittal shall be delivered to NCDOT a minimum of five weeks prior to the intended permit application submittal date.

Prerequisites:
- Accepted Final Hydraulic Plans

Total Number	4 or 5 Half-size
Transportation Program Management	1 Half-size
Hydraulics Unit (Deliver to TPM)	1 Half-size
PDEA (Deliver to TPM)	2 Half-size
Structure Design Unit (If causeway is required) (Deliver to TPM)	1 Half-size

Upon acceptance by NCDOT, submit one set of half-size plans and permit impact sheets for each of the above Units and for each of the following agencies. Submittal shall provide to NCDOT a minimum of three weeks prior to the meeting to review the Final Design Submittal and permit application or permit modification.

US Army Corps of Engineers	NC Wildlife Resources Commission
US Fish and Wildlife Service	NCDENR - Division of Water Quality
EPA	All Other Agencies and NCDOT Personnel as Needed

Geotechnical Design

The Geotechnical submittals shall consist of retaining wall plans and design, foundation recommendations, and temporary shoring plans and designs.

Permanent Retaining Wall Layout

For each retaining wall, with the exception of standard gravity walls, submit a wall layout and design. The wall layout submittal shall include (1) wall envelope with top and bottom of wall, existing ground and finished grade elevations at incremental stations; (2) wall alignment with stations and offsets; (3) typical sections showing top and bottom of wall, drainage, embedment, slopes, barriers, fences, etc.; and (4) details of conflicts with utilities and drainage structures. Submittal shall also include calculations for bearing capacity, global stability and settlement.

Prerequisites:
- Accepted Preliminary Roadway Plans and x-sections at wall sites

Total Number	3 Full-size and 1 Half-size of prerequisite
Transportation Program Management	1 Full-size and 1 Half-size of prerequisite
Geotechnical Engineering Unit Regional Office	1 Full-size and 1 Half-size of prerequisite
Resident Engineer	1 Full-size and 1 Half-size of prerequisite

Permanent Retaining Wall Design

When temporary shoring is required to construct a retaining wall, submit the temporary shoring design with the retaining wall Design Document Submittal.

Prerequisites:
- Accepted Retaining Wall Layout
- Temporary Shoring Design (when required)

Total Number	3 copies with each prerequisite
Transportation Program Management	1 copy with each prerequisite
Geotechnical Engineering Unit Regional Office	1 copy with each prerequisite
Resident Engineer	1 copy with each prerequisite

Foundation Design Recommendation Reports

Submittal shall include a separate Foundation Design Recommendation Report for following: (a) each Bridge together with associated permanent retaining walls, (b) all permanent retaining walls not associated with Bridges combined, (c) entire roadway and (d) all sound barriers. Foundation Design Recommendation Reports, plans, Project Special Provisions and calculations shall be signed and sealed by a Registered Professional Engineer licensed in the State of North Carolina.

Prerequisites:

- N/A

Total Number	4 Sets of designs
Transportation Program Management	1 Set
Geotechnical Engineering Unit Regional Office	2 Sets
Resident Engineer	1 Set

Conceptual and Final Soil Improvement and Reinforced Fill Design

Final Design shall be signed and sealed by a Registered Professional Engineer licensed in the State of North Carolina.

Prerequisites:

- N/A

Total Number	4 Sets of designs
Transportation Program Management	1 Set
Geotechnical Engineering Unit Regional Office	2 Sets
Resident Engineer	1 Set

Traffic Control

Traffic Control Plans shall be submitted in three distinct phases, including a staging concept, phase submittals and RFC Plans. In addition to the copies specified below, submit electronic files with all traffic control Design Submittals.

Developer's Submittal shall comply the "Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design Build Projects", available through the NCDOT Design-Build website (http://www.ncdot.gov/doh/preconstruct/altern/design_build/default.html).

Traffic Control Phasing Concept

Prerequisites:

- Accepted Preliminary Roadway Plans and x-sections
- Accepted Preliminary Hydraulics Plans
- Accepted Bridge Preliminary General Drawings (if staging construction)

Total Number	2 Full-size and 7 Half-size
Transportation Program Management	1 Half-size and 1 Half-size of each prerequisite
Work Zone Traffic Control Unit (Deliver to TPM)	1 Full-size, 1 Half-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size
ITS Engineer, if applicable (Deliver to TPM)	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size

Traffic Control Phase Submittals

A separate submittal shall be provided for each Traffic Control Phase unless prior approval is obtained from the Transportation Program Management Director.

Prerequisites:

- Accepted Culvert and Structure Staging
- Accepted Temporary Signal Plans

Total Number	2 Full-size and 7-8 Half-size, and 1 Half-size Signals Plans, if applicable
Transportation Program Management	1 Half-size, 1 Half-size Signals Plans, if applicable and 1 Half-size of each prerequisite
Work Zone Traffic Control Unit (Deliver to TPM)	1 Full-size, 1 Half-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size
Signing Section, if submittal contains detour signing (Deliver to TPM)	1 Half-size
ITS Engineer, if applicable (Deliver to TPM)	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size

RFC Traffic Control Plans

Prerequisites: • Traffic Control Phase Submittals

Total Number	2 Full-size and 6 Half-size
Transportation Program Management	1 Half-size
Work Zone Traffic Control Unit (Deliver to TPM)	1 Full-size, 1 Half-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size
ITS Engineer, if applicable (Deliver to TPM)	1 Half-size
Division Construction Engineer	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size
Resident Engineer	2 Full-size

Pavement Markers and Markings

Developer's Submittal shall comply with the "Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design-Build Projects", available through the NCDOT Design-Build website (http://www.ncdot.gov/doh/preconstruct/altern/design_build/default.html).

Preliminary Pavement Marking Plans

Prerequisites: • Accepted Right of Way / Intermediate Roadway Plans

Total Number	2 Full-size, 6 Half-size and
Transportation Program Management	1 Half-size and 1 Half-size of Prerequisite
Work Zone Traffic Control Unit (Deliver to TPM)	1 Full-size, 1 Half-size
Signing and Delineation Unit (Deliver to TPM)	1 Full-size, 1 Half-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size
Resident Engineer	2 Full-size

Final Pavement Marking Plans

Prerequisites: • Final Signals Plans

Total Number	2 Full-size and 6 Half-size
Transportation Program Management	1 Half-size
Work Zone Traffic Control Unit (Deliver to TPM)	1 Full-size, 1 Half-size
Signing and Delineation Unit (Deliver to TPM)	1 Full-size, 1 Half-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size

RFC Pavement Marking Plans

Final Pavement Marking Plans shall be signed and sealed by a Professional Engineer registered in the State of North Carolina and re-distributed as RFC Plans as follows:

Prerequisites: • Accepted Final Pavement Marking Plans

Total Number	2 Full-size and 5 Half-size
Transportation Program Management	1 Half-size

Work Zone Traffic Control Unit	1 Full-size, 1 Half-size
Signing and Delineation Unit	1 Full-size, 1 Half-size
Signals Section, if applicable	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size
Division Construction Engineer	1 Half-size
Resident Engineer	2 Full-size

Traffic Signal & Intelligent Transportation Systems

The Traffic Signal & Intelligent Transportation System (ITS) Plans shall be divided into Preliminary, Final and RFC Plans. The Traffic Signal & Intelligent Transportation System Plans shall follow the "Guidelines for Preparation of Traffic Signal & Intelligent Transportation System Plans on Design-Build Projects" available on the NCDOT Design-Build website.

ITS Plans will be will be similar to that specified in this exhibit for Traffic Signal Plans except that Intermediate ITS Plans shall also be provided. ITS Design Submittals shall include documents specified in Section 21 of the Technical Provisions and in this exhibit.

For all plan submittals, Developer shall provide NCDOT a copy of all supporting documentation, computer files and any other pertinent information as required for a complete and accurate review by NCDOT. Supporting documentation may include, but not be limited to the information shown in the Guidelines mentioned above. Intermediate ITS plans shall include detailed product cut sheets for all the ITS equipment and communications equipment.

Developer shall develop plans using the current version of Microstation software required by NCDOT and shall be in English units, unless otherwise noted in the CA Documents. The plans shall follow NCDOT's CADD standards including, but not limited to, file naming convention, leveling chart, and file folder structure. These standards can be found through a link on the NCDOT Design-Build website.

Developer shall submit electronic files of the Traffic Signal & Intelligent Transportation System Plans after they are released for construction.

Traffic Signal Plans (Conceptual or Preliminary, Final and RFC)

Prerequisites:
- N/A

Total Number	4 Full-size and 6 Half-size
Transportation Program Management	1 Half-size
Signals Section	2 Half-size and 2 Full-size
ITS Section	2 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size

Utility Make-Ready Plans (Preliminary, Final and RFC)

Prerequisites:
- Accepted Preliminary Traffic Signal and / or ITS Plans

Total Number	4 Full-size and 5 Half-size
Transportation Program Management	1 Half-size
Signals Section	1 Half-size
ITS Section	2 Half-size and 2 Full-size
Division Traffic Engineer	1 Half-size

Electrical and Programming Detail Plans (Final and RFC)

Prerequisites:
- Accepted Preliminary Traffic Signal Plans

Total Number	10 Half-size and 2 Full-size
Transportation Program Management	1 Half-size
Signals Section	3 Half-size and 2 Full-size
ITS Section	2 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size
Resident Engineer	2 Half-size

Communications Cable & Conduit Routing Plans (Preliminary, Final and RFC)

Prerequisites:
- Accepted Final Utility Make-Ready Plans

Total Number	2 Full-size and 8 Half-size
Transportation Program Management	1 Half-size
ITS Section	2 Full-size and 2 Half-size
Signals Section	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size
Resident Engineer	2 Half-size

Utility Adjustment Plans (Preliminary, Final, and RFC)

Prerequisites:
- Accepted Intermediate Roadway Plans

Total Number	2 Full-size and 4 Half-size
Transportation Program Management	1 Half-size
Utilities Unit	2 Half-size and 2 Full-size
Resident Engineer	1 Half-size

Project Special Provisions (Final and RFC)

Project Special Provisions shall cover all items of work, material, equipment and methods of construction for the installation of a complete traffic signal system that are not otherwise covered in the CA Documents.

Prerequisites:
- Preliminary Traffic Signal Plans
- Preliminary Communications Cable & Conduit Routing Plans

Total Number	7 sets
Transportation Program Management	1 set
ITS Section	1 set
Signals Section	2 set
Division Traffic Engineer	1 set
Resident Engineer	2 set

Product Catalog Cut Sheets

Product Catalog Cut Sheets shall be submitted and shall include the manufacturer's make and model number for each piece of equipment, and the quantity of items to be used. The Engineer is not required to seal product catalog cut sheets.

Group A – **Signal Equipment** (included but not limited to all signal related equipment, wire and cabling, loop wires, field equipment cabinet, controller equipment, central and local controller software)
Group B – **DMS** (included but not limited to DMS enclosure, field cabinet, sign controller, and structural assemblies)
Group C – **Field Infrastructure** (included but not limited to conduit, risers, junction boxes, and misc. hardware)
Group D – **Fiber Optic Cable** (included but not limited to fiber optic communications cable, drop cable assemblies, interconnect centers, splice enclosures, and delineator markers)
Group E – **CCTV Field Equipment** (included but not limited to CCTV camera, field cabinet, encoders, decoders, camera lowering device, cabling, camera pole)
Group F – **Communications Hardware** (included but not limited to core, routing, Layer 2 and Ethernet edge switches, port servers, and communications racks)
Group G – **Computer Hardware, Workstation and Peripherals**
Group H – **MVDS Detection** (includes detector unit, vendor software, cabling, detector pole)
Group I - **Electrical** (included but not limited to UPS, meter bases, disconnects, wiring)

Prerequisites:

- RFC Traffic Signal Plans
- RFC Electrical & Programming Detail Plans
- RFC Communications Cable & Conduit Routing
- RFC Project Special Provisions

Total Number	8 sets
Transportation Program Management	1 set
Signals Section	3 sets
ITS Section	2 sets
Resident Engineer	2 set

Signing

Submittals shall generally be made in four phases. Prior to the submittal of the Intermediate plans, Developer shall coordinate with the Division Traffic Engineer and Regional Traffic Engineer. This coordination shall occur through the Design-Build Group staff. The Signing Plans shall follow the "Signing Design Guidelines for Design-Build Projects" located on the NCDOT Design-Build website (http://www.ncdot.gov/doh/PRECONSTRUCT/altern/design_build/signingGuidelines.pdf).

Conceptual or Preliminary Signing Plans

Submittal shall include signing plan sheets and plan view rollout of the entire Project including existing, proposed, relocated signs and future signs, including messages.

Prerequisites:

- Accepted Preliminary Roadway Plans and x-sections

Total Number	2 Full-size, 5 - 7 Half-size, and 1 Half-size roll-out
Transportation Program Management	2 Half-size, 1 Half-size rollout and 1 Half-size Preliminary Roadway Plans
Signing Section (Deliver to TPM)	1 Half-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size
FHWA, if applicable (Deliver to TPM)	1 Half-size
Resident Engineer	2 Full-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size

Intermediate Signing Plans

Submittal shall include signing plan view sheets with all signs located by station reference, sign designs, completed Type E and F sign sheets, ground-mounted sign support chart with support designs and design calculation information (S-Dimension Worksheets), and overhead structure line drawing(s), completed in the format of the final product.

Prerequisites:

- Accepted Preliminary Roadway Plans and x-sections
- Meeting with Division and Regional Traffic Engineers, Design-Build Group and Signing Section

Total Number	2 Full-size, 5 - 7 Half-size, and 1 Half-size roll-out
Transportation Program Management	2 Half-size, 1 Half-size rollout and 1 Half-size Prerequisite Plans
Signing Section (Deliver to TPM)	1 Half-size
Signals Section, if applicable (Deliver to TPM)	1 Half-size
FHWA, if applicable (Deliver to TPM)	1 Half-size
Resident Engineer	2 Full-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size

Final Signing Plans

Submittal shall include structure line drawings, signing sheets, sign designs for Type A, B and Overlay signs plan sheets, supporting documentation and location of signalized intersections.

Submittal shall include General Notes sheet listing applicable Roadway Standard Drawings, draft Project Special Provisions (other than those prepared and sealed by NCDOT), and all signing sheets and supporting documentation required by the 90% submittal review. A 4½" x 4½" area for full size sheets, directly below the Project information block in the upper right corner of all sheets, shall be left blank and unobstructed.

Prerequisites:

- Accepted Intermediate Roadway Plans
- Accepted Final Pavement Marking P
- Accepted Traffic Control Staging Concept

Total Number	2 Full-size, 5 - 6 Half-size, and 1 Half-size roll-out
Transportation Program Management	2 Half-size, 1 Half-size rollout and 1 Half-size of each Prerequisite Plans
Signing Section (Deliver to TPM)	1 Half-size
FHWA, if applicable (Deliver to TPM)	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size

RFC Signing Plans

Submittal shall include (1) original set of Project Special Provisions signed and sealed by a Professional Engineer registered in the State of North Carolina (see the Project Special Provision section of the Signing Design Guidelines for Design-Build Projects); (2) design files on CD that have name of the Professional Engineer, registration number, and seal date inserted where seal, signature, and date are located on original plans; and (3) supporting documentation.

Prerequisites:

- Field verification of “S” Dimensions for ground mounted and overhead sign assemblies

Total Number	3 Full-size and 4 - 6 Half-size
Transportation Program Management	1 Full-size and 1 Half-size
Signing Section	1 Half-size
Signals Section, if applicable	1 Half-size
FHWA, if applicable	1 Half-size
Division Traffic Engineer	1 Half-size
Regional Traffic Engineer	1 Half-size
Resident Engineer	2 Full-size

Project Special Provisions

Developer shall provide complete Project Special Provisions for review with both the 100% and RFC Plan submittal. A Professional Engineer registered in the State of North Carolina shall sign and seal the final submittal of these Project Special Provisions. A copy of the signed and sealed Project Special Provisions shall be submitted in the manner and quantity designated above for the RFC Signing Plans. The Project Special Provisions shall also be submitted electronically to Transportation Program Management.

Overhead Sign Structures Shop Drawings

Developer shall prepare shop drawings and computations for the design of all overhead sign structures.

Prerequisites:

- Accepted RFC Signing Plans
- Field verification of “S” Dimensions for ground mounted and overhead sign assemblies

Total Number 13 Half-size and 1 Half-size RFC Signing Plans w/ “S” Dimensions verification

Structure Design Unit 13 Half-size and 1 Half-size RFC Signing Plans w/ “S” Dimensions

Erosion Control Design

The RFC Grading Erosion Control Plans shall only be deemed final after the roadway drainage design has been accepted by NCDOT. Specifically, acceptance of all Erosion Control submittals, prior to and including the RFC Grading Erosion Control Plans, shall be contingent on acceptance of the roadway drainage design. Design modifications developed after acceptance of the RFC Grading Erosion Control Plans shall require Developer to submit Intermediate Erosion Control Plans for review and acceptance as noted below. Each plan submittal shall include all pertinent design information required for review, such as design calculations, drainage areas, etc.

The NCDOT Roadside Environment Unit (REU) will provide a sample set of Erosion and Sedimentation Control plans and MicroStation Erosion Control workspace to Developer upon request. Erosion Control Special Provisions are available through the NCDOT website (http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/soil_water/special_provisions/). Developer shall coordinate a pre-design meeting between the NCDOT REU Soil and Water Engineering Section, Developer and other pertinent NCDOT personnel before beginning the erosion control design.

Intermediate Clearing & Grubbing EC Plans

Prerequisites:

- Accepted Preliminary Roadway Plans and Cross Section
- Pre-design meeting required by Section 13.2 of the Technical Provisions

Total Number	2 Half-size and 4 Half-size Prerequisite Plans
Transportation Program Management	1 Half-size and 2 Half-size Prerequisite Plans
Roadside Environmental Unit (Deliver to TPM)	1 Full-size
REU Field Operations Engineer	1 Full-size and 2 Half-size Prerequisite Plans
Division Environmental Officer	1 Half-size
Resident Engineer	1 Full-size

Final Clearing & Grubbing EC Plans

Prerequisites:

- Accepted Final Roadway Plans Slope stakes, x-sections and drainage

Total Number	3 Full-size, 2 Half-size and 3 Half-size Prerequisites
Transportation Program Management	1 Half-size and 2 Half-size Prerequisites
Roadside Environmental Unit (Deliver to TPM)	1 Full-size
REU Field Operations Engineer	1 Full-size and 1 Half-size Prerequisites
Division Environmental Officer	1 Half-size
Resident Engineer	1 Full-size

RFC Clearing & Grubbing EC Plans

Prerequisites:

- N/A

Total Number	2 Full-size and 6 Half-size Roadway Plans with Slope stakes, x-sections and drainage
• Transportation Program Management	1 Half-size and 2 Half-size Roadway Plans
• Roadside Environmental Unit(Deliver to TPM)	2 Half-size

- REU Field Operations Engineer — 1 Half-size and 1 Half-size Roadway Plans
- Resident Engineer — 2 Full-size
- Division Environmental Officer — 1 Half-size
- Roadway Construction Engineer — 1 Half-size

Intermediate Grading Erosion Control Plans

Prerequisites:
- Accepted Preliminary Roadway Plans with drainage and Cross Section

Total Number — 3 Full-size and 3 Half-size Prerequisites

Transportation Program Management — 1 Half-size and 1 Half-size Prerequisite
Roadside Environmental Unit (Deliver to TPM) — 1 Full-size and 1 Half-size Prerequisite
REU Field Operations Engineer — 1 Full-size and 1 Half-size Prerequisite
Division Environmental Officer — 1 Half-size
Resident Engineer — 1 Full-size

Final Grading EC Plans

Prerequisites:
- Accepted Final Roadway Plans with and x-sections
- Accepted 100% Hydraulic Plans

Total Number — 3 Full-size, 2 Half-size, 3 Half-size Prerequisite Plans and 2 Sets Basin Calculations

- Transportation Program Management — 1 Half-size and 2 Half-size Prerequisite Plans and 1 Set of Basin Calculations
- Roadside Environmental Unit(Deliver to TPM) — 2 Half-size
- REU Field Operations Engineer — 1 Full-size and 1 Half-size Prerequisite Plans and 1 Set of Basin Calculations
- Resident Engineer — 2 Full-size
- Division Environmental Officer — 1 Half-size

RFC Grading EC Plans

Prerequisites:
- Accepted Final Grading EC Plans

Total Number — 2 Full-size, 7 Half-size and 8 sets of PSP

- Transportation Program Management — 1 Half-size and 1 set of PSP
- Roadside Environmental Unit (Deliver to TPM) — 2 Half-size and 1 set of PSP
- REU Field Operations Engineer — 1 Full-size and 1 set of PSP
- Resident Engineer — 2 Full-size and 2 Sets PSP
- Division Environmental Officer — 1 Half-size and 1 set of PSP
- Division Construction Engineer — 1 Half-size and 1 set of PSP
- Roadway Construction Engineer — 1 Half-size and 1 set of PSP

Revised or Supplemental EC Plans

Submittal is required when design modifications and / or site conditions require additional erosion control design or design revisions to the RFC Clearing and Grubbing and / or the RFC Grading Erosion Control Plans. Revised or Supplemental Plans submittal shall also be

required to document addition, deletion or modification of basin(s) and to review all basins requiring individual calculations. The NCDOT REU shall review and accept Revised or Supplemental Plans prior to construction of any aspect impacted by the revised erosion control design.

Prerequisites:

- Accepted Roadway and / or Hydraulic Plans of the design modifications

Total Number	3 Full-size and 5 Half-size
• Transportation Program Management	1 Half-size and 2 Half-size Roadway Plans with Slope stakes and drainage, x-sections and
• Roadside Environmental Unit (Deliver to TPM)	2 Half-size
• REU Field Operations Engineer	1 Full-size and 1 Half-size Roadway Plans with Slope stakes and drainage, x-sections and
• Resident Engineer	2 Full-size
• Division Environmental Officer	1 Half-size
• Roadway Construction Engineer	1 Half-size

Landscape Design

Submittal shall be prepared in accordance with the "Guidelines for Preparation of Landscape Plans".

Preliminary Landscape Plans

Concurrent with the preliminary plan submittal, the Design-Build Team shall schedule a meeting with the Roadside Environmental Engineer.

Prerequisites:
- Accepted Final Roadway Plans

Total Number	2 Full-size and 5-6 Half-size
Transportation Program Management	1 Half-size
Roadside Environmental Unit (Deliver to TPM)	1 Full-size and 1 Half-size
REU Field Operations Engineer	1 Half-size
Division Roadside Environmental Officer	1 Half-size
FHWA, if applicable	1 Half-size
Resident Engineer	1 Full-size and 1 Half-size

Final Landscape Plans

Prerequisites:
- Accepted Preliminary Landscape Plans

Total Number	2 Full-size and 5-6 Half-size
Transportation Program Management	1 Half-size
Roadside Environmental Unit (Deliver to TPM)	1 Full-size and 1 Half-size
REU Field Operations Engineer	1 Half-size
Division Roadside Environmental Officer	1 Half-size
FHWA, if applicable	1 Half-size
Resident Engineer	1 Full-size and 1 Half-size

RFC Landscape Plans

Prerequisites:
- Accepted Preliminary Landscape Plans

Total Number	3 Full-size and 6-7 Half-size
Transportation Program Management	1 Half-size
Roadside Environmental Unit (Deliver to TPM)	1 Full-size and 1 Half-size
REU Field Operations Engineer	1 Half-size
Division Roadside Environmental Officer	1 Half-size
FHWA, if applicable	1 Half-size
Resident Engineer	2 Full-size and 2 Half-size

Lighting

Conceptual Lighting Plans

Lighting layout and supporting photometric calculations along with other interim plan review documents. Photometric calculations consist of computer generated spacing charts, or footcandle and uniformity graphs.

Prerequisites:
- Accepted Preliminary Roadway Plans

Total Number	4 Half-size, 2 Full-size and Calculations
• Transportation Program Management	1 Half-size
• Special Design Section (Deliver to TPM)	1 Half-size and Calculations
• Division Construction Engineer	1 Half-size
• Roadway Construction Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	2 Full-size

Final Lighting Plans

Lighting layout with pole size, pole design, electrical routing and catalog cuts. Submittal distribution same as Conceptual Lighting Plans

RFC Lighting Plans

Prerequisites:
- N/A

Total Number	4 Half-size, 2 Full-size
• Transportation Program Management	1 Half-size
• Special Design Section (Deliver to TPM)	1 Half-size
• Roadway Construction Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	2 Half-size and 2 Full-size

Tolling and Related Facilities

Design Submittals shall include documents specified in Section 24.7 of the Technical Provisions and in this exhibit.

Toll Gantries

The Toll Gantry Submittal will consist of design calculations and plans for the proposed ORT Toll Gantries. All designs, plans and calculations shall be signed and sealed by a Professional Engineer registered in the State of North Carolina. Each of the submittals listed below shall have the following prerequisites and distribution:

Preliminary Toll Gantry Plans

The toll gantry plan sheets and plan view rollout of the entire Project shall include all existing, proposed and future toll gantries

Prerequisites:
- Accepted Preliminary Roadway Plans and x-sections

Total Number 3 Full-size, 2-3 Half-size, 2 Half-size roll-out and 1 Half-size Roadway Plans

• Transportation Program Management	1 Half-size and 1 Half-size rollout and 1 Half-size Roadway Plans
• NC Turnpike Authority (Deliver to TPM)	2 Full-size and 1 Half-size Rollout
• Division Traffic Engineer	1 Half-size
• Division Construction Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	1 Full-size

Intermediate Toll Gantry Plans

Submittal shall include toll gantry plan view sheets with all toll gantries located by station reference, gantry designs with vertical support designs, toll equipment and aesthetic cladding attachment locations, design calculation information (S-Dimension Worksheets), overhead structure line drawing(s) completed in the format of the final product, and a draft of Project Special Provisions

Prerequisites:
- Accepted Intermediate Roadway Plans and x-sections
- Accepted Preliminary ORT Site Plans

Total Number 8 Full-size, 11 - 12 Half-size, and 1 Half-size Roadway Plans

• Transportation Program Management	1 Half-size 1 Half-size Roadway Plans
• Structure Design Unit (Deliver to TPM)	1 Full-size and 2 Half-size
• NC Turnpike Authority (Deliver to TPM)	2 Full-size and 2 Half-size
• Division Traffic Engineer	1 Half-size
• Division Construction Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	1 Full-size and 1 Half-size

100% Final Toll Gantry Plans

This submittal shall include structure line drawings in the format of the final product. This submittal shall also include the General Notes sheet with list of applicable Roadway Standard Drawings, draft Project Special Provisions, and toll gantry sheets and supporting

documentation. A 4½" x 4½" area for full size sheets, directly below the Project information block in the upper right corner of all sheets, shall be left blank and unobstructed

Prerequisites:

- Accepted Final Roadway Plans
- Accepted Toll Gantry Foundation Recommendation report and investigation
- Field verification of "S" Dimensions for toll gantries
- Accepted Final Pavement Marking Plans

Total Number	3 Full-size, 8-9 Half-size and 1 Half-size Roadway Plans
• Transportation Program Management	2 Half-size and 1 Half-size Roadway Plans
• Structure Design Unit (Deliver to TPM)	1 Half-size
• Geotechnical Engineering Unit (Deliver to TPM)	1 Half-size
• NC Turnpike Authority (Deliver to TPM)	2 Full-size and 2 Half-size
• Division Traffic Engineer	1 Half-size
• Division Construction Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	2 Full-size

RFC Toll Gantry Plans

All copies shall be sealed by a Professional Engineer registered in the State of North Carolina. This submittal shall include (1) original set of Project Special Provisions sealed by a Professional Engineer registered in the State of North Carolina; (2) design files on CD that have name of the Professional Engineer, registration number, and seal date inserted where seal, signature, and date are located on original plans; and (3) all other supporting documentation

Prerequisites:

- N/A

Total Number	3 Full-size, 8-9 Half-size and 1 Half-size Roadway Plans
• Transportation Program Management	2 Half-size and 1 Half-size Roadway Plans
• Structure Design Unit (Deliver to TPM)	2 Half-size
• NC Turnpike Authority (Deliver to TPM)	2 Full-size and 2 Half-size
• Division Traffic Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	2 Full-size and 2 Half-size

Project Special Provisions

Developer shall prepare Project Special Provisions for review at the intermediate, Final and RFC plan Submittal. A Professional Engineer registered in the State of North Carolina shall seal the final submittal of these Project Special Provisions. A copy of the sealed Project Special Provisions shall be submitted in the manner and quantity designated above for the RFC Toll Gantry Plans. The Project Special Provisions shall also be submitted electronically to the NCTA and the Transportation Program Management Unit.

Toll Gantry Shop Drawings

Developer shall prepare shop drawings and computations for the design of all toll gantries.

Prerequisites:

- Accepted RFC Toll Gantry Plans

Total Number 4 Half-size and 1 Half-size RFC Toll Gantry Plans w/ "S" Dimensions

- Structure Design Unit (Deliver to TPM) 2 Half-size and 1 Half-size RFC Toll Gantry Plans
- NC Turnpike Authority (Deliver to TPM) 2 Half-size

Electronic Toll Collection System (ETCS)

The ETCS Submittal will consist of plans for the proposed ETCS together with supporting documents as specified in Section 24 of the Technical Provisions and below. All RFC designs, plans and calculations shall be signed and sealed by a Professional Engineer registered in the State of North Carolina. Each of the submittals listed below shall have the following prerequisites and distribution:

Conceptual or Preliminary ETCS Plans

Submittal shall include the documents specified in Section 24.7.1 of the Technical Provisions.

Prerequisites:
- Accepted Intermediate Roadway Plans

Total Number 3 Full-size and 2-3 Half-size and 5 - 6 set of other documents

- Transportation Program Management 1 Half-size, 1 Half-size and 2 set of other documents
- NC Turnpike Authority (Deliver to TPM) 2 Full-size and 2 set of other documents
- Division Traffic Engineer 1 Half-size and 1 set of other documents
- Division Construction Engineer 1 Half-size and 1 set of other documents
- FHWA, if applicable 1 Half-size and 1 set of other documents
- Resident Engineer 1 Full-size and 1 set of other documents

Intermediate ETCS Plans

Submittal shall include the documents specified in Section 24.7.2 of the Technical Provisions.

Prerequisites:
- Accepted Final Roadway Plans
- Accepted Preliminary ORT Site Plans

Total Number 3 Full-size, 6 - 7 Half-size and 9 - 10 set of other documents

- Transportation Program Management 1 Half-size and 1 set of other documents
- NC Turnpike Authority (Deliver to TPM) 2 Full-size and 2 Half-size and 4 set of other documents
- Division Traffic Engineer 1 Half-size and 1 set of other documents
- Division Construction Engineer 1 Half-size and 1 set of other documents
- FHWA, if applicable 1 Half-size and 1 set of other documents
- Resident Engineer 1 Full-size and 1 Half-size and 2 set of other documents

100% Final ETCS Plans

Submittal shall include the documents specified in Section 24.7.3 of the Technical Provisions.

Prerequisites:
- Accepted Final Pavement Marking Plans
- Accepted Final Signing Plans

Total Number 4 Full-size and 6 - 7 Half-size and 1 set of other documents

- Transportation Program Management 2 Half-size and 1 set of other documents

• NC Turnpike Authority (Deliver to TPM)	2 Full-size and 2 Half-size and 4 set of other documents
• Division Traffic Engineer	1 Half-size and 1 set of other documents
• Division Construction Engineer	1 Half-size and 1 set of other documents
• FHWA, if applicable	1 Half-size and 1 set of other documents
• Resident Engineer	2 Full-size and 2 set of other documents

RFC ETCS Plans

Submittal shall include the documents specified in Section 24.7.4 of the Technical Provisions.

Prerequisites:

- N/A

Total Number	4 Full-size and 7 - 8 Half-size
• Transportation Program Management	2 Half-size
• NC Turnpike Authority (Deliver to TPM)	2 Full-size and 2 Half-size
• Division Traffic Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	2 Full-size and 2 Half-size

Architectural and Structural

Submittal shall include design calculations and plans for the proposed ORT Facility Buildings. All designs, plans and calculations shall be signed and sealed by a Professional Engineer registered in the State of North Carolina. The minimum drawing scale shall be 1”=16’, but shall be adequate to clearly present the design intent.

Preliminary ORT Facility Buildings (Structure) Plans

Submittal shall contain, at a minimum:

- Building plans including foundation with concrete sidewalk and maintenance pad, elevation, plan view and roof line view for each type of proposed ORT facility building.
- Structural design criteria.
- A construction plan for each type of ORT facility including dimensions and preliminary sizes of the building components.
- General notes outlining all code required loads including dead, live, wind, seismic, and other applicable loads.

Prerequisites:

- Accepted ORT RFC Site Plans
- Accepted RFC Toll Gantry Design Plans
- Accepted Roadway RFC Plans and x-sections
- Field verification of “S” Dimensions for toll gantry assemblies

Total Number 8 Half-size and 2 Copies Design Computations and 1 Half-size Toll Gantry Plans with field verification of “S” Dimensions

- Transportation Program Management 1 Half-size
- Structure Design Unit (Deliver to TPM) 4 Half-size and 2 Copies Design Computations and 1 Half-size Toll Gantry Plans with “S” Dimensions
- NC Turnpike Authority (Deliver to TPM) 1 Half-size
- Division Traffic Engineer 1 Half-size
- FHWA, if applicable 1 Half-size
- Resident Engineer 1 Half-size

Intermediate ORT Facility Buildings (Structure) Plans

In addition to the above, Submittal shall contain, at a minimum:

- Design criteria and general notes sheets which include finalized design loads.
- Typical structural details sheet.
- Construction plans for each ORT facility building including component sizes and other information sufficient for construction.
- Connections and bracing detail sheets.
- Materials list.

Prerequisites:
- N/A

Total Number	8 Half-size
• Transportation Program Management	1 Half-size
• Structure Design Unit (Deliver to TPM)	4 Half-size
• NC Turnpike Authority (Deliver to TPM)	1 Half-size
• Division Traffic Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	1 Half-size

Final ORT Facility Buildings (Structure) Plans

In addition to the above, the Design Build-Team shall submit all the final detailed construction drawings and all associated details, including aesthetic treatments and color schemes.

Prerequisites:
- N/A

Total Number	8-9 Half-size
• Transportation Program Management	1 Half-size
• Structure Design Unit (Deliver to TPM)	4 Half-size
• NC Turnpike Authority (Deliver to TPM)	1 Half-size
• Division Traffic Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	1 Half-size

RFC ORT Facility Buildings (Structure) Plans

In addition to the above, the Design Build-Team shall submit all the final detailed construction drawings and all associated details, including aesthetic treatments and color schemes.

Prerequisites:
- N/A

Total Number	2 Full-size and 8-9 Half-size
• Transportation Program Management	1 Half-size
• Structure Design Unit (Deliver to TPM)	4 Half-size
• NC Turnpike Authority (Deliver to TPM)	1 Half-size
• Division Traffic Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	2 Full-size and 2 Half-size

Tolling and Related Facilities

Mechanical, Electrical, Plumbing and Monitoring System

Submittal shall include Structural, Electrical, HVAC, and Mechanical/Plumbing plans. Provide design calculations including lighting, HVAC and electrical for all components. All designs, plans and calculations shall be signed and sealed by a Professional Engineer registered in the State of North Carolina.

Preliminary Mechanical, Electrical, Plumbing and Monitoring Systems Plans

Submittal shall contain, at a minimum:

- Code Review – Submit a complete Code Review indicating how each code requirement is to be met.
- Life-cycle Mechanical Analysis – Provide a 10 year life-cycle costs analysis comparing possible mechanical systems using electric, natural gas and propane alternatives for final selection of HVAC System.
- Utilities – Provide written report regarding the availability of electrical, water and sewer utilities for each proposed site, as applicable.
- Monitoring System design schematic including details for operation of mechanical systems (i.e. HVAC, alarm, electrical).

Prerequisites:
- Roadway RFC Plans

Total Number	6-7 Half-size
• Transportation Program Management	2 Half-size
• NC Turnpike Authority (Deliver to TPM)	2 Half-size
• Division Construction Engineer	1 Half-size
• FHWA, if applicable	1 Half-size
• Resident Engineer	1 Half-size

Intermediate Mechanical, Electrical, Plumbing and Monitoring Systems Plans

In addition to the above, submit the following items. These drawings shall include at a minimum, but not limited to:

- HVAC equipment plans and sections, including ductwork, louvers and exterior mounted equipment locations.
- Electrical power, lighting, Emergency, and communications systems.
- Plumbing plans.
- Standby generator and propane storage tank locations.
- Monitoring system configuration, controllers, and devices utilized for connection to mechanical systems.
- Monitoring system communication details including router hardware, and schedule and alarm programs.

Calculations & Equipment Cuts – Developer shall submit mechanical and electrical calculations and shall include at a minimum, but not be limited to, the following:

- Proposed mechanical, electrical and plumbing fixture and equipment cuts.
- HVAC load calculations based on the building envelope.
- Electrical service sizing calculations

Prerequisites: • N/A

Total Number 6-7 Half-size

- Transportation Program Management 2 Half-size
- NC Turnpike Authority (Deliver to TPM) 2 Half-size
- FHWA, if applicable 1 Half-size
- Division Construction Engineer 1 Half-size
- Resident Engineer 1 Half-size

Final Mechanical, Electrical, Plumbing and Monitoring Systems

In addition to the above, the Design Build-Team shall submit all the final detailed construction drawings and all associated details. All previous NCTA comments shall be addressed. In addition to the above, submit the following items

- Graphical User Interface (GUI) software application details
- Listing of special tools and testing equipment required for operation, installation, and maintenance of the equipment.
- Code compliance shall be provided by submission of final code documentation.
- Final calculations and equipment cuts.

Prerequisites: • Accepted Roadway RFC Plans

Total Number 6-7 Half-size

- Transportation Program Management 2 Half-size
- NC Turnpike Authority (Deliver to TPM) 2 Half-size
- FHWA, if applicable 1 Half-size
- Division Construction Engineer 1 Half-size
- Resident Engineer 1 Half-size

RFC Mechanical, Electrical, Plumbing and Monitoring Systems

Prerequisites: • N/A

Total Number 2 Full-size and 5-6 Half-size

- Transportation Program Management 2 Half-size
- NC Turnpike Authority (Deliver to TPM) 1 Half-size
- FHWA, if applicable 1 Half-size
- Resident Engineer 2 Full-size and 2 Half-size

As-Built Record Plans and Reports

Upon completion of the Project, Developer shall provide both electronic and hard copies of the entire Project. The hard copies shall adhere to the NCDOT *Roadway Design Manual* plan preparation format and Section 2.9 of the Technical Provisions.

Total Number 3 Full-size and 4 - 5 Half-size, DVD of all MicroStation and GeoPak Files

Transportation Program Management 2 Full-size and 2 Half-size, DVD of all MicroStation and GeoPak Files

Roadway Construction Engineer 1 Half-size

FHWA, if applicable 1 Half-size

Resident Engineer	1 Full-size and 1 Half-size

Exhibit 2-10

Submittal of Working Drawings

General

Submit working drawings in accordance with Article 105-2 of the *Standard Specifications* and this provision. For this provision, "submittals" refers to only those listed in this provision. The list of submittals contained herein does not represent a list of required submittals for the Project. Submittals are only necessary for those items as required by the Contract. Make submittals that are not specifically noted in this provision directly to the Resident Engineer. Either the Structure Design Unit or the Geotechnical Engineering Unit or both units will jointly review submittals.

If a submittal contains variations from plan details or specifications or significantly affects Project cost, field construction or operations, discuss the submittal with, and submit all copies to the Resident Engineer. State the reason for the proposed variation in the submittal. To minimize review time, make sure all submittals are complete when initially submitted. Provide a contact name and information with each submittal. Direct any questions regarding submittal requirements to the Resident Engineer, Structure Design Unit contacts or the Geotechnical Engineering Unit contacts noted below.

In order to facilitate in-plant inspection by NCDOT and approval of working drawings, provide the name, address and telephone number of the facility where fabrication will actually be done if different than shown on the title block of the submitted working drawings. This includes, but is not limited to, precast concrete items, prestressed concrete items and fabricated steel or aluminum items.

Addresses and Contacts

Structure Submittals	
Via US mail:	**Via other delivery service:**
Mr. G. R. Perfetti, P. E.	Mr. G. R. Perfetti, P. E.
State Structures Engineer	State Structures Engineer
NC Department of Transportation	NC Department of Transportation
1581 Mail Service Center	1000 Birch Ridge Drive
Raleigh, NC 27699-1581	Raleigh, NC 27610
Attention: Mr. P. D. Lambert, P. E.	Attention: Mr. P. D. Lambert, P. E.

	Contact Name	**E-mail**	**Telephone Fax**	**Facsimile**
To	Paul Lambert	plambert@ncdot.gov	(919) 707-6407	(919) 250-4082
Copy	James Gaither	jgaither@ncdot.gov	(919) 707-6409	(919) 250-4082
Copy	James Bolden	jlbolden@ncdot.gov	(919) 707-6408	(919) 250-4082

Geotechnical Engineering Unit

Via US mail:	Via other delivery service:
Mr. K. J. Kim, Ph. D., P. E.	Mr. K. J. Kim, Ph. D., P. E.
Eastern Region Geotechnical Manager	Eastern Region Geotechnical Manager
NC Department of Transportation	NC Department of Transportation
Geotechnical Engineering Unit	Geotechnical Engineering Unit
1570 Mail Service Center	3301 Jones Sausage Road, Suite 100
Raleigh, NC 27699-1570	Garner, NC 27529

Geotechnical Engineering Unit	
Via USPS:	**Via other delivery service:**
Mr. Eric Williams, P. E.	Mr. Eric Williams, P. E.
Western Regional Geotechnical Manager	Western Region Geotechnical Manager
NC Department of Transportation	NC Department of Transportation
5253 Z Max Boulevard	5253 Z Max Boulevard
Harrisburg, NC 28075	Harrisburg, NC 28075

The status of the review of structure-related submittals sent to the Structure Design Unit can be viewed from the Unit's web site, via the "Contractor Submittal" link.

Direct any questions concerning submittal review status, review comments or drawing markups to the following contacts:

Eric Williams

(704) 455 – 8902

(704) 455 – 8912 facsimile

ewilliams@ncdot.gov

Submittal Copies

Furnish one complete copy of each submittal, including all attachments, to the Resident Engineer. At the same time, submit the number of hard copies shown below of the same complete submittal directly to the Structure Design Unit and/or the Geotechnical Engineering Unit.

The first table below covers "Structure Submittals". The Resident Engineer will receive review comments and drawing markups for these submittals from the Structure Design Unit. The second table in this section covers "Geotechnical Submittals". The Resident Engineer will receive review comments and drawing markups for these submittals from the Geotechnical Engineering Unit.

Unless otherwise required, submit one set of supporting calculations to either the Structure Design Unit or the Geotechnical Engineering Unit unless both units require submittal copies in which case submit a set of supporting calculations to each unit. Provide additional copies of any submittal as directed.

STRUCTURE SUBMITTALS

Submittal	Copies to Structure Design Unit	Copies to Geotechnical Engineering Unit	Contract Reference Requiring Submittal [1]
Arch Culvert Falsework	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Box Culvert Falsework [7]	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Cofferdams	6	2	Article 410-4
Foam Joint Seals [6]	9	0	"Foam Joint Seals"
Expansion Joint Seals (hold down plate type with base angle)	9	0	"Expansion Joint Seals"
Expansion Joint Seals (modular)	2, then 9	0	"Modular Expansion Joint Seals"
Expansion Joint Seals (strip seals)	9	0	"Strip Seals"
Falsework & Forms [2] (substructure)	8	0	Article 420-3 & "Falsework and Formwork"
Falsework & Forms (superstructure)	8	0	Article 420-3 & "Falsework and Formwork"
Girder Erection over Railroad	5	0	Railroad Provisions
Maintenance and Protection of Traffic Beneath Proposed Structure	8	0	"Maintenance and Protection of Traffic Beneath Proposed Structure at Station ___"
Metal Bridge Railing	8	0	Plan Note
Metal Stay-in-Place Forms	8	0	Article 420-3
Metalwork for Elastomeric Bearings [4,5]	7	0	Article 1072-8
Miscellaneous Metalwork [4,5]	7	0	Article 1072-8
Optional Disc Bearings [4]	8	0	"Optional Disc Bearings"
Overhead and Dynamic Message Signs (DMS) (metalwork and foundations)	13	0	Applicable Provisions
Placement of Equipment on Structures (cranes, etc.)	7	0	Article 420-20

Pot Bearings [4]	8	0	"Pot Bearings"
Precast Concrete Box Culverts	2, then 1 reproducible	0	"Optional Precast Reinforced Concrete Box Culvert at Station ___"
Prestressed Concrete Cored Slab (detensioning sequences) [3]	6	0	Article 1078-11
Prestressed Concrete Deck Panels	6 and 1 reproducible	0	Article 420-3
Prestressed Concrete Girder (strand elongation and detensioning sequences)	6	0	Articles 1078-8 and 1078-11
Removal of Existing Structure over Railroad	5	0	Railroad Provisions
Revised Bridge Deck Plans (adaptation to prestressed deck panels)	2, then 1 reproducible	0	Article 420-3
Revised Bridge Deck Plans (adaptation to modular expansion joint seals)	2, then 1 reproducible	0	"Modular Expansion Joint Seals"
Sound Barrier Wall (precast items)	10	0	Article 1077-2 & "Sound Barrier Wall"
Sound Barrier Wall Steel Fabrication Plans [5]	7	0	Article 1072-8 & "Sound Barrier Wall"
Structural Steel [4]	2, then 7	0	Article 1072-8
Temporary Detour Structures	10	2	Article 400-3 & "Construction, Maintenance and Removal of Temporary Structure at Station ____"
TFE Expansion Bearings [4]	8	0	Article 1072-8

FOOTNOTES

References are provided to help locate the part of the Contract where the submittals are required. References in quotes refer to the provision by that name. Articles refer to the *Standard Specifications*.

Submittals for these items are necessary only when required by a note on plans.

Submittals for these items may not be required. A list of pre-approved sequences is available from the producer or the NCDOT Materials and Tests Unit.

The fabricator may submit these items directly to the Structure Design Unit.

The two sets of preliminary submittals required by Article 1072-8 of the *Standard Specifications* are not required for these items.

Submittals for Fabrication Drawings are not required. Submittals for Catalogue Cuts of Proposed Material are required. See Section 5.A of the referenced provision.

Submittals are necessary only when the top slab thickness is 18” or greater.

GEOTECHNICAL SUBMITTALS

Submittal	Copies Required by Geotechnical Engineering Unit	Copies Required by Structure Design Unit	Contract Reference Requiring Submittal [1]
Drilled Pier Construction Plans [2]	1	0	Subarticle 411-3(A)
Crosshole Sonic Logging (CSL) Reports [2]	1	0	Subarticle 411-5(A)(2)
Pile Driving Equipment Data Forms [2,3]	1	0	Subarticle 450-3(D)(2)
Pile Driving Analyzer (PDA) Reports [2]	1	0	Subarticle 450-3(F)(3)
Retaining Walls [4]	8 drawings, 2 calculations	2 drawings	Applicable Provisions
Temporary Shoring [4]	5 drawings, 2 calculations	2 drawings	"Temporary Shoring" & "Temporary Soil Nail Walls"

FOOTNOTES

1. References are provided to help locate the part of the Contract where the submittals are required. References in quotes refer to the provision by that name. Subarticles refer to the *Standard Specifications*.

2. Submit one hard copy of submittal to the Resident or Bridge Maintenance Engineer. Submit a second copy of submittal electronically (PDF via email) or by facsimile, US mail or other delivery service to the appropriate Geotechnical Engineering Unit regional office. Electronic submission is preferred.
3. The Pile Driving Equipment Data Form is available from: www.ncdot.org/doh/preconstruct/highway/geotech/formdet/
   See second page of form for submittal instructions.
4. Electronic copy of submittal is required. See referenced provision.

Exhibit 6-01

Utility Relocation Agreement

* * * ** * * *

Work and the Department shall be relieved of participating in the costs of such unauthorized Work unless such Work is done pursuant to a supplemental agreement attached to and made a part hereof.

3. That the COMPANY will prepare an estimate, broken down as to estimated cost of labor, construction overhead, materials and supplies, handling charges, transportation and equipment, rights of way, preliminary engineering and construction engineering, including an itemization of appropriate credits for salvage, betterments and accrued depreciation, all in sufficient detail to provide the Department a reasonable basis for analysis. Unit costs, such as broad gauge units of property, may be used for estimating purposes where the COMPANY uses such units in its own operations. The COMPANY will also prepare plans, sketches or drawings showing their existing facilities, temporary and permanent changes to be made with reference to the Department's new right of way using appropriate nomenclature, symbols, legend, notes, color coding or the like. The before mentioned estimate and plans are attached hereto and made a part hereof. The Department will not reimburse the COMPANY for any utility relocations or changes not necessitated by the construction of the Highway project, nor for changes made solely for the benefit or convenience of the COMPANY, its Contractor, or a Highway Contractor.

4. That the Department's authority, obligation, or liability to pay for relocations as set forth in this agreement is based on the COMPANY having a right of occupancy in its existing location by reason of holding the fee, an easement or other real property interest, the damaging or taking of which is compensable in eminent domain.

5. That payment for all Work done hereunder shall be made in accordance with the requirements of FAPG unless payment is being made pursuant to a supplemental agreement attached to and made a part of this agreement.

6. That the construction Work provided for in this agreement will be performed by the method or methods as specified below:

___ BY COMPANY'S REGULAR FORCE: The COMPANY proposes to use its regular construction or maintenance crews and personnel at its standard schedule of wages and working hours in accordance with the terms of its agreement with such employees.

___ BY EXISTING WRITTEN CONTINUING CONTRACT: The COMPANY proposes to use an existing written continuing Contract under which certain Work as shown by the COMPANY's estimate is regularly performed for the COMPANY and under which the lowest available costs are developed.

___ BY CONTRACT: The COMPANY does not have adequate staff or equipment to perform the necessary Work with its own forces. The COMPANY proposes to award a Contract to the lowest qualified bidder who submits a proposal in conformity with the requirements and specifications for the Work to be performed as set forth in an appropriate solicitation for bids.

7. a. It is contemplated by the parties hereto that the construction of this State Highway Project will begin on or about the _____ day of _____, _____.

b. Based on the best information available at the present time to the COMPANY, indicate applicable paragraph below:

___ Materials are available and it is expected that Work will be complete prior to Highway construction.

___ All Work will take place during Highway construction and arrangements for said Work will be coordinated with Highway construction operations at preconstruction conference.

___ Work will begin promptly upon notification by the Department; however, it is not expected to be complete prior to Highway construction. Any remaining Work will be coordinated with Highway construction operations at preconstruction conference.

___ Other (Specify) _____

_____

_____

_____

8. That the method used by the COMPANY in developing the relocation costs shall be as indicated by Paragraph (a), (b), or (c) as follows:

a. ___ Actual direct and related indirect costs accumulated in accordance with a Work order accounting procedure prescribed by the applicable Federal or State regulatory body.

b. ___ Actual direct and related indirect costs accumulated in accordance with an established accounting procedure developed by the COMPANY and approved by the Department.

c. ___ On a lump-sum basis where the estimated cost to the Department does not exceed $100,000.00. Except where unit costs are used and approved, the estimate shall show such details as man-hours by class and rate; equipment charges by type, size, and rate; materials and supplies by items and price; and payroll additives and other overhead factors.

9. Indicate if (a), (b), or (c) is applicable:

a. ___ That the replacement facility is not of greater functional capacity or capability than the one it replaces, and includes no COMPANY betterments.

b. ___ That the replacement facility involves COMPANY betterments, or is of greater functional capacity or capability than the one it replaces.

c. ___ That the replacement facility is other than a segment of the COMPANY's service, distribution, or transmission lines, such as a building, pumping station, filtration plant, power plant or substation, production or transfer of storage facilities and other similar operating units of the COMPANY's physical plant or operating facilities.

If (c) is applicable, set forth credit to the project for the accrued depreciation of the facility being replaced.

10. That the total estimated cost of the Work proposed

herein, including all cost to the Department and COMPANY less any credit and COMPANY less any credit for salvage, is

estimated to be ---------- $_____

The estimated non-betterment cost to the Department, including all cost less any credits for salvage, betterments, accrued depreciation and additional Work done by the

COMPANY will be ---------- $_____

The estimated cost to the COMPANY including betterments, accrued depreciation and any additional Work done by the

COMPANY will be ---------- $_____

(*The above costs shall be supported by attached estimate and plans*)

11. That in the event it is determined there are changes in the scope of Work, extra Work, or major changes from the statement of Work covered by this agreement, reimbursement shall be limited to costs covered by a modification of this agreement or a written change or extra Work order approved by the Department.

12. Periodic progress billings of incurred costs may be made by COMPANY to the Department not to exceed monthly intervals; however, total progress billing payments shall not exceed 95% of the approved non-betterment estimate. Progress billing forms may be obtained from the State Utility Agent. One final and detailed complete billing of all costs shall be made by COMPANY to the Department at the earliest practicable date after completion of Work and in any event within 6 months after completion of Work. The statement of final billing shall follow as closely as possible the order of the items in the estimate portion of this agreement.

13. That the Department shall have the right to inspect non-reusable materials of the COMPANY recovered on this project prior to disposal by sale or scrap.

14. That the Department shall have the right to inspect all books, records, accounts and other documents of the COMPANY pertaining to the Work performed by it under this agreement at any time after Work begins and for a period of 3 years from the date final payment has been received by the COMPANY.

15. That the COMPANY obligates itself to erect, service and maintain the facilities to be retained and installed over and along the Highway within the Department right of way limits in accordance with the mandate of the General Statutes and such other Laws, rules, and regulations as have been or may be validly enacted or adopted, now or hereafter.

16. That if, in the future, it becomes necessary due to Highway construction or improvement to adjust or relocate utilities covered in this agreement being relocated at the Department expense that are crossing or otherwise occupying Highway right of way, the non-betterment cost of same will be that of the Department.

17. That if, at any time, the Department shall require the relocation of or changes in the location of the encroaching facilities covered in this agreement being relocated at COMPANY expense, the COMPANY binds itself, its successors and assigns, to promptly relocate or alter the facilities, in order to conform to the said requirements, without any cost to the Department.

18. That the COMPANY agrees to relinquish their rights in that portion of right of way vacated by their existing facilities now absorbed within the Department right of way.

19. Proper temporary and permanent measures shall be used to control erosion and sedimentation in accordance with all local, State and Federal regulations.

20. The Company agrees to comply with Buy America. United States Codes (USC) 313 and Code of Federal Regulations 23 CFR 635.410: Requires the use of domestic steel and iron in all federally funded construction projects.

IN WITNESS WHEREOF, the parties hereby have affixed their names by their duly authorized officers the day and year first above written.

DEPARTMENT OF TRANSPORTATION

BY: _____

ASST. STATE UTILITY AGENT

ATTEST OR WITNESS

_____

(TITLE)

_____

(NAME OF COMPANY)

BY: _____

TITLE: _____

Form R/W 16.8

Rev. 02/03/09

Exhibit 6-02

Encroachment Agreement

STATE PROJECT_____ STATE OF NORTH CAROLINA

ROUTE_____ FEDERAL PROJECT_____
COUNTY_____

DEPARTMENT OF TRANSPORTATION RIGHT OF WAY -AND- ENCROACHMENT AGREEMENT

INTERSTATE AND OTHER CONTROLLED ACCESS HIGHWAYS

THIS AGREEMENT, made and entered into this the day of , 20 , by and between the Department of Transportation, party of the first part; and _____party of the second part,

W I T N E S S E T H

THAT WHEREAS, the party of the second part desires to encroach on the right of way of the public road designated as

Route(s) _____, located_____

with the construction and/or erection of:

WHEREAS, it is to the material advantage of the party of the second part to effect this encroachment, and the party of the first part in the exercise of authority conferred upon it by statute, is willing to permit the encroachment within the limits of the right of way as indicated, subject to the conditions of this agreement;

NOW, THEREFORE, IT IS AGREED that the party of the first part hereby grants to the party of the second part the right and privilege to make this encroachment as shown on attached plan sheet(s), specifications and special provisions which are made a part hereof upon the following conditions, to wit:

That the installation, operation, and maintenance of the above described facility will be accomplished in accordance with the party of the first part's latest POLICIES AND PROCEDURES FOR ACCOMMODATING UTILITIES ON HIGHWAY RIGHTS-OF-WAY, and such revisions and amendments thereto as may be in effect at the date of this agreement. The party of the second part agrees to comply with Buy America, United States Codes (USC) 313 and Code of Federal Regulations 23 CFR 635.410: Requires the use of domestic steel and iron in all federally funded construction projects. Information as to these policies and procedures may be obtained from the Division Engineer or State Utility Agent of the party of the first part.

That the said party of the second part hereby agrees that access for servicing its facilities will be limited to access via (a) frontage roads where provided, (b) nearby or adjacent public roads and street, or (c) trails along or near the Highway right of way lines, connecting only to an intersecting road; from any one or all of which entry may be made to the outer portion of the Highway right of way. The party of the second part's rights of access to the through-traffic roadways and ramps shall be subject to the same rules and regulations as apply to the general public, except if an Emergency situation occurs, and the usual means of access for service operation as herein provided will not permit the immediate action required by the party of the second part in making Emergency repairs as required for the safety and welfare of the public, the party of the second part shall have a temporary right of access to and from the through-traffic roadways and ramps as necessary to accomplish the required Emergency repairs, provided that the party of the second part complies with the regulations established by the party of the first part for policing and control to protect the Highway Users.

That the said party of the second part binds and obligates himself to install and maintain the encroaching facility in such safe and proper condition that it will not interfere with or endanger travel upon said Highway, nor obstruct nor interfere with the proper maintenance thereof, to reimburse the party of the first part for the cost incurred for any repairs or maintenance to its roadways and structures necessary due to the installation and existence of the facilities of the party of the second part, and if at any time the party of the first part shall require the removal of or changes in the location of the said facilities, that the said party of the second part binds himself, his successors and assigns, to promptly remove or alter the said facilities, in order to conform to the said requirement, without any cost to the party of the first part.

That the party of the second part agrees to provide during construction and any subsequent maintenance proper signs, signal lights, flagmen and other warning devices for the protection of traffic in conformance with the latest Manual on Uniform Traffic Control Devices for Streets and Highways and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the Division Engineer of the party of the first part.

That the party of the second part hereby agrees to indemnify and save harmless the party of the first part from all damages and claims for damage that may arise by reason of the installation and maintenance of this encroachment.

That the party of the second part agrees to restore all areas disturbed during installation and maintenance to the satisfaction of the Division Engineer of the party of the first part. The party of the second part agrees to exercise every reasonable precaution during construction and maintenance to prevent eroding of soil; silting or pollution of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces or other property; or pollution of the air. There shall be compliance with applicable rules and regulations of the North Carolina Division of Environmental Management, North Carolina Sedimentation Control Commission, and with ordinances and regulations of various counties, municipalities and other official agencies relating to pollution prevention and control. When any installation or maintenance operation disturbs the ground surface and existing ground cover, the party of the second part agrees to remove and replace the sod or otherwise reestablish the grass cover to meet the satisfaction of the Division Engineer of the party of the first part.

That the party of the second part agrees to assume the actual cost of any inspection of the Work considered necessary by the Division Engineer of the party of the first part.

That the party of the second part agrees to have available at the construction site, at all times during construction, a copy of this agreement showing evidence of approval by the party

of the first part. The party of the first part reserves the right to stop all Work unless evidence of approval can be shown.

Provided the Work contained in this agreement is being performed on a completed Highway open to traffic; the party of the second part agrees to give written notice to the Division Engineer of the party of the first part when all Work contained herein has been completed. Unless specifically requested by the party of the first part, written notice of completion of Work on Highway projects under construction will not be required.

That in the case of noncompliance with the terms of this agreement by the party of the second part, the party of the first part reserves the right to stop all Work until the facility has been brought into compliance or removed from the right of way at no cost to the party of the first part.

That it is agreed by both parties that this agreement shall become void if actual construction of the Work contemplated herein is not begun within one year from the date of authorization by the party of the first part unless written waiver is secured by the party of the second part from the party of the first part.

During the performance of this Contract, the second party, for itself, its assignees and successors in interest (hereinafter referred to as the "Contractor"), agrees as follows:

a) Compliance with Regulations: The Contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the U. S. Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this Contract.

b) Nondiscrimination: The Contractor, with regard to the Work performed by it during the Contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the Contract covers a program set forth in Appendix B of the Regulations.

c) Solicitations for Subcontracts, including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Contractor for Work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or Supplier shall be notified by the Contractor of the Contractor's obligations under this Contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

d) Information and Reports: The Contractor shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Department of Transportation or the Federal Highway Administration to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the Department of Transportation, or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.

e) Sanctions for Noncompliance: In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the Department of Transportation shall

impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to,

(1) Withholding of payments to the Contractor under the Contract until the Contractor complies, and/or

(2) Cancellation, termination or suspension of the Contract, in whole or in part.

f) Incorporation of Provisions: The Contractor shall include the provisions of paragraphs "a" through "f" in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the Department of Transportation or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or Supplier as a result of such direction, the Contractor may request the Department of Transportation to enter into such litigation to protect the interests of the State, and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

1) R/W (162) : Party of the Second Part certifies that this agreement is true and accurate copy of the form

2) R/W (162) incorporating all revisions to date.

IN WITNESS WHEREOF, each of the parties to this agreement has caused the same to be executed the day and year first above written.

DEPARTMENT OF TRANSPORTATION

BY: _____

ASSISTANT MANAGER OF RIGHT OF WAY

ATTEST OR WITNESS:

_____ _____

_____ _____

_____ _____

Second Party

INSTRUCTIONS

When the applicant is a corporation or a municipality, this agreement must have the corporate seal and be attested by the corporation secretary or by the empowered city official, unless a waiver of corporate seal and attestation by the secretary or by the empowered City official is on file in the Raleigh office of the Manager of Right of Way. In the space provided in this agreement for execution, the name of the corporation or municipality shall be typed above the name, and title of all persons signing the agreement should be typed directly below their signature.

When the applicant is not a corporation, then his signature must be witnessed by one person. The address should be included in this agreement and the names of all persons signing the agreement should be typed directly below their signature.

GENERAL REQUIREMENTS

1. Wherever possible, freeway crossing should be parallel to and within the prevailing right of way of intersecting roads.
2. Crossings should be as near as possible normal to the center line of the freeway.
3. Parallel encroachments will not be permitted except outside of control of access lines.
4. The Department's Division Engineer should be given notice by the applicant prior to actual starting of installations included in this agreement.

For Overhead Wire Lines

5. Minimum vertical clearances of overhead wires above all roadways must conform to clearances set out in the National Electric Safety Code.
6. Supporting poles or structures must be clear of control of access lines, and be at least 30 feet clear of the edge of Shoulders of through lanes and 20 feet clear of the Shoulders of interchange ramps.

For Underground Utilities

7. Open-cut installation for crossings will be permitted only when a Highway project is in rough grading stage prior to paving. Generally, on rough grading projects, open-cut will not be permitted in fills of over 10 feet in depth and back filled material must be compacted to maximum density meeting the Department requirements.
8. Encasements under an existing freeway must be installed by means of tunneling, jacking, or boring and any voids outside the encasement must be filled with lean concrete grout and the ends of encasements be satisfactorily closed.
9. In cut section, encasement must extend continuously from ditch line to ditch line and in fill section, encasement must extend continuously five feet beyond toe to slopes.
10. Vents for encasement should be extended to the right of way line or as otherwise required by the Department.
11. All pipe encasements as to material and strength shall meet the standards and specifications of the Department.

1. When trenching is carried down cut slopes, excavation must be backfilled to maximum density and the disturbed portion of the slope be stabilized and sodded to the satisfaction of the Department's Engineer.

Plans

This Encroachment Agreement must be accompanied, in the form of an attachment, by a plan showing the following:

1. All roadways and ramps
2. Right of way and control of access lines
3. Drainage structures or Bridges if affected by encroachment
4. Location of the proposed encroachment
5. Length, size and type of encroachment
6. Dimensions, showing the distance from the encroachment to roadways, Shoulders, structures, etc.
7. Location by Highway survey station number. If station number cannot be obtained, location should be shown by distance from some identifiable point, such as a Bridge, road intersection, etc. (To assist in preparation of the encroachment plan, the Department roadway plans may be seen at the various Highway Division Offices or at the Raleigh Office.)

All Encroachment Agreements involving the crossing of the right of way, roadways and/or ramps of a freeway, must be accompanied, in the form of an attachment, by a profile showing the following information:

1. The profile should extend from right of way line to right of way line and show all slopes (cut or fill), ditches, Shoulders, pavements, medians, etc.
2. A vertical dimension from bottom of road ditches and from surface of pavement to encroaching structures.
3. Length, size, and type of encasement where required.
4. Notation of portion to be installed by open-cut.
5. For underground encroachments involving encasements that must be vented, the location of vents must be shown.
6. Method of installation must be shown in detail on either the plan or profile.
7. Any attachment to a Bridge or other drainage structure must be approved by the Department's Structure Management Unit.
8. Where profile is required, it should be on same sheet with the plan.

SPECIAL PROVISIONS OR SPECIFICATIONS

Any special provisions or specifications as to the performance of the Work or the method of construction that may be required by the Department must be shown on a separate sheet attached to encroachment, provided that such information cannot be shown on the plan and profile sheet.

Exhibit 6-04

Utility Assembly Checklist

Project: _____

County: _____

Utility Owner: _____

Utility Assembly for (description of Work) _____

_____

ITEM	YES	N/A
Utility Relocation Plans include the following:		
A. Project No., STIP No., County and Legend	_____	_____
B. Location of existing and proposed facilities relative to Highway stationing, and existing and Proposed Right of Way limits	_____	_____
C. Pertinent vertical and horizontal clearance	_____	_____
D. Location, length, size and/or capacity, type, class and design features of the following:		
1. Existing facilities to be adjusted	_____	_____
2. Temporary facilities to be installed	_____	_____
3. Permanent facilities to be installed	_____	_____
4. Facilities to be abandoned	_____	_____
E. Work to be performed at Utility owner's expense	_____	_____
F. Work to be performed at Developer's expense	_____	_____
Plans and estimate show that proposed location is consider the most economical and that estimate is reasonable for the Work	_____	_____
Estimate and agreement adequately show the following:		
A. Betterments	_____	_____
B. Accrued depreciation	_____	_____
C. Salvage value	_____	_____
D. Relocation Work to be performed at expense of the Utility Owner and/or Developer , and proportionate share of cost borne by each	_____	_____
E. Cost of Right of Way	_____	_____
Right of Way status report included	_____	_____

Pole data included	_____	_____
Agreement or supporting information document findings as to:	_____	_____
A. Method of performing Work	_____	_____
B. Method of developing relocation cost by Utility Owner	_____	_____
C. Developer Utility Adjustment Agreement	_____	_____
D. Disposition of existing facility to be replaced	_____	_____

I have reviewed the Utility Assembly transmitted herewith and I am in agreement with the Work provided therein.

Approved and Accepted For: _____	Approved and Accepted For: Developer
BY: _____	BY: _____
Signature _____	Signature _____

Reviewed by NCDOT Date _____ Initials _____

Exhibit 7-01

Checklist for Condemnation Package

Document Title	Check
FRM13-K(2) – Declaration of Taking	☐
FRM13-A - AG Information Form	☐
FRM10-F – Administrative Adjustment/Condemnation Review Form	☐
FRM10-B – Summary Statement/Offer to Purchase Real Property Due to the Acquisition of Right of Way and Damages	☐
FRM13-D – Request for Compensation for Deposit in Court Final Report Checklist	☐
FRM13-B – Request for Compensation for Deposit in Court Final Report	☐
FRM4-C , 4-D, 4-E and continuation sheets FRM4-F – Negotiating Diary	☐
FRM13.E – Existing Right of Way Abstract	☐
FRM12-J – Appraisal Tabulation	☐
FRM4-I – Partial Taking of Buildings and Structures (if applicable)	☐
FRM4-B – Appraisal Request/Summary Sheet	☐
FRHM4-H – Information Obtained on Initial Contact	☐
FRM6-A – Request for Certificate of Title	☐
FRM12-A.1 – Additional Payees (if applicable)	☐
FRM6-C – Preliminary Report of Title	☐
FRM5-K - Value Finding	☐
Appraisal	☐
FRM5-H – Appraisal Summary Sheet	☐
FRM5-S – Review Certification	☐
FRM5-R – Review Summary	☐
Substitute Form W-9 (One for all property owners)	☐
Plan Sheets and/or Final Court Map	☐

Exhibit 10-01

Sound Barrier Walls

Design and Construction

Developer shall design and construct post and panel sound barrier walls in accordance with the requirements herein and other CA Documents. Developer shall design and construct the sound barrier walls specified in Table 01. Sound barrier walls shall be designed in accordance with AASHTO *LRFD Bridge Design Specifications* and have a nominal thickness of four inches.

Developer's Design Documents shall include details showing the profile and alignment of sound barrier walls. The top elevation of the walls shall not have changes in elevation that result in a jagged appearance. The difference in elevation between adjacent wall panels shall not exceed one foot except when the wall traverses a slope, in which case the difference in elevation shall not exceed two feet. Pile spacing greater than 15 feet will not be permitted. Provide consistent pile spacing the entire length of the wall except when otherwise specified by the Design Documents at the ends of the wall and at changes in the wall alignment. Developer shall design and construct sound barrier walls to provide no less than six inch embedment of the panel bottom into the ground. Except as otherwise specified in Section 10.2.4 of the Technical Provisions, the top-of-wall elevations must be equal to those provided in the Design Noise Reports. Developer shall design and construct noise sealant material along the full height of the panel edge and such sealant shall be secured to remain in place.

Developer may use sound barrier walls that have been assigned "Approved" or "Approved for Provisional Use" status by the NCDOT Product Evaluation Program.

Prior to submittal of Working Drawings, submit a copy of the signed NCDOT Product Status Notification Letter and two sets of preliminary plans for review and comment, including material specifications for all components. After Developer addresses NCDOT comments regarding preliminary plans, submit Working Drawings in accordance with the CA Documents that include ground surveys at the proposed wall and details necessary to fabricate and construct the sound barrier wall.

Submit casting drawings for the precast face panels in accordance with Article 1077-2 of the Standard Specifications for NCDOT review and comment prior to casting precast panels. Show the inserts, method of handling, and support details used for transportation on casting drawings. Submit metalwork fabrication drawings to NCDOT for review and comment prior to fabrication of steel wall components. Submit an erection plan and concrete face panel placing plan, including location of various heights of panels, for review and comment.

Provide precast panels that are 4 inches ± ¼ inch thick with textured finishes on both sides. The depth of the textured relief shall not exceed the above 4-inch nominal precast panel thickness by greater than 1 inch on each side.

Excavate holes with the diameters shown on the plans. Perform pile excavation to the depths shown on the plans and install piles as shown on the plans or in the accepted submittals with a tolerance of 1/2 inch per foot (42 mm per meter) from vertical. Backfill excavations with concrete after placing piles.

Use equipment of adequate capacity and capable of drilling through soil and non-soil including rock, boulders, debris, man-made objects and any other materials encountered. Blasting is not permitted to advance the excavation. Blasting for core removal is only permitted when

approved by the Engineer. Dispose of drilling spoils in accordance with Section 802 of the Standard Specifications and as directed by the Engineer. Drilling spoils consist of all excavated material including water removed from the excavation either by pumping or drilling tools.

If unstable, caving or sloughing soils are anticipated or encountered, stabilize excavations with either slurry or steel casing. When using slurry, submit slurry details including product information, manufacturer's recommendations for use, slurry equipment information and written approval from the slurry supplier that the mixing water is acceptable before beginning drilling. When using steel casing, use either the sectional type or one continuous corrugated or non-corrugated piece. Steel casings should consist of clean watertight steel of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the hole size and a minimum wall thickness of 1/4 inch.

Before placing concrete, center and support the pile in the excavation and check the water inflow rate in the excavation after any pumps have been removed. If the inflow rate is less than 6" per half hour, remove any water and free fall the concrete into the excavation. Ensure that concrete flows completely around the pile. If the water inflow rate is greater than 6" per half hour, propose a concrete placement procedure to the Engineer. The Engineer shall approve the concrete placement procedure before placing concrete.

Fill the excavation with Class A concrete in accordance with Section 1000 of the Standard Specifications except as modified herein. Provide concrete with a slump of 6" to 8". Use an approved high-range water reducer to achieve this slump. Place concrete in a continuous manner and remove all casings.

Table 01

Sound Barrier Wall Number	Location
277NW2C	Along EB I-277 shoulder from North Tryon St ramp to North Church St ramp
277NW2B	EB I-277 shoulder from North Church St ramp to North Pine St ramp
77NW2A	Along westbound I-277 from Seaboard St bridge to near Hamilton St overpass
77NW2B	Along westbound I-277 ramp to northbound I-77 near Hamilton St overpass to Oaklawn Ave overpass
77NW1A	Along southbound I-77 / westbound Brookshire Freeway ramp to shoulder of southbound I-77 north of Oaklawn Ave overpass
77NW2C	Along shoulder of northbound I-77 from north of Oaklawn Ave overpass at Genesis Park Pl to Erwin Creek
77NW1B	Along shoulder of southbound I-77 near Dean St to south of Lasalle St
77NW3	Along northbound I-77 at Double Oaks Park to the northbound I-77 / Lasalle St ramp
77NW4	Along southbound I-77 north of Lasalle St to the northbound I-85 / southbound I-77 ramp at Crestdale Dr
77NW5	Along LaSalle St / northbound I-77 ramp to northbound I-77 / northbound I-85 ramp
-NW6-	Along shoulder of southbound I-77 near Slater Rd to near Biesterfield Dr

-NW7-	Along northbound I-77 from north of Cindy Ln overpass to near Juniper Dr
-NW8-	Along shoulder of northbound I-77 from south of Sunset Rd interchange at Suburban Dr to the I-77 northbound / Sunset Rd ramp
-NW9-	Along southbound I-77 from near Shalom Dr to the Lakeview Rd overpass
-NW12-	Along southbound I-77 / Gilead Rd ramp and southbound I-77 to south of Stumptown Rd overpass
-NW14-	Along southbound I-77 / Sam Furr Rd ramp and southbound I-77 to near Northcross Dr
-NW15-	Along southbound I-77 from south of Westmoreland Rd to the Westmoreland Rd overpass
-NW16-	Along southbound I-77 from near Ogden Cove Dr to the Lake Norman causeway
-NW17-	Along northbound I-77 from near Holiday Ln to near Sterling Bay Ln West at Lake Norman
-NW24-	Along southbound I-77 and Alcove Rd from north of Wades Way to north of Edgeway Rd
-NW25-	Along southbound I-77 and Bridgewater Ln from near Sapphire Dr to the Lake Norman causeway
-NW27-	Along southbound I-77 from the Lake Norman causeway near Hickory Hill Rd to the Brawley School Rd / southbound I-77 ramp at Gibbs Rd

Note: Sound barrier wall number 277NW3 shown in the Environmental Assessment (prepared on July 1, 2013), Design Noise Report for TIP Project No. I-3311C (approved June 18, 2013) and Design Noise Report Addendum #1 for TIP Project No. I-3311C (approved September 30, 2013) is deleted.

Architectural Concrete Surface Treatment

Developer shall design and construct a simulated stone/masonry/brick textured surface on both faces of pre-cast concrete panels used in sound barrier walls. Sound barrier walls shall have an architectural concrete surface treatment with a simulated stone/masonry/brick texture and color surface on both faces. All texture shall extend outward from the nominal panel thickness but by no more than an average of one inch.

Developer shall use the same source of form liner and color stains for all sound barrier wall panels within each continuous wall. The architectural concrete surface treatment shall match the appearance (shape, texture, pattern, color, and relief) specified in Table 02. When used, concrete columns shall remain unstained and there shall be an appreciable contrast between the colors of the unstained concrete columns and the stained panels. For information only, sources of form liners include, but are not limited to:

Scott System, Inc.
10777 E. 45th Avenue
Denver, Colorado 80239
www.scottsystem.com

Architectural Polymers, Inc.
1220 Little Gap Road
Palmerton, PA 18071
www.architecturalpolymers.com/

Creative Form Liners, Inc.
3411 Windom Road
Brentwood, Maryland 20722
www.creativeformliners.com/

Developer shall submit for review and comment, plan and elevation views and details showing overall simulated stone/masonry/brick pattern, joint locations, form tie locations, and end, edge or other special conditions. The drawings shall include typical cross sections of applicable surfaces, joints, corners, relief, simulated masonry pattern size, mortar joint and bed depths.

The form liner shall be patterned such that long continuous horizontal or vertical lines do not occur on the finished exposed surface. The line pattern shall be random in nature and shall conceal construction joint lines. Special attention should be given to details for wrapping form liners around corners. The top 1'-0" of the top panel shall remain untreated. This portion shall have a smooth, non-textured finish, and remain in its natural concrete color.

Shop drawings shall be submitted in accordance with the CA Documents. Developer shall construct three 24" x 24" transportable sample panels complying with the requirements, including form liners.

After the color, texture, and uniformity of the furnished samples are determined acceptable by NCDOT, Developer shall produce a full scale wall unit for each pattern and color combination meeting the design requirements. The furnished wall units shall establish the standard quality for production panels. Architectural surface treatments and patterns of the finished work shall achieve the same final effect as demonstrated on the accepted sample panel(s). When producing the final installed panels, use fine and coarse aggregate, retarder, and cement from the same source as those used in the approved sample panels.

Developer shall use form liners that are a high quality, reusable product manufactured of high strength urethane rubber or other approved material which attaches easily to the form work system, and shall not compress more than ¼" when concrete is poured at a rate of 10 vertical feet per hour. The form liners shall be removable without causing deterioration of the surface or underlying concrete.

Developer shall use a form release agent that is non-staining petroleum distillate free from water, asphaltic, and other insoluble residue or an equivalent product acceptable to NCDOT. Form release agent shall be compatible with the color system applied and any special surface finish.

Form ties shall be set back a minimum of 2" from the finished concrete surface. The ties shall be designed so that all material in the device to a depth of at least 2" back of the concrete face (bottom of simulated mortar groove) can be disengaged and removed without spalling or damaging the concrete. Developer shall submit the type of form ties to NCDOT for review and comment.

Developer shall apply a surface color system to the face of concrete panels using approved coloring systems/stains suitable for the purpose intended and applied in a manner consistent with the design intent of the project. The approved sample panel shall be the basis for determining the appropriate color/stain application.

Color stains shall be a special penetrating stain mix as provided by the manufacturer and shall create a surface finish that is breathable (allowing water vapor transmission), and that resists deterioration from water, acid, alkali, fungi, sunlight, or weathering. Stain mix shall meet the requirements for mildew resistance of Federal Test Method Standard 144, Method 6271, and requirements for weathering resistance of 1,000 hours accelerated exposure measures by Weatherometer in accordance with ASTM G 26. Color samples and coloring system shall be submitted NCDOT for review and comment.

Manufacturer of simulated stone/masonry/brick form liners and custom coloring system shall have at least five years' experience making masonry molds and color stains to create formed concrete surfaces to match shapes, surface textures and colors.

Developer's manufacturer precast concrete panels of shall have a minimum of three consecutive years' experience in architectural concrete surface treatment construction similar to that required for the Project. Developer shall furnish to NCDOT 5 references that were responsible for supervision of similar projects and will testify to the successful completion of these projects by such contractor. Such references shall include name, address, telephone number, and specific type of application.

Developer shall schedule a pre-installation conference with Developer, Developer's manufacturer and NCDOT to review requirements for construction of sample panel(s), and to coordinate the work.

Developer shall perform the Work in compliance with the following:

- Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be accepted by NCDOT before being used. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.
- Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a ¼" seam. Blend form liner butt joints into the brick pattern and finish off the final concrete surface. Create no visible vertical or horizontal seams or conspicuous form liner butt joint marks. At locations where the form liners are joined, carefully blend to match the balance of the brick pattern. Form liners shall be installed to withstand anticipated concrete placement pressures without leakage and without causing physical or visual defects. Wall ties shall be coordinated with the form liner system. Developer shall have a technical representative from the form liner manufacturer on site for technical supervision during the installation and removal of form liners.
- Form release agent shall be applied in accordance with the manufacturer's recommendations. The material shall be compatible with the form liner material and the concrete coloring system and in accordance with this Special Provision. Form release agent should be worked into all areas, especially pattern recesses.
- All form tie holes and other defects in finished uncolored surface shall be filled or repaired within 48 hours of form removal. Use patching materials and procedures in accordance with the manufacturer's recommendations.
- All surfaces that are to receive coloring agent application shall be free of all laitance, dirt, dust, grease, efflorescence, paint or any other foreign material prior to the application of coloring agent. Cleaning of surfaces shall be accomplished by pressure washing with

water set at 3000 psi to remove laitance. The fan nozzle shall be held perpendicular to the surface at a distance of 1 to 2 feet. Sandblasting will not be permitted.

- Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities. All patterns shall be continuous without visual disruption.
- Reinforced concrete shall be finished in accordance with the Standard Specifications, except that curing of concrete should been done to accommodate the application of coloring and surface finish treatment.
- Grout pattern joints shall be constructed to simulate the appearance of mortared joints produced in laid up masonry work. Grout pattern joints shall be produced in accordance with the form liner / concrete color system manufacturer.
- Finished concrete and patches shall stand in place 30 days after form liners are removed prior to application of coloring/staining agent. Maintain the concrete temperature between 40°F and 85°F during color/stain application and for 48 hours after color/stain application. Consult the manufacturer's recommendations for preparation, application, curing, and storage of coloring agents/stains. Developer shall provide a Color Application Artist who is trained in the special techniques to achieve realistic surface appearances, if requested by NCDOT. Treated surfaces located adjacent to exposed soil or pavement shall be temporarily covered to prevent dirt or soil splatter from rain.
- Following the completion of all work, repairs of any damage made by other construction operations shall be made to the form lined and colored surfaces as directed by the Engineer.

Table 02

Sound Barrier Wall Architectural Appearance

Sound Barrier Wall Number	Roadway Face		Far Face	
	Pattern	Color	Pattern	Color
277NW2C	[ ]	[ ]	[ ]	[ ]
277NW2B	[ ]	[ ]	[ ]	[ ]
77NW2A	[ ]	[ ]	[ ]	[ ]
77NW2B	[ ]	[ ]	[ ]	[ ]
77NW1A	[ ]	[ ]	Utility Brick	#30109
77NW2C	[ ]	[ ]	[ ]	[ ]
77NW1B	[ ]	[ ]	Utility Brick	#30109
77NW3	[ ]	[ ]	[ ]	[ ]
77NW4	[ ]	[ ]	Utility Brick	#30109
77NW5	[ ]	[ ]	[ ]	[ ]
-NW6-	[ ]	[ ]	[ ]	[ ]
-NW7-	[ ]	[ ]	[ ]	[ ]
-NW8-	[ ]	[ ]	[ ]	[ ]

-NW9-	[ ]	[ ]	[ ]	[ ]
-NW12-	Dry Stack Stone	#30372	Dry Stack Stone	#30372
-NW14-	Dry Stack Stone	#30372	Dry Stack Stone	#30372
-NW15-	Standard Brick	#30100 for bricks	Standard Brick	#30100 for bricks
-NW16-	Standard Brick	#30100 for bricks	Standard Brick	#30100 for bricks
-NW17-	Standard Brick	#30100 for bricks	Standard Brick	#30100 for bricks
-NW24-	Ashlar Stone	#36400	Ashlar Stone	#36400
-NW25-	Ashlar Stone	#36400	Ashlar Stone	#36400
-NW27-	Ashlar Stone	#36400	Ashlar Stone	#36400

Developer is required to meet all the architectural appearance requirements for sound barrier walls as specified in Table 02 of this Exhibit 10-01 of the Technical Provisions.

For sound barrier walls –NW15-, -NW16-, and –NW17-, the red brick color (#30100) shall be rolled onto the brick, leaving the spaces between bricks unpainted. In addition for both sides of these three walls, the walls shall have roughly 12% of the bricks painted so as to produce a random flashing pattern. The color of these flashing bricks shall be #30097. Roughly half of the flashing bricks shall be painted solid with the flashing brick color. The remaining half of flashing bricks shall be painted with two vertical stripes that are asymmetrical, non-uniform, and not in the same location on each brick using the flashing brick color.

For sound barrier walls 77NW1A, 77NW1B and 77NW4, the medium brown color (#30109) shall be applied to all exposed surfaces on the far face including any piles and coping.

For sound barrier walls in Table 02 of this Exhibit 10-01 that do not have roadway face or far face pattern and color specified, the municipality will determine the roadway face and far face pattern and color to be used by Developer. If the municipality chooses a pattern other than Dry Stack Stone, Standard Brick, or Ashlar Stone, then a Change Order will be issued in accordance with Section 14.1 of the Agreement; otherwise Developer shall supply the pattern and color selected by the municipality.

Exhibit 11-01

Pavement Surface Testing

Test the finished pavement surface of any portion of the Project with a Design Speed of 50 mph or greater in accordance with the requirements herein.

A. Equipment and Operator Requirements

Use Inertial Profiler complying with AASHTO M 328-10 to measure the longitudinal pavement surface profile. Produce International Roughness Index (IRI) and Mean Roughness Index (MRI) values for measuring smoothness. Prior to testing, provide NCDOT and CEI Firm certification that the Inertial Profiler has been calibrated and verified in accordance with AASHTO M 328-10.

Operator shall be trained by the equipment manufacturer, or other training acceptable to the NCDOT, in the operation of the Inertial Profiler.

B. Preparation for Testing

Pavement shall be free of adverse objects or material at the time of testing.

Delineate the termini of the area to be tested to activate the profiler's automatic triggering sensor to begin and end data collection. Mark the limits of areas to be excluded from testing using the profiler's event identifier such that the exact locations can be extracted from the profile data file during processing. Divide the pavement surface for the segment which represents a continuous placement (i.e. the start of the Project to Bridge, intersection to intersection).

C. Testing Requirements

Perform surface testing in the presence of the CEI Firm.

Operate the Inertial Profiler in the direction of the final traffic pattern. Operation of the Inertial Profiling system shall conform to AASHTO R 57. Operate the profiler at a speed conforming to the manufacturer's recommendations, however, the speed shall be constant to within ± 3 mph of the intended speed and any required acceleration should be as gradual as possible. For example, if the intended speed were 30 mph, the acceptable range of speed for testing would be 27 to 33 mph.

Collect IRI data from both wheel paths (3' from the edge of Lane) of a lane during a single test pass. Operate the event marker at all times unless impractical. The profiler shall reach the intended operating speed before entering the test section and continue at the operating speed through the test section.

D. Data Requirements

Provide the user selected Inertial Profiler settings to NCDOT. Certification of the Inertial Profiling system shall conform to AASHTO R 56.

Configure the profiler to record the actual elevation of the pavement surface. Do not use the profiler's internal IRI calculation mode. The profile data shall be filtered with a cutoff wavelength of 300 ft. The interval at which relative profile elevations are reported shall be 1".

Provide IRI data in accordance with most current version of ASTM E1926. Use personnel trained to record and evaluate IRI data.

Use testing and recording software to produce electronic inertial road profiles in a format compatible with the latest version of FHWA's ProVAL (Profile Viewing and Analysis) software.

The evaluation of the profiles will be performed on each 0.10 mile section, or portion thereof, for each pavement lane.

After testing, transfer the profile data from the profiler portable computer's hard drive to a storage media (DVD-R or CD-R) or electronic media acceptable to NCDOT. Label the disk or electronic media with the Project number, Route, file number, date, and termini of the profile data. Submit the electronic data on the approved media to NCDOT immediately after testing and this media will not be returned to Developer.

Submit documentation and electronic data of the evaluation for each section (IRI, MRI and localized roughness test) to NCDOT within 10 days after completion of the testing. Submit the electronic files compatible with ProVAL and the evaluation in tabular form with each 0.10-mile segment occupying a row. Include each row with the beginning and ending station for the section, the length of the section, the original IRI values from each wheel path, and the MRI value for the section. Each continuous run for a section will occupy a separate table and each table will have a header that includes the following: the Project contract number, county, the roadway number or designation, a lane designation, the dates of the smoothness runs, and the beginning and ending station of the continuous run. Summarize each table at the bottom.

E. Acceptance Requirements

IRI and MRI numbers recorded in inches per mile will be established for each 0.10-mile section, or portion thereof, for each Lane of the finished pavement surface on the HOT Lanes and GP Lanes that are constructed or resurfaced on I-77, I-85, I-277 or I-485 within the Project.

Areas excluded from testing by the profiler will be tested by Developer and CEI Firm using a 10-ft stationary straightedge furnished by Developer. Any location on the pavement selected by NCDOT or CEI Firm shall be tested as well as all transverse joints. Apply the straightedge parallel to the centerline of the surface. Do not exceed 1/8" variation of the surface being tested from the edge of the straightedge between any 2 contact points.

Each 0.10-mile section of the GP Lanes and HOT Lanes, or portion thereof, shall have a Mean Roughness Index (MRI) of 70 inches per mile or less.

When corrections to the pavement surface are required, NCDOT shall approve Developer's method of correction. Corrective Work shall be for the entire lane width. Pavement cross slopes shall be maintained through corrective area. Methods of correction shall be mill and inlay of bituminous concrete pavement and diamond grinding of Portland cement concrete pavement or remove and replace. Correct the adjoining Lane or Shoulders to produce a uniform cross section.

Where corrections are made after the initial smoothness testing, the pavement will be retested by Developer to verify that corrections have produced the acceptable ride surface.

F. Localized Roughness

Areas of localized roughness shall be identified through the “Smoothness Assurance Module” provided in the ProVAL software. Use the “Smoothness Assurance Module” to optimize repair strategies by analyzing the measurements from profiles collected using inertial profilers. The ride quality threshold for localized roughness shall be 125 in/mile at the continuous short interval of 25 ft. Submit a continuous roughness report to identify sections outside the threshold and identify all localized roughness, with the signature of the Operator included with the submitted IRI trace and electronic files.

Re-test the corrected area to ensure that the corrective action was successful.

Developer’s proposed corrective Work for localized roughness shall be approved by NCDOT before performing the Work and shall consist of either diamond grinding or other methods approved by NCDOT. Corrective Work shall not reduce the integrity or durability of the pavement that is to remain in place.

Localized roughness correction Work shall be for the entire Lane width. Pavement cross slope shall be maintained through corrective areas.

Exhibit 13-02

Erosion and Sediment Control/Stormwater Certification

General

Schedule and conduct construction activities in a manner that will minimize soil erosion and the resulting sedimentation and turbidity of surface waters. Comply with the requirements herein regardless of whether or not a National Pollution Discharge Elimination System (NPDES) permit for the Work is required.

Developer shall establish a chain of responsibility for Developer's operations to ensure that the *Erosion and Sediment Control/Stormwater Pollution Prevention Plan* is implemented and maintained over the Term. Developer shall provide at a minimum one Person in each classification below who is certified by NCDOT through NCSU as meeting the following requirements:

- *Certified Supervisor* – provide a certified Erosion and Sediment Control/Stormwater Supervisor to manage operations, insure compliance with Federal, State and Local ordinances and regulations, and manage the Quality Control Program;
- *Certified Foreman* – provide a certified, trained foreman for each construction operation that increases the potential for soil erosion or the possible sedimentation and turbidity of surface waters;
- *Certified Installer* – provide a certified installer to install or direct the installation for erosion or sediment/stormwater control practices; and
- *Certified Designer* – provide a certified designer for the design of the erosion and sediment control/stormwater component of reclamation plans and, if applicable, for the design of the Project erosion and sediment control/stormwater plan.

Roles and Responsibilities

- *Certified Erosion and Sediment Control/Stormwater Supervisor* – the Certified Supervisor shall be Level II and responsible for ensuring the erosion and sediment control/stormwater plan is adequately implemented and maintained on the Project and for conducting the quality control. The Certified Supervisor shall be on the Project within 24 hours notice during the Construction Period. Perform the following duties:
    - manage operations – Coordinate and schedule the Work of subcontractors so that erosion and sediment control/stormwater measures are fully executed for each operation and in a timely manner over the duration of the contract;
    - oversee the Work of subcontractors so that appropriate erosion and sediment control/stormwater preventive measures are conformed to at each stage of the Work.
    - prepare the required National Pollutant Discharge Elimination System (NPDES) Inspection Record and submit to NCDOT;
    - attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues;
    - implement the erosion and sediment control/stormwater site plans requested.

- provide any needed erosion and sediment control/stormwater practices for Developer's Temporary Work not shown on the plans, such as, but not limited to Work platforms, temporary construction, pumping operations, plant and storage yards, and cofferdams;
- acquire applicable permits and comply with requirements for borrow pits, dewatering, and any Temporary Work conducted by Developer in jurisdictional areas;
- conduct all erosion and sediment control/stormwater Work in a timely and workmanlike manner;
- fully perform and install erosion and sediment control/stormwater Work prior to any suspension of the Work;
- coordinate with NCDOT, Federal, State and Local Regulatory agencies on resolution of erosion and sediment control/stormwater issues due to Developer's operations;
- ensure that proper cleanup occurs from vehicle tracking on paved surfaces or any location where sediment leaves the ROW; and
- have available a set of erosion and sediment control/stormwater plans that are initialed and include the installation date of Best Management Practices. These practices shall include temporary and permanent groundcover and be properly updated to reflect necessary plan and field changes for use and review by NCDOT personnel as well as regulatory agencies.

- requirements set forth under the NPDES Permit – NCDOT's NPDES Stormwater permit (NCS000250) outlines certain objectives and management measures pertaining to construction activities. The permit references *NCG010000, General Permit to Discharge Stormwater* under the NPDES, and states that NCDOT shall incorporate the applicable requirements into its delegated Erosion and Sediment Control Program for construction activities disturbing one or more acres of land. NCDOT further incorporates these requirements on all contracted Bridge and culvert Work at jurisdictional waters, regardless of size. Some of the requirements are, but are not limited to:
    - control Project site waste to prevent contamination of surface or ground waters of the state, i.e. from equipment operation/maintenance, construction materials, concrete washout, chemicals, litter, fuels, lubricants, coolants, hydraulic fluids, any other petroleum products, and sanitary waste;
    - inspect erosion and sediment control/stormwater devices and stormwater discharge outfalls at least once every 7 calendar days, twice weekly for construction related *Federal Clean Water Act, Section 303(d)* impaired streams with turbidity violations, and within 24 hours after a significant rainfall event of 0.5 inch that occurs within a 24 hour period;
    - maintain an onsite rain gauge or use NCDOT's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates;
    - maintain erosion and sediment control/stormwater inspection records for review by NCDOT and Regulatory personnel upon request;

- implement approved reclamation plans on all borrow pits, waste sites and staging areas;
- maintain a log of turbidity test results as outlined in the NCDOT's Procedure for Monitoring Borrow Pit Discharge;
- provide secondary containment for bulk storage of liquid materials;
- provide training for employees concerning general erosion and sediment control/stormwater awareness, NCDOT's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000*; and
- report violations of the NPDES permit to the Engineer of Record immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.

- Quality control – in addition to the requirements elsewhere in the CA Documents, maintain a quality control program to control erosion, prevent sedimentation and Environmental Approvals. The quality control for erosion and sedimentation control shall:
  - comply with Environmental Approvals related to the Work; ensure that all operators and subcontractors on site have the proper erosion and sediment control/stormwater certification;
  - notify NCDOT when the required certified erosion and sediment control/stormwater personnel are not available on the job site when needed.
  - conduct the inspections required by the NPDES permit;
  - take corrective actions in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections;
  - incorporate erosion control into the Work in a timely manner and stabilize disturbed areas with mulch/seed or vegetative cover on a section-by-section basis;
  - use flocculants approved by State regulatory authorities where appropriate and where required for turbidity and sedimentation reduction;
  - ensure proper installation and maintenance of temporary erosion and sediment control devices;
  - remove temporary erosion or sediment control devices when they are no longer necessary; and
  - Developer's quality control and inspection procedures shall be subject to review by NCDOT. Maintain NPDES inspection records and make records available at all times for verification by NCDOT.
- *Certified Foreman* – at least one Certified Foreman shall be onsite for each type of Work listed herein during the respective construction activities to control erosion, prevent sedimentation and follow permit provisions:
  - foreman in charge of grading activities;

- foreman in charge of Bridge or culvert construction over jurisdictional areas; and
- foreman in charge of utility activities.

Developer may request to use the same Person as the Level II Certified Supervisor and Level II Certified Foreman. This Person shall be onsite whenever construction activities as described above are taking place. This request must be approved by NCDOT prior to Work beginning.

Developer may request to name a single Level II Certified Foreman to oversee multiple construction activities. This request must be approved by NCDOT prior to Work beginning.

- *Certified Installers* – provide at least one onsite, Level I Certified Installer for each of the following erosion and sediment control/stormwater crew:
    - seeding and mulching;
    - temporary seeding;
    - temporary mulching;
    - sod placement;
    - silt fence or other perimeter erosion/sediment control device installations;
    - erosion control blanket installation;
    - hydraulic tackifier installation;
    - turbidity curtain installation;
    - rock ditch check/sediment dam installation;
    - ditch liner/matting installation;
    - inlet protection;
    - riprap placement;
    - stormwater BMP installations (such as but not limited to level spreaders, retention/detention devices); and
    - pipe installations within jurisdictional areas.

  If a Level I *Certified Installer* is not onsite, Developer may substitute a Level II Certified Foreman for a Level I Certified Installer, provided the Level II Certified Foreman is not tasked to another crew requiring Level II Foreman oversight.

- *Certified Designer* – include the certification number of the Level III Certified Designer on the erosion and sediment control/stormwater component of all reclamation plans and if applicable, the certification number of the Level III Certified Designer on the design of the Project erosion and sediment control/stormwater plan.

Furnish the names of the *Certified Erosion and Sediment Control/Stormwater Supervisor, Certified Foremen, Certified Installers* and *Certified Designer* and notify NCDOT of changes in certified personnel over the life of the contract within 2 days of change.

Ethical Responsibility

Any company performing Work for the North Carolina Department of Transportation has the ethical responsibility to fully disclose any reprimand or dismissal of an employee resulting from improper testing or falsification of records.

Revocation or Suspension of Certification

Upon recommendation of the Director of Asset Management to the certification entity, certification for *Supervisor*, *Certified Foremen*, *Certified Installers* and *Certified Designer* may be revoked or suspended with the issuance of an *Immediate Corrective Action (ICA), Notice of Violation (NOV),* or C*ease and Desist Order* for erosion and sediment control/stormwater related issues.

The NCDOT will suspend, temporarily or permanently, of the certification of the Erosion and Sediment Control personnel, for any of the following:

- failure to adequately perform the duties as defined within this certification provision.
- issuance of an ICA, NOV, or Cease and Desist Order;
- failure to fully perform Environmental Commitments as detailed within the permit conditions and specifications;
- demonstration of erroneous documentation or reporting techniques;
- cheating or copying another candidate's work on an examination;
- intentional falsification of records;
- directing a subordinate under direct or indirect supervision to perform any of the above actions;
- dismissal from a company for any of the above reasons; and
- suspension or revocation of one's certification by another entity.

Suspension or revocation of a certification will be sent by certified mail to the certificant and the Corporate Head of the company that employs the certificant.

A certificant has the right to appeal any adverse action which results in suspension or permanent revocation of certification by responding, in writing, to the Director of Asset Management within 10 calendar days after receiving notice of the proposed adverse action.

Director of Asset Management

1537 Mail Service Center

Raleigh, NC 27699-1537

Failure to appeal within 10 calendar days will result in the proposed adverse action becoming effective on the date specified on the certified notice. Failure to appeal within the time specified will result in a waiver of all future appeal rights regarding the adverse action taken. The certificant will not be allowed to perform duties associated with the certification during the appeal process.

The Director of Asset Management will hear the appeal and make a decision within seven days of hearing the appeal. Decision of the Director of Asset Management will be final and will be made in writing to the certificant.

If a certification is temporarily suspended, the certificant shall pass any applicable written examination and any proficiency examination, at the conclusion of the specified suspension period, prior to having the certification reinstated.

Exhibit 13-03

Erosion and Sedimentation Control Plans

1. General

Developer's Erosion and Sedimentation Control Plans shall at a minimum address the following:

2. Clearing and Grubbing Phase

- Use correct NCDOT symbols
- Protect existing drainage structure inlets with Rock Inlet Sediment Trap Type 'A' (RIST-A), Rock Inlet Sediment Trap Type 'C' (RIST-C), Rock Pipe Inlet Sediment Trap Type 'A' (PIST-A), etc.
- Utilize adequate perimeter controls (temporary silt ditches (TSD), temporary silt fence (TSF), etc.)
- Utilize skimmer basins and rock measures with sediment control stone (Temporary Rock Sediment Dam Type 'B' (TRSD-B), Temporary Rock Silt Check Type 'A' (TRSC-A), etc.) at drainage outlets
- Take into account existing topography and show contour lines
- Utilize Temporary Rock Silt Checks Type 'B' (TRSC-B) to reduce velocity in existing ditches with spacing of 250 feet divided by percentage of ditch grade. Also utilize TRSC-Bs in proposed TSDs and temporary diversions (TD)
- Protect existing streams; do not place erosion control devices in live streams
- Show 50 ft. Environmentally Sensitive Area (ESA) for all Riparian Buffers for Lake Norman and to Byers Creek and unnamed tributaries to Byers Creek on Clearing & Grubbing plans.
- Provide adequate silt storage for 3600 cubic feet per disturbed acre and sediment basins shall be sized with surface area equal to 435 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using 10-year peak rainfall data (*NCDENR - Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site

  http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html for partial duration (ARI) time series type). A Sediment Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit (REU) upon request.
- Design Riser Basins to the following standards:
- Surface Area shall be determined by Equation A(sq. feet) = Q10(cfs) * 435
- Volume requirement shall be 1800 cubic feet per disturbed acre draining to the riser basin
- Riser Pipe shall have a cross-sectional area 1.5 times that of the barrel pipe
- The riser pipe shall be non-perforated with a skimmer attached to the bottom of the pipe 1 ft. from the bottom of the basin
- NCDENR - Erosion and Sediment Control Planning and Design Manual design criteria

- Skimmer Basins shall provide adequate silt storage for 1800 cubic feet per disturbed acre with surface area equal to 325 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using the 10-year peak rainfall data (NCDENR - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html for partial duration (ARI) time series type). A Skimmer Basin Designer Spreadsheet will be provided by the NCDOT (REU) upon request.
- For sediment basins located in the watershed of Lake Norman and Byers Creek, the 25-year peak inflow rate, Q25, shall be used using the 25-year peak rainfall data (NCDENR - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html for partial duration (ARI) time series type).
- The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively.
- Coir Fiber Baffles shall be installed in all silt basins and sediment dams at drainage outlets. For silt basins with a 20-foot or longer length, three Coir Fiber Baffles shall be installed with a spacing of 1/4 the basin length. For silt basins with a length less than 20 feet, a minimum of two Coir Fiber Baffles shall be installed, with a spacing of 1/3 the basin length. Developer will not be required to show the individual baffles on the Erosion Control Plans, but shall be required to incorporate the Coir Fiber Baffle Detail on the Erosion Control Plans.
- Include any culvert and/or pipe construction sequence plan sheets in the Clearing & Grubbing Erosion Control Plans; all pipes 48" or larger, or any combination of pipes that total 48" or more require a construction sequence. Prior to installation of pipes smaller than 48 inches in jurisdictional areas, Developer shall submit a phasing plan for managing the watercourse to the NCDOT for review and acceptance. The phasing plan shall be in accordance with the Best Management Practices for Construction and Maintenance Activities.
- Incorporate temporary sediment basins into permanent stormwater devices.
- Utilize Coir Fiber Wattles with Polyacrylamide (PAM) and/or TRSC-As with Matting and PAM in temporary and permanent, existing and proposed ditches at a spacing of 50 feet in areas where sediment basins are not feasible at drainage outlets, and in areas where sediment basins at drainage outlets with sediment traps (i.e. PIST-A, RIST-A, etc.), cannot be properly sized to surface area and/or sediment storage requirements due to safety concerns, right of way restrictions, utility conflicts or other construction limitations approved by the Roadside Environmental Unit.
- Do not place erosion control devices that require excavation (i.e. basins, silt ditches, etc.) in wetlands or buffer zones.

3. Final Grade Phase

- Use correct NCDOT symbology
- Protect existing and proposed drainage structure inlets with RIST-A, RIST-C, PIST-A, etc.
- Utilize adequate perimeter controls (TSD, TSF, etc.)

- Utilize TRSC-Bs to reduce velocity in existing and proposed ditches with spacing of 250 feet divided by percentage of ditch grade. Also utilize TRSC-Bs in proposed TSDs and TDs
- Utilize temporary slope drains and earth berms at top of fill slopes 8 feet or higher and a fill slope grade of 3:1 or steeper, or where there are superelevations above 0.04 and fills are greater than 5 feet. Maximum slope drain spacing shall be 200 feet.
- Utilize rock energy dissipater and/or silt basin at outlet of slope drain
- Devices at all drainage turnouts shall utilize skimmer or sediment control stone (TRSD-B, TRSC-A, etc.) and a spillway with an adequately designed base length to distribute outflow
- Provide adequate silt storage for 3600 cubic feet per disturbed acre and sediment basins shall be sized with surface area equal to 435 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using 10-year peak rainfall data (*NCDENR - Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html for partial duration (ARI) time series type). A Sediment Basin Designer Spreadsheet will be provided by NCDOT REU upon request
- Provide matting for erosion control in all ditch lines, including but not limited to temporary ditch lines (TDs) utilized to divert offsite runoff around construction areas, where the velocity is greater than 2.0 ft/s, and the shear stress is 1.55 psf or less. For ditch lines with a shear stress above 1.55 psf, Permanent Soil Reinforcement Mat or Rip Rap shall be utilized
- Provide matting for erosion control on all fill slopes 2:1 or steeper
- Design Riser Basins to the following standards:
- Surface Area shall be determined by Equation A(sq. feet) = Q10(cfs) * 435
- Volume requirement shall be 1800 cubic feet per disturbed acre draining to the riser basin
- Riser Pipe shall have a cross-sectional area 1.5 times that of the barrel pipe
- The riser pipe shall be non-perforated with a skimmer attached to the bottom of the pipe 1 ft. from the bottom of the basin
- See NCDENR - *Erosion and Sediment Control Planning and Design Manual* for additional design criteria
- Skimmer Basins shall provide adequate silt storage for 1800 cubic feet per disturbed acre with surface area equal to 325 square feet per cubic foot per second (cfs) of the peak inflow rate, Q10, using the 10-year peak rainfall data (*NCDENR - Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html for partial duration (ARI) time series type). A Sediment Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit (REU) upon request
- For sediment basins located in the watershed of Lake Norman and Byers Creek, the 25-year peak inflow rate, Q25, shall be used using the 25-year peak rainfall data (NCDENR - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html for partial duration (ARI) time series type).

- The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively
- Coir Fiber Baffles shall be installed in all silt basins and sediment dams at drainage outlets. For silt basins with a 20-foot or longer length, three Coir Fiber Baffles shall be installed with a spacing of 1/4 the basin length. For silt basins with a length less than 20 feet, a minimum of two Coir Fiber Baffles shall be installed, with a spacing of 1/3 the basin length. Developer will not be required to show the individual baffles on the Erosion Control Plans, but shall be required to incorporate the Coir Fiber Baffle Detail on the Erosion Control Plans
- Incorporate temporary sediment basins into permanent stormwater devices
- Utilize Coir Fiber Wattles with Polyacrylamide (PAM) and/or TRSC-As with Matting and PAM in temporary and permanent, existing and proposed ditches at a spacing of 50 feet in areas where sediment basins are not feasible at drainage outlets, and in areas where sediment basins at drainage outlets with sediment traps (i.e. PIST-A, RIST-A, etc.), cannot be properly sized to surface area and/or sediment storage requirements due to safety concerns, right of way restrictions, utility conflicts or other construction limitations approved by the Roadside Environmental Unit.
- Do not place erosion control devices that require excavation (i.e. basins, silt ditches, etc.) in wetlands or buffer zones.
- Streambank Reforestation for mitigation shall be shown as a cross hatched pattern and extend 50 ft. from the top of the stream bank.

4. Supplemental Phase

- Supplemental Erosion Control Plans shall consist of design modifications and/or site conditions require additional erosion control design or design revisions to the RFC Clearing and Grubbing and/or RFC Final Grade Erosion Control Plans. Intermediate Plans shall be submitted for review and shall be accepted prior to construction of any aspect impacted by the revised erosion control design. For any intermediate phase, comply with Section B, “Final Grade Phase” above.

4.1 Detail Sheets and Notes

- Provide Project specific special notes and details such as temporary rock silt check type B, coir fiber baffle, skimmer basin, coir fiber wattle with Polyacrylamide (PAM), etc.
- Provide matting summary sheet(s): matting for erosion control and permanent soil reinforcement mat
- Provide reforestation sheet(s): regular, wetland, stream bank and/or buffer showing appropriate species

5. Title Sheet

- Show correct notes: HQW, ESA, clearing and grubbing, etc.
- Show correct standards for Project
- Standard NCDOT symbols
- Show name and certification number of Level IIIA certified individual responsible for designing and/or reviewing Erosion and Sedimentation Control Plans

6. Special Provisions

- Erosion Control Special Provisions are available at the following website

  http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/soil_water/special_provisions/

- References in Erosion Control Special Provisions from the aforementioned website to Method of Measurement, Basis of Payment, or any other statement regarding direct payment for Erosion & Sediment Control measures shall be disregarded

- Developer shall comply with and incorporate into contracts for the Initial Build Exhibit 13-02 of Technical Provisions titled "Erosion and Sediment Control/Stormwater Certification".

7. Miscellaneous

- Plan Submittals shall include all pertinent design information required for review, such as design calculations, drainage areas, etc.

- NCDOT will provide a sample set of Erosion and Sedimentation Control Plans (including any special details or special provisions used by NCDOT) and MicroStation Erosion Control Workspace to Developer for reference upon request.

- Plans shall address any environmental issues raised during the permitting process.

- Sufficient time shall be allowed for Developer to make any changes to the Erosion and Sedimentation Control Plans deemed necessary by NCDOT.

- Temporary access and haul roads, other than public roads, constructed or used in connection with the Project shall be considered a part of the Project and addressed in the Erosion and Sedimentation Control Plans.

- Borrow or waste areas that are part of the Project shall require a separate Reclamation Plan, unless the borrow activity or waste activity is regulated under the *Mining Act of 1971*, or is a landfill regulated by the Division of Solid Waste Management (NCDENR). Developer shall submit the permit number for waste and/or borrow sites covered by the Mining Act or regulated by DSWM (NCDENR) concurrently to NCDOT. For Reclamation Procedures, see:

- http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/fieldops/downloads/Files/ContractedReclamationProcedures.pdf

- Whenever NCDOT determines that significant erosion and sedimentation continues despite the installation of approved protective practices, Developer shall be required to and shall take additional protective action.

- An accepted Erosion and Sedimentation Control Plan does not exempt Developer from making every effort to contain sediment onsite.

- any erosion control design revisions made during the construction of the Project shall be submitted to NCDOT by the 15th of the month. When significant changes are made to the Project design that affects the Erosion and Sedimentation Control Plans and at other times requested by the NCDOT, not to exceed four times per year, Developer shall provide an updated version of the Erosion and Sedimentation Control Plans for distribution to all parties involved in the construction process.

- comply with the North Carolina Administrative Code Title 15 A Department of Environment and Natural Resources Chapter 4, Sediment Control.

- A pre-design meeting shall take place between the NCTA, NCDOT REU Soil & Water Engineering Section, Developer, and any other pertinent NCDOT personnel before any Erosion and Sedimentation Control Designs are submitted to NCDOT REU. Erosion and Sedimentation Control Plan Submittals shall only be reviewed and accepted by NCDOT after the Erosion Control Pre-Design Meeting. Developer shall be required to submit a tentative Erosion and Sedimentation Control Plan Submittal schedule at the pre-design meeting.
- At minimum, Developer shall bring one erosion control plan sheet with a Clearing & Grubbing erosion control design to the Erosion and Sedimentation Control Plan pre-design meeting.
- All RFC Erosion and Sedimentation Control Plans, including any red line revisions, shall be kept on site at all times throughout the duration of the Project.
- Erosion Control and/or Stormwater Certification shall be required according to the Project Special Provision in the CA Documents.
- Prior to installation of any erosion control devices, Developer shall verify boundaries of jurisdictional areas in the field and delineated with Safety Fence.
- Once RFC Erosion and Sedimentation Control Plans are issued, any major design change or addition, any change that involves calculations, and any addition, deletion, or relocation of a sediment basin shall be submitted to the NCDOT REU for review and acceptance. Minor changes such as moving silt fence, adding or moving temporary ditches (unless adding new flow to a sediment basin), and adding or moving slope drains shall be reviewed by NCDOT in the field.
- Sediment basins that drain directly into jurisdictional water or have a total drainage area of one acre or more shall be designed and constructed with outlet structures that only withdraw water from the surface. For sediment basins that do not drain directly into jurisdictional water or have less than one acre of total drainage area, surface dewatering outlets and stone outlets may be provided.

8. Groundcover Stabilization

Developer's plans shall include requirement for the following:

8.1 General

- Ground cover stabilization shall comply with the timeframe guidelines specified by the North Carolina Department of Environment and Natural Resources Division of Water Quality NCG-010000 General Construction Permit that became effective on August 3, 2011. Excluding the slopes noted below, temporary and permanent ground cover stabilization shall be provided within seven calendar days from the last land-disturbing activity. Developer shall label all slopes subject to the seven-day ground cover stabilization requirements on all Erosion and Sedimentation Control Plans submitted to the NCDOT for review and acceptance.

8.2 Stabilization Schedule and Type

- For the slopes noted below, temporary and permanent ground cover stabilization shall be provided within 14 calendar days from the last land-disturbing activity:
- Slopes between 2:1 and 3:1, with a slope length of ten feet or less
- Slopes 3:1 or flatter, with a slope length of 50 feet or less

- Slopes 4:1 or flatter
- Temporary and permanent ground cover stabilization shall be provided in accordance with the Vegetation Management Plan developed by Developer.
- Ground cover stabilization shall be done in accordance with the following:

8.2.1 Short Term Stabilization: For areas that will remain inactive for up to 21 days

Erodible areas shall be stabilized utilizing non-vegetative cover. Non-vegetative cover options include straw mulch, hydraulic applied erosion control products or rolled erosion control products. If straw mulch is used, it shall provide 100% groundcover and be tacked sufficiently to hold the mulch in place for the duration of the inactive period. All other methods shall be installed according to the manufacturer's directions.

8.2.2 Mid-Term Stabilization: For areas that will remain inactive for up to 90 days

Erodible areas shall be stabilized utilizing the following stabilization protocol:

August 1 – June 1	May 1 – September 1
25# Rye Grain	10# German or Browntop Millet
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

At the Engineer's sole discretion, the use of limestone on sandy soils that require topsoil for stabilization may be eliminated. Developer shall consult with, and obtain approval from, the Roadside Environmental Unit prior to eliminating limestone.

Upon obtaining approval from the Engineer, Developer may use wood mulch and / or ground clearing and grubbing debris as an option for Mid-Term Stabilization. If approved, the aforementioned mulch and / or debris shall be installed at a thickness that prevents erosion.

8.2.3 Long Term Stabilization: For areas that will remain inactive for more than 91 days

Erodible areas shall be stabilized utilizing the following stabilization protocol:

Shoulder and Median Areas

January 1 – December 31

75# Hard Fescue Cultivars *

20# Kentucky Bluegrass Cultivars **

500# Fertilizer

4000# Limestone

Areas Beyond Mowing Pattern, Waste and Borrow Areas

January 1 – December 31

100# Tall Fescue Cultivars ***

15# Kentucky Bluegrass Cultivars **

30# Hard Fescue Cultivars *

500# Fertilizer

4000# Limestone

*** Approved Hard Fescue Cultivars**

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

**** Approved Kentucky Bluegrass Cultivars**

Alpine	Bariris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

***** Approved Tall Fescue Cultivars**

2nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo

Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

From January 1 – December 31, Developer shall apply an additional 20# of Sericea Lespedeza on cut and fill slopes 2:1 or steeper.

Fertilizer shall be 10-20-20 analysis or a different analysis that provides a 1-2-2 ratio applied at a rate that provides the same amount of plant food as a 10-20-20 analysis and as directed.

8.3 Additional Requirements

8.3.1 Soil Analysis

- If vegetation establishment indicates a deficiency in soil nutrients or an incurred pH level is present, Developer shall take soil samples and apply additional soil amendments to the affected area and as directed.

8.3.2 Fertilizer

In accordance with the requirements noted below, Developer shall apply a minimum of one Fertilizer Topdressing application to all permanently seeded areas, and as directed, prior to completion of the project and during every growing season from April 1st through September 31st.

Prior to completion of the project and once during every growing season from April 1st through September 31st, Developer shall apply a minimum of one Fertilizer Topdressing application, in accordance with the requirements noted below, to all permanently seeded areas and as directed.

Developer shall comply with the following:

- fertilizer used for topdressing on all roadway areas except slopes 2:1 and steeper shall be 10-20-20 analysis applied at a rate of 500 pounds per acre; or a different analysis that provides a 1-2-2 ratio applied at a rate that provides the same amount of plant food as a 10-10-20 analysis and as directed.
- fertilizer used for topdressing on slopes 2:1 and steeper and waste and borrow areas shall be 16-8-8 grade applied at a rate of 500 pounds per acre; or a different analysis that provides a 2-1-1 ratio applied at a rate that provides the same amount of plant food as a 16-8-8 analysis and as directed.

8.3.3 Supplemental Seeding

- specify the kinds of seed and proportions shall be the same as specified above for *Long Term Stabilization* for all supplemental seeding, with the exception that centipede seed will not be allowed in the seed mix and the rate of application for supplemental seeding shall be between 25# to 75# per acre. Prior to topdressing, Developer shall determine the actual rate per acre for supplemental seeding and submit the supplemental seeding rate and areas to the NCDOT for review and acceptance.

- to prevent disturbance of existing vegetation, require the use of minimum tillage equipment, consisting of a sod seeder, shall be used to incorporate seed into the soil where degree of slope allows. Where degree of slope prevents the use of a sod seeder, a clodbuster (ball and chain) may be used.

Exhibit 16-01

Norfolk Southern Railway Co. Agreement Form

NORTH CAROLINA

_____ COUNTY

THIS AGREEMENT, made this _____ day of _____, 20_____ by and between Norfolk Southern Railway Company, a corporation of the State of Virginia, herein called "Railroad", and the Department of Transportation, an agency of the State of North Carolina, acting by and through its Chief Engineer, herein called "Department";

WHEREAS Department proposes to _____ beginning at Station _____ running in a _____ direction over the tracks of Norfolk Southern Railway Company to Station _____, identified for preliminary engineering as State Project _____ (____) and Federal Project _____ in _____ County and in connection therewith proposes to construct a crossing at a separated grade, referred to herein as the “overhead” _____ and appurtenant works across Railroad's right-of-way, tracks and other facilities near Railroad Milepost _____ and Highway Survey Station _____ in accordance with plans and specifications prepared by Department and approved by Railroad, all herein collectively called "proposed work"; and

WHEREAS, the "proposed work" as used in this Agreement refers to all construction affecting Railroad in the proposed highway project which includes the construction of the proposed overhead, approaches, and the drainage facilities, all as indicated on the plans and applicable changes in communication, signal and electric lines and appurtenances as shown on Railroad drawing _____ dated _____ and marked Exhibit "B", attached hereto and any and all other work of any kind or character necessary to accomplish the construction of the overhead, approaches, and the drainage facilities; and

WHEREAS, the parties desire to set forth in this Agreement their understanding and agreements relating to the construction, maintenance and allocation of costs of said proposed work and the changes made necessary in connection therewith;

NOW, THEREFORE, the parties hereto agree as follows:

ARTICLE I

In consideration of covenants and conditions to be fulfilled by the Department as hereinafter set forth, RAILROAD AGREES:

1. Insofar as it legally may, to give and to grant and hereby does give or grant to the Department, its agents and contractors, easements across Railroad's right-of-way for the proposed work as shown on Railroad drawing _____ dated _____ and marked Exhibit "C", attached hereto and made a part hereof to construct the overhead, approaches, and drainage facilities, to remove _____ _____ and to use and maintain a grade separation structure across the Railroad's right of way, tracks and other facilities.

2. To furnish all labor, materials, tools and equipment and to perform all work required to make changes in its alignment, location or elevation of telephone, pipe and signal lines over and/or

under its right of way, property, track and other facilities _____ as may become necessary by reason of the construction of said overhead, and to comply with the provisions of Federal-Aid Policy Guide 23 CFR 140I and 23 CFR 646B except for such deviations as are approved by the Department in writing.

3. To perform all work required to be done by Railroad under this Agreement with Railroad's forces working under Railroad Labor Agreements; and said work shall be done on a force account basis, or by contract, subject to the provisions of Federal-Aid Policy Guide 23 CFR 140I except for such deviations as are approved by the Department in writing, the cost thereof to be paid to Railroad by Department in the manner hereinafter set forth.

4. To furnish such watchmen and flagmen as Railroad deems necessary for the safety of Railroad property or the movement of its trains during the progress of the work.

5. To furnish a detailed and itemized estimate of the cost of the work to be performed by the Railroad, which shall be incorporated herein and made a part hereof, whether or not attached, and designated as Exhibit "A".

6. To present, insofar as possible, final billing within one hundred twenty (120) days after completion of work performed by Railroad at expense of Department on the basis of detailed and itemized statement of cost for items set forth in the said force account estimate, marked Exhibit "A", and in accordance with and subject to the terms and provisions of the Federal-Aid Policy Guide 23 CFR 140I, Railroad may present monthly progress bills to Department for work as completed, and the final payment will be made in the amount of the difference between the sum of the monthly payments made and the itemized audited statements for the total amount of the work performed by Railroad upon completion of the work. In the event of over-payment, Railroad shall refund to Department such excess.

ARTICLE II

In consideration of the covenants and conditions to be fulfilled by Railroad as herein set forth, DEPARTMENT AGREES:

1. To prepare plans and specifications, including special provisions, for said proposed overhead work, and all work incidental thereto. Said plans, specifications and special provisions are to be approved by the parties prior to the commencement of construction and are hereby made a part of this Agreement by reference, whether or not attached hereto.

2. To acquire all rights of way necessary for the construction of the proposed work.

3. To make any and all arrangements with Railroad and others that may be necessary for the location of wire lines, pipe lines and other facilities not owned by the Railroad.

4. To furnish or cause to be furnished all labor, materials, tools and equipment and to construct the proposed work, except such work as is to be performed by Railroad, in accordance with the approved plans and specifications.

5. To require Department's contractor, in respect to this work performed upon, over or under Railroad's right of way, to comply with all environmental laws and regulations (including sedimentation and erosion control), and to provide Railroad Protective Liability Insurance in the form set forth in the Special Provisions.

A. No work shall be started on Railroad property until:

1. Certificates of contractor's public liability and property damage insurance have been furnished to Railroad.

2. Original copy of Railroad Protective Insurance Policy is furnished to Railroad.

3. Railroad has advised Department that limits, form and substance of insurance policy and certificates of insurance are satisfactory to Railroad.

B. That public liability and property damage policy shall be kept in full force and effect by Department's contractor during the performance of said work upon Railroad's property and thereafter until completion and acceptance of the project.

6. To give, or to require its contractor and agents to give, ten (10) days written notice to Railroad's Chief Engineer – Bridges & Structures before commencing work in connection with said proposed work upon Railroad property; and to require contractor to give no less than 72 hours notice to Railroad prior to conducting blasting operations within these limits.

7. To require all work on said project to be performed in a manner that will not endanger the safety of the Railroad or unduly interfere with the operation thereof. If, in the opinion of Railroad, the operation of Department's contractor is endangering the safety of Railroad's operation, Railroad may, through the Department, order immediate termination of further work on Railroad's premises, without liability on Railroad's part, until the dangerous condition has been corrected.

8. To reimburse Railroad promptly upon receipt of bills for cost of work done by Railroad forces compiled and incurred in accordance with the provisions of this Agreement, subject to the conditions of Article III, Paragraph 2, of this Agreement.

A. PROVIDED, however, that should some unforeseen condition or combination of conditions create additional work to be performed by Railroad causing increased costs exceeding the total cost as set forth in the original estimate, marked Exhibit "A", Railroad shall continue to furnish the Department for payment partial billings for the cost incurred and furnish the Department within 120 days after reaching the total costs set forth in the original estimate, a supplemental estimate reflecting the increased cost incurred and any additional cost anticipated. An all inclusive final force account bill may be submitted within the 120 days period in lieu of a supplemental estimate.

B. PROVIDED, further that in the event Department shall for any reason cancel or terminate its contract and abandon the construction of said overhead or in the event Department's contractor shall stop work thereon for a period of sixty (60) calendar days, other than seasonal suspensions authorized by Department, for reason over which the Department or contractor has no control, and Department has not prepared to relet or resume work under the contract, Railroad shall have the right after due notice to Department to restore its property to the condition existing prior to commencement of work on said overhead, and Department agrees to reimburse Railroad for all expenses incurred by Railroad for such restoration by Railroad.

ARTICLE III

DEPARTMENT AND RAILROAD mutually agree:

1. That all work contemplated in this Agreement shall be mutually scheduled and coordinated, commenced promptly and completed without undue delay. All work shall be performed in a good and workmanlike manner.

2. It is the intent of this Agreement that Railroad shall be reimbursed for all costs and expenses incurred by Railroad as provided in this Agreement for work performed in accordance with the plans and the force account estimate (Exhibit "A") and any changes therein authorized by the Department, notwithstanding that any item of such cost or expenses may be disallowed by the Federal Highway Administration.

3. That no benefit will accrue to Railroad pursuant to the provisions of Title 23 of the U. S. Code (Highways) as amended and Federal-Aid Policy Guide 23 CFR 646B due to the construction of said overhead, inasmuch as the construction will be a separation structure for a new highway crossing an existing railroad, in view of which there will be no Railroad contribution.

3. There will be a benefit to the Railroad as a result of the construction of the proposed overhead and the elimination of the existing at-grade crossing at the proposed construction site. It has been determined in accordance with the provisions of the Federal-Aid Policy Guide 23 CFR 646B that the amount of benefit to the Railroad as mentioned above will be five (5) percent of the cost for preliminary engineering and construction of the overhead and approaches, and the earthwork involved for a change in grade from Station _____ to Station _____ necessary to provide the required vertical clearance beneath the overhead and that the Railroad will contribute to the cost of the project five (5) percent of the final cost of the work described above, plus (5) percent of the force account estimate marked Exhibit "A".

4. That after completion of the overhead, Department shall, at its own cost and expense, maintain and make all necessary repairs to the superstructure and substructure of the overhead, the handrails therefore, as well as the wearing surface of the highway on said overhead, approaches, and drainage facilities. IT IS EXPRESSLY UNDERSTOOD, that this Agreement is intended to cover ordinary maintenance only and not intended to obligate either party in the event changed conditions or major deteriorations should require a new overhead Bridge or major repairs.

5. The Railroad and its contractors are to maintain all books, documents, papers, accounting records and other evidence pertaining to costs incurred and to make such materials available at their respective office at all reasonable times during the contract period and for 3 years from the date of final payment for inspection by the Department, Federal Highway Administration or any authorized representative of the Federal Government and copies thereof shall be furnished if requested.

6. That this Agreement shall be binding upon and inure to the benefit of the Railroad, its successors and assigns, and upon and to the benefit of the Department of Transportation, its successors and assigns.

7. That it is specifically understood and agreed that the rights to the use and control of the area or space above said overhead which exceed reasonable requirements for highway purposes have not been determined and are not affected by execution of this Agreement, and both the Railroad and Department reserve the right to have the use and control of such air rights judicially determined at a future date.

8. Upon the date of acceptance of said project by the Department, any rights granted by temporary construction easement which may be herein granted shall be extinguished.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement in duplicate the day and year first above written.

ATTEST:

NORFOLK SOUTHERN RAILWAY COMPANY

By_____ By _____

Assistant Secretary General Manager

SEAL:

DEPARTMENT OF TRANSPORTATION

By _____

Chief Engineer

SEAL:

APPROVED AS TO FORM AND EXECUTION

By _____

Assistant Attorney General

EXAMINED AND APPROVED:

_____

Date

By _____

Division Administrator - FHWA

Exhibit 16-02

CSX Transportation Inc. Agreement Form

NORTH CAROLINA

_____ COUNTY

THIS AGREEMENT, made this _____ day of _____, 20_____ by and between CSX Transportation Inc., a corporation of the State of Virginia, herein called "Railroad", and the Department of Transportation, an agency of the State of North Carolina, acting by and through its Chief Engineer, herein called "Department";

WHEREAS Department proposes to _____ beginning at Station _____ running in a _____ direction over the tracks of CSX Transportation, Inc. to Station _____, identified for preliminary engineering as State Project _____ (____) and Federal Project _____ in _____ County and in connection therewith proposes to construct a crossing at a separated grade, referred to herein as the “overhead” _____ and appurtenant works across Railroad's right of way, tracks and other facilities near Railroad Milepost _____ and Highway Survey Station _____ in accordance with plans and specifications prepared by Department and approved by Railroad, all herein collectively called "proposed work"; and

WHEREAS, the "proposed work" as used in this Agreement refers to all construction affecting Railroad in the proposed highway project which includes the construction of the proposed overheads, approaches, and the drainage facilities, all as indicated on the plans and applicable changes in communication, signal and electric lines and appurtenances as shown on Railroad drawing _____ dated _____ and marked Exhibit "B", attached hereto and any and all other work of any kind or character necessary to accomplish the construction of the grade separations, approaches, and the drainage facilities; and

WHEREAS, the parties desire to set forth in this instrument their understanding and agreements relating to the construction, maintenance and allocation of costs of said proposed work and the changes made necessary in connection therewith;

NOW, THEREFORE, the parties hereto agree as follows:

ARTICLE I

In consideration of covenants and conditions to be fulfilled by the Department as hereinafter set forth, RAILROAD AGREES:

1. Insofar as it legally may, to give and to grant and hereby does give or grant to the Department, its agents and contractors, easements across Railroad's right of way for the proposed work as shown on Railroad drawing _____ dated _____ and marked Exhibit "C", attached hereto and made a part hereof to construct the overhead, approaches, and drainage facilities, to remove _____ _____ and to use and maintain a grade separation structure across the Railroad's right of way, tracks and other facilities.

2. To furnish all labor, materials, tools and equipment and to perform all work required to make changes in its alignment, location or elevation of telephone, pipe and signal lines over and/or under its right of way, property, track and other facilities _____ as may

become necessary by reason of the construction of said work, and to comply with the provisions of Federal-Aid Policy Guide 23 CFR 140I and 23 CFR 646B except for such deviations as are approved by the Department in writing.

3. To perform all work required to be done by Railroad under this Agreement with Railroad's forces working under Railroad Labor Agreements; and said work shall be done on a force account basis, or by contract, subject to the provisions of Federal-Aid Policy Guide 23 CFR 140I except for such deviations as are approved by the Department in writing, the cost thereof to be paid to Railroad by Department in the manner hereinafter set forth.

4. To furnish such watchmen and flagmen as Railroad deems necessary for the safety of Railroad property or the movement of its trains during the progress of the work.

5. To furnish a detailed and itemized estimate of the cost of the work to be performed by the Railroad, which shall be incorporated herein and made a part hereof, whether or not attached, and designated as Exhibit "A".

6. To present, insofar as possible, final billing within one hundred twenty (120) days after completion of work performed by Railroad at expense of Department on the basis of detailed and itemized statement of cost for items set forth in the said force account estimate, marked Exhibit "A", and in accordance with and subject to the terms and provisions of the Federal-Aid Policy Guide 23 CFR 140I, Railroad may present monthly progress bills to Department for work as completed, and the final payment will be made in the amount of the difference between the sum of the monthly payments made and the itemized audited statements for the total amount of the work performed by Railroad upon completion of the work. In the event of over-payment, Railroad shall refund to Department such excess.

7. Only if necessary for construction, to construct a temporary grade crossing across the tracks of CSX Transportation at a point agreed upon by NCDOT Engineer and CSX Engineer. The temporary crossing will be used for the transportation of materials or equipment across the tracks of CSX for the construction of the aforesaid project. NCDOT or NCDOT's contractor will cause or have caused the temporary crossing to be barricaded on either side of the tracks during the periods not being used for construction or inspections. The barricades will be used until such time as the crossing is removed at the completion of construction of the project. NCDOT will be responsible for all cost to construct and remove the temporary crossing.

ARTICLE II

In consideration of the covenants and conditions to be fulfilled by Railroad as herein set forth, DEPARTMENT AGREES:

1. To prepare plans and specifications, including special provisions, for said proposed overhead work, and all work incidental thereto. Said plans, specifications and special provisions are to be approved by the parties prior to the commencement of construction and are hereby made a part of the Agreement by reference, whether or not attached hereto.

2. To acquire all rights of way necessary for the construction of the proposed work.

3. To make any and all arrangements with Railroad and others that may be necessary for the location of wire lines, pipe lines and other facilities not owned by the Railroad.

4. To furnish or cause to be furnished all labor, materials, tools and equipment and to construct the proposed work, except such work as is to be performed by Railroad, in accordance with the approved plans and specifications.

5. To require Department's contractor, in respect to this work performed upon, over or under Railroad's right of way, to comply with all environmental laws and regulations (including sedimentation and erosion control), and to provide Railroad Protective Liability Insurance in the form set forth in the Special Provisions.

A. No work shall be started on Railroad property until:

1. Certificates of contractor's public liability and property damage insurance have been furnished to Railroad.

2. Original copy of Railroad Protective Insurance Policy is furnished to Railroad.

3. Railroad has advised Department that limits, form and substance of insurance policy and certificates of insurance are satisfactory to Railroad.

B. That public liability and property damage policy shall be kept in full force and effect by Department's contractor during the performance of said work upon Railroad's property and thereafter until completion and acceptance of the project.

6. To give, or to require its contractor and agents to give, thirty (30) days written notice to Railroad's Chief Engineer before commencing work in connection with said proposed work upon Railroad property; and to require contractor to give no less than 10 days notice to Railroad prior to conducting blasting operations within these limits.

7. To require all work on said project to be performed in a manner that will not endanger the safety of the Railroad or unduly interfere with the operation thereof. If, in the opinion of Railroad, the operation of Department's contractor is endangering the safety of Railroad's operation, Railroad may, through the Department, order immediate termination of further work on Railroad's premises, without liability on Railroad's part, until the dangerous condition has been corrected.

8. To reimburse Railroad promptly upon receipt of bills for cost of work done by Railroad forces compiled and incurred in accordance with the provisions of this Agreement, subject to the conditions of Article III, Paragraph 2, of this Agreement.

A. PROVIDED, however, that should some unforeseen condition or combination of conditions create additional work to be performed by Railroad causing increased costs exceeding the total cost as set forth in the original estimate, marked Exhibit "A", Railroad shall continue to furnish the Department for payment partial billings for the cost incurred and furnish the Department within 120 days after reaching the total costs set forth in the original estimate, a supplemental estimate reflecting the increased cost incurred and any additional cost anticipated. An all inclusive final force account bill may be submitted within the 120 days period in lieu of a supplemental estimate.

B. PROVIDED, further that in the event Department shall for any reason cancel or terminate its contract and abandon the construction of said structure or in the event Department's contractor shall stop work thereon for a period of sixty (60) calendar days, other than seasonal suspensions authorized by Department, for reason over which the Department or contractor has no control, and Department has not prepared to relet or resume work under the contract, Railroad shall have the right after due notice to Department to restore its property to the condition existing prior to commencement of work on said structure, and Department agrees to reimburse Railroad for all expenses incurred by Railroad for such restoration by Railroad.

ARTICLE III

DEPARTMENT AND RAILROAD mutually agree:

1. That all work contemplated in this Agreement shall be mutually scheduled and coordinated, commenced promptly and completed without undue delay. All work shall be performed in a good and workmanlike manner.

2. It is the intent of this Agreement that Railroad shall be reimbursed for all costs and expenses incurred by Railroad as provided in this Agreement for work performed in accordance with the plans and the force account estimate (Exhibit "A") and any changes therein authorized by

the Department, notwithstanding that any item of such cost or expenses may be disallowed by the Federal Highway Administration.

3. That no benefit will accrue to Railroad pursuant to the provisions of Title 23 of the U. S. Code (Highways) as amended and Federal-Aid Policy Guide 23 CFR 646B due to the construction of said overhead structure, inasmuch as the construction will be a separation structure for a new highway crossing an existing railroad, in view of which there will be no Railroad contribution.

3. There will be a benefit to the Railroad as a result of the construction of the proposed structure and the elimination of the existing at-grade crossing at the proposed construction site. It has been determined in accordance with the provisions of the Federal-Aid Policy Guide 23 CFR 646B that the amount of benefit to the Railroad as mentioned above will be five (5) percent of the cost for preliminary engineering and construction of the structure and approaches, and the earthwork involved for a change in grade from Station _____ to Station _____ necessary to provide the required vertical clearance beneath the structure and that the Railroad will contribute to the cost of the project five (5) percent of the final cost of the work described above, plus (5) percent of the force account estimate marked Exhibit "A".

4. That after completion of the overheads, Department shall, at its own cost and expense, maintain and make all necessary repairs to the superstructure and substructure of the Bridge, the handrails therefore, as well as the wearing surface of the highway on said overheads, approaches, and drainage facilities.

5. The Railroad and its contractors are to maintain all books, documents, papers, accounting records and other evidence pertaining to costs incurred and to make such materials available at their respective office at all reasonable times during the contract period and for 3 years from the date of final payment for inspection by the Department, Federal Highway Administration or any authorized representative of the Federal Government and copies thereof shall be furnished if requested.

6. That this Agreement shall be binding upon and inure to the benefit of the Railroad, its successors and assigns, and upon and to the benefit of the Department of Transportation, its successors and assigns.

7. That it is specifically understood and agreed that the rights to the use and control of the area or space above said Bridge which exceed reasonable requirements for highway purposes have not been determined and are not affected by execution of this Agreement, and both the Railroad and Department reserve the right to have the use and control of such air rights judicially determined at a future date.

8. Upon the date of acceptance of said project by the Department, any rights granted by temporary construction easement which may be herein granted shall be extinguished. IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement in duplicate the day and year first above written.

ATTEST:

CSX TRANSPORTATION, INC.

By_____ By _____

Assistant Secretary Vice President

SEAL:

DEPARTMENT OF TRANSPORTATION

By _____

Chief Engineer

SEAL:

APPROVED AS TO FORM AND EXECUTION

By _____

Assistant Attorney General

EXAMINED AND APPROVED:

_____

Date

By _____

Division Administrator - FHWA

Exhibit 16-03

Railroad Memorandum of Understanding, Letter and Related Drawings

Memorandum of Understanding

This Memorandum of Understanding between the North Carolina Department of Transportation (NCDOT) and Norfolk Southern Corporation (NSC) serves to assist the Developer's understanding of what can be reasonably expected from the Railroad during the progression of the NCDOT I-77 HOT Lanes Public Private Partnership (PPP) Project in Charlotte, NC. Unless otherwise proposed by the Developer and agreed upon by NSC, by signing this Memorandum, both parties acknowledge that the following conditions have been discussed and agreed upon:

- The proposed bridge widening will not encroach on the existing horizontal and vertical clearances to the two (2) NSC tracks (reference Pages 5 and 6 of 10 for eastern extension of Bent #14 and Pages 7 and 8 of 10 for western extension of Bent #15). Please also note that these clearances were established contemplating a third NSC track under the bridge.

- Crashwalls are proposed to be constructed along the existing bridge piers as well as the proposed pier extensions where horizontal clearances with NSC are less than the 25' minimum and these locations are noted on the drawings.

- To aid in the production process, we request that NSC agree to provide all necessary plan, agreement, and other such reviews within 45 days of submittal.

- During construction, the Developer shall follow all regular Railroad Policies with respect to track vicinity work, flagging, etc.

Signature: _____ Date: 2-4-14
(Dave Wyatt – Norfolk Southern Corporation)

Signature: _____ Date: 2/7/14
(NCDOT Signing Authority)

Benjamin P. Biesterveld
Project Manager II – Public Projects
1610 Forest Avenue, Suite 120
Richmond, VA 23229
804-226-7718
Benjamin_Biesterveld@csx.com

March 10, 2014

Mr. Rodger Rochelle
Director of Transportation Program Management
North Carolina Department of Transportation
1595 Mail Service Center
Raleigh, NC 27699-1595

Subject: Charlotte, Mecklenburg County, North Carolina – Proposed widening of I-277 Bridge over CSX, DOT# 631 405 U; Milepost SF-330.64, Florence Division, Charlotte Subdivision, CSXT OP# NC0726; NCDOT Project No. 34181.1.7 (I-3311C)
CSXT Acceptance of Preliminary Design Layout

Dear Mr. Rochelle:

CSXT has reviewed the December 16, 2014 North Carolina Department of Transportation (NCDOT) submission and subsequent January 10, 2014 submission from TGS Engineers, and takes no exceptions to NCDOT continuing development of the subject project as shown on the provided preliminary plans, including the minimum horizontal clearances shown below.

EXISTING AND PROPOSED HORIZONTAL CLEARANCES					
From	**To**	**Existing**	**HOT Lanes w/o CRISP**	**CRISP w/o HOT Lanes**	**HOT Lanes w/ CRISP**
Plan Sheet Page Numbers		**1**	**4,6,8,10,12**	**2**	**3,5,7,9,11**
Bent 13 – West End	Temporary CRISP Detour Track	N/A	N/A	14'	12.5'
Bent 13 - East End	Temporary CRISP Detour Track	N/A	N/A	41.7'	41.7'
Bent 14 – West End	CSXT Mainline	18.8'	18.8'	8.1' (to trough edge)	8.1' (to trough edge)
Bent 14 – East End	Temporary CRISP Detour Track	N/A	N/A	20.3'	12.5'
Bent 15 – West End	ADM Spur	22.2'	16.5'	41.1' (realigned)	37.3' (realigned)
Bent 15 – East End	CSXT Mainline	14.5'	14.5'	9.1' (to trough edge)	9.1' (to trough edge)
Bent 15 – East End	ADM Spur	11.7'	16.1' (realigned)	10.5' (realigned)	16.1' (realigned)
Bent 16 – West End	ADM Spur	55'	46.9' (realigned)	38.6' (realigned)	36.1' (realigned)
Bent 16 – East End	ADM Spur	65'	43.2' (realigned)	35.7' (realigned)	30' (realigned)

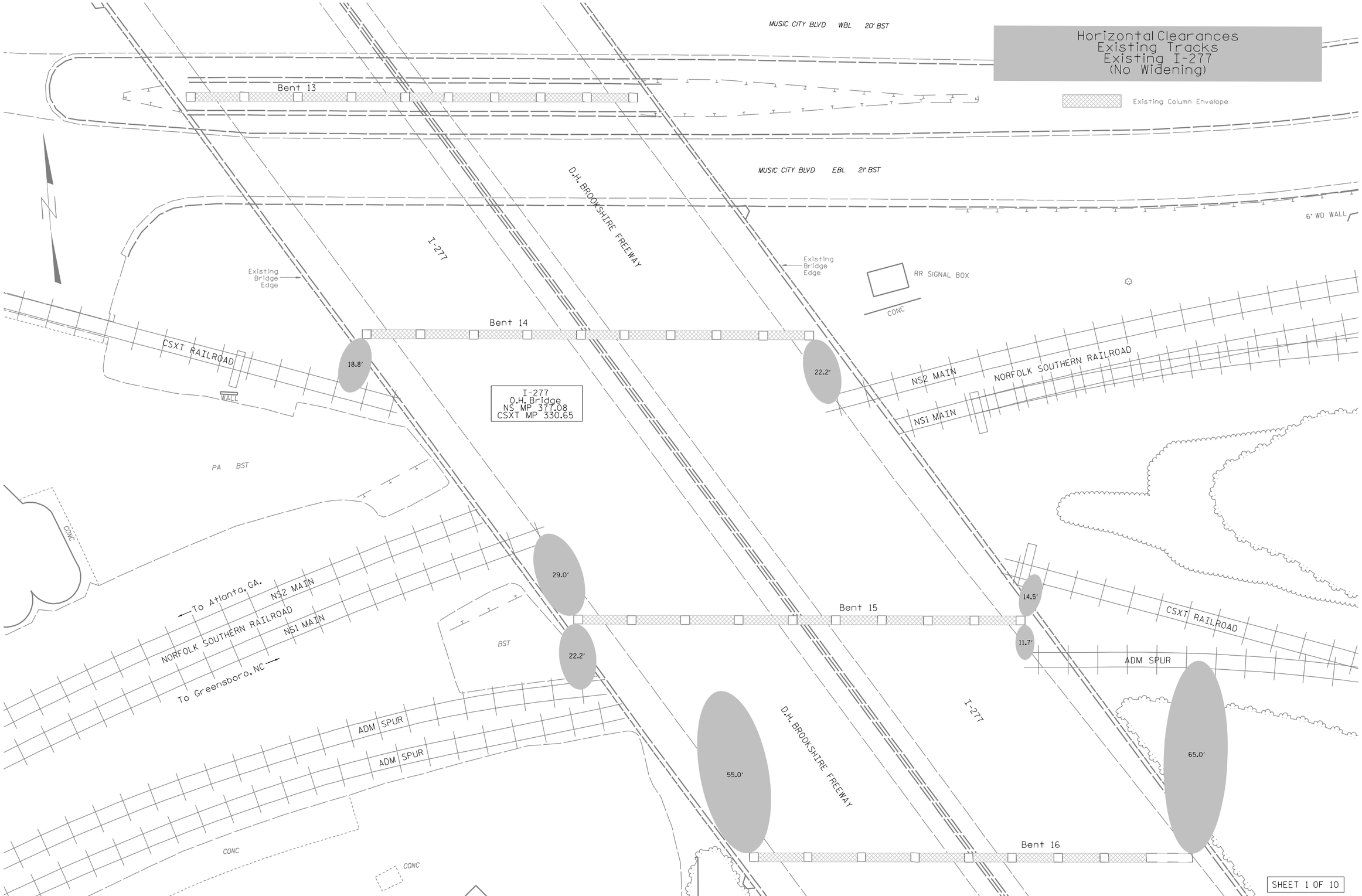
CSXT does not object to the preliminary design as shown, including the proposed horizontal clearances, and need for the relocation of the ADM Spur track, however CSXT does reserve the right to have and provide further comments and concerns regarding the design of the subject project.

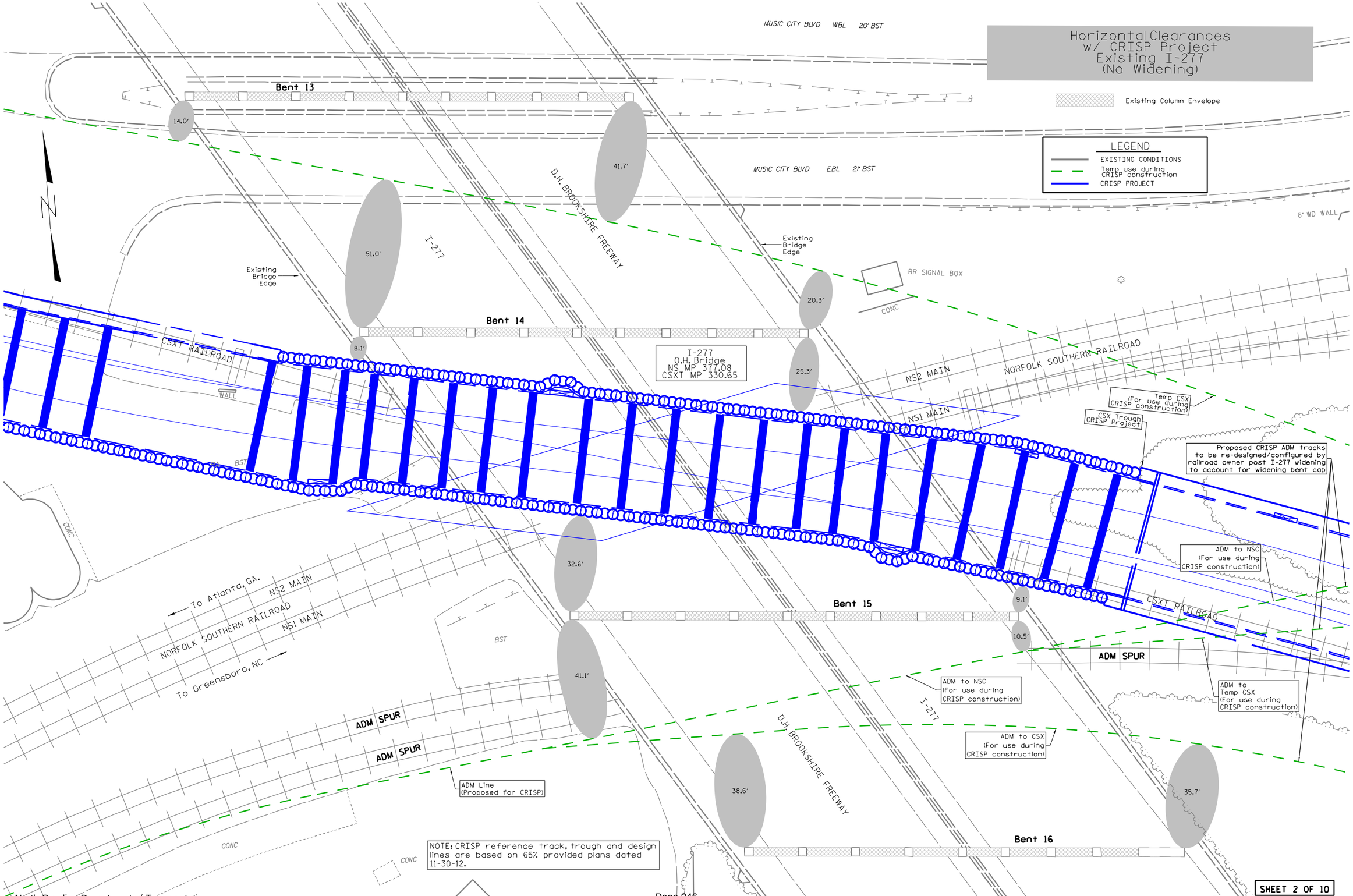
With regard to NCDOT's request that CSXT perform all necessary plan, agreement, or other such reviews related to the subject project within 45 days of receipt, please be advised that CSXT is agreeable to this term. However, it should be noted that substantial reviews, such as this initial review which included consideration and acceptance of track relocation and multiple deviations from CSXT's standard requirements regarding horizontal clearance, may take longer. In the event it is anticipated that a review may take more than 45 days, CSXT will notify NCDOT appropriately.

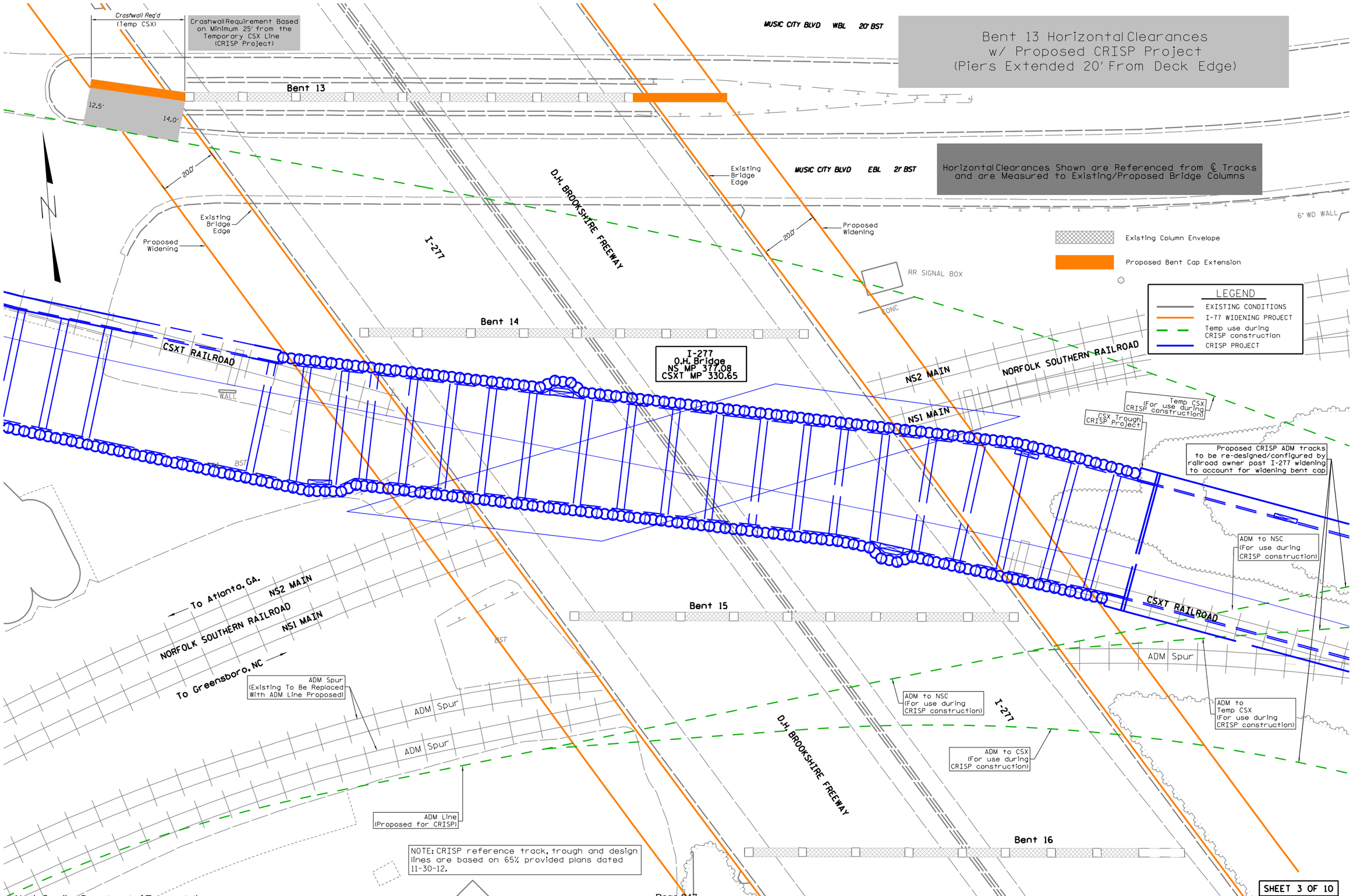
Sincerely,

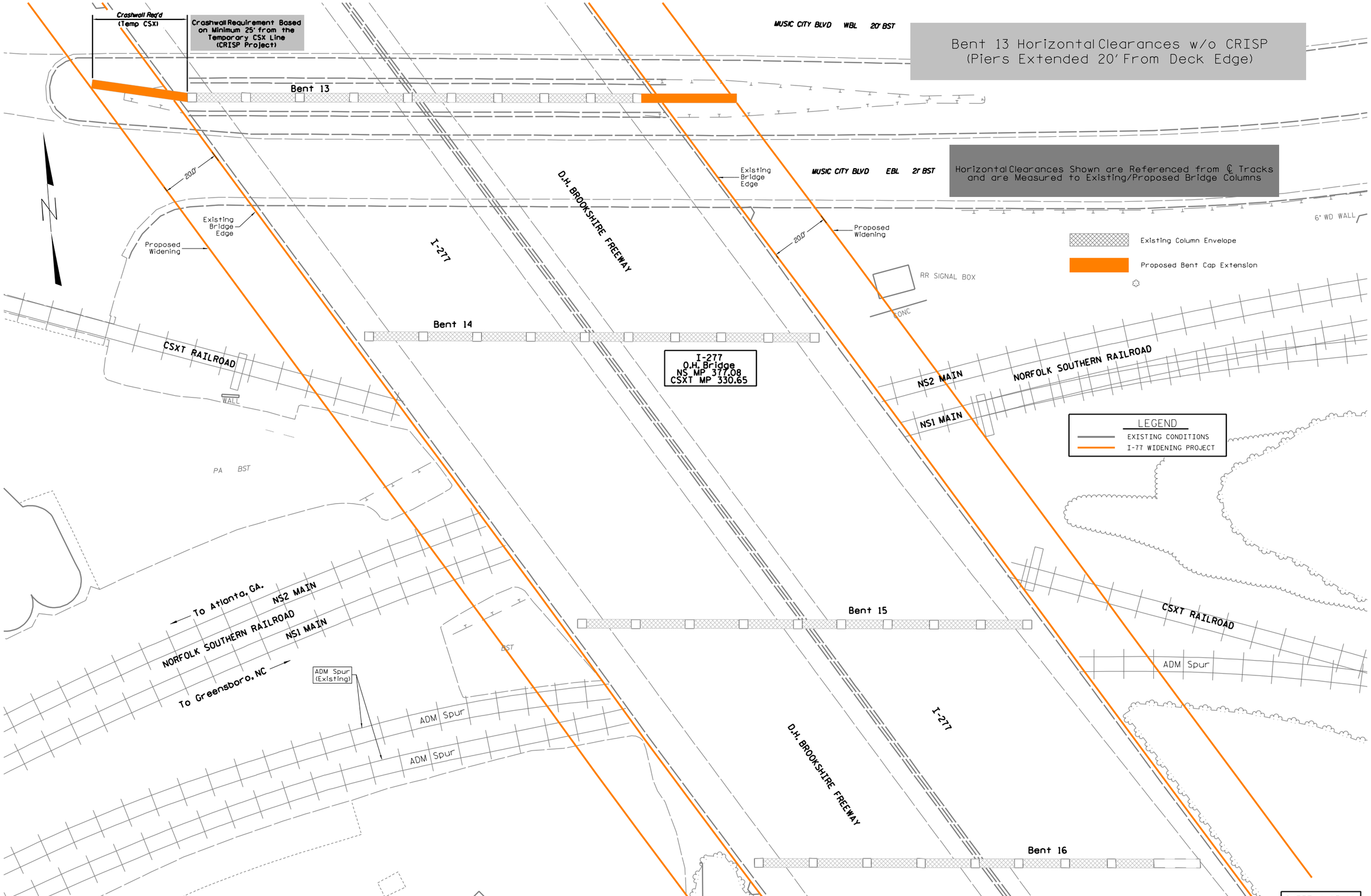
Ben Biesterveld
Project Manager II – Public Projects

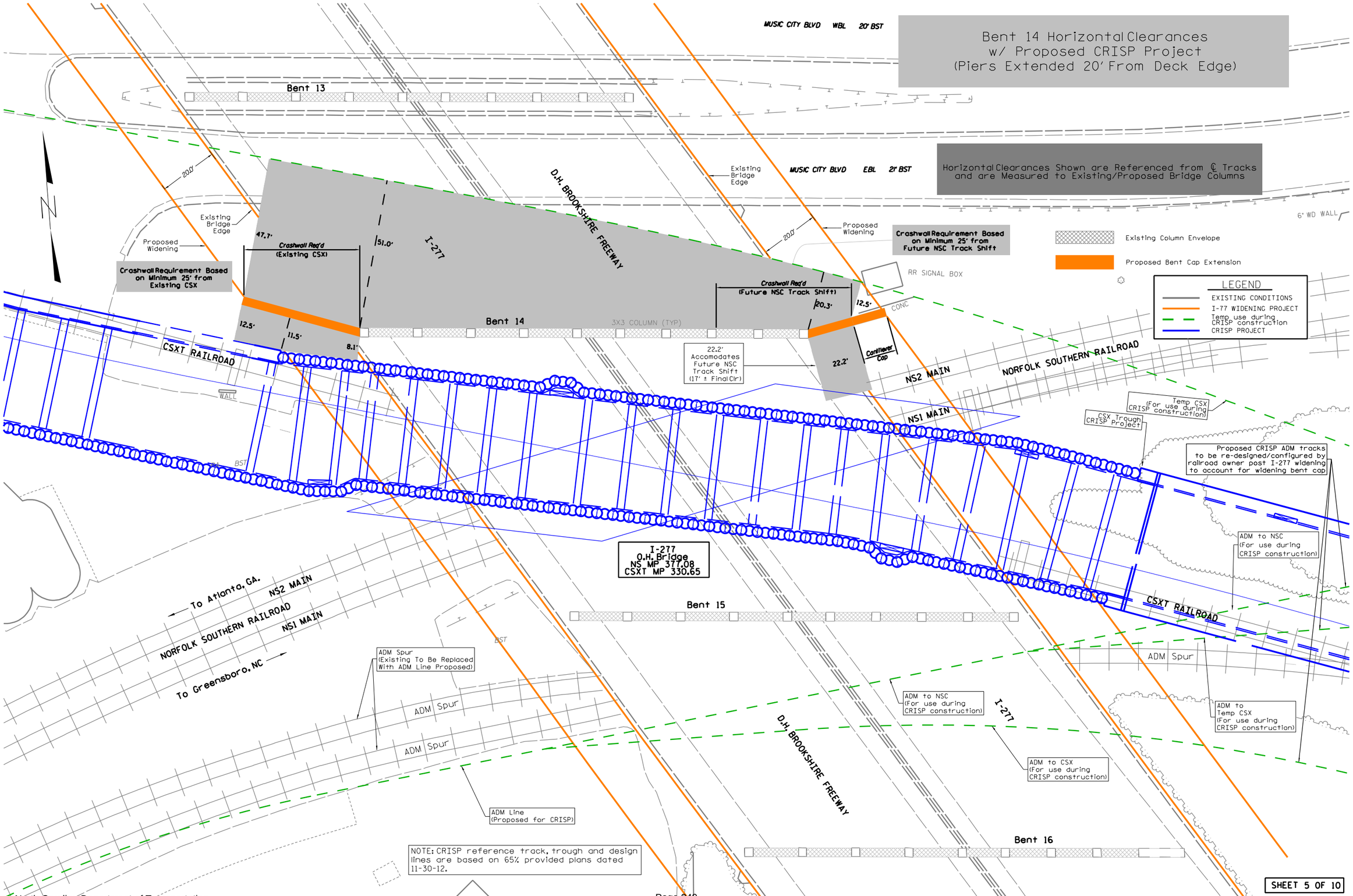
Cc (via email): Kevin Fischer, NCDOT
Brian Hanks, NCDOT
Allen Raynor, TGS Engineers
Leonard Fletcher, TGS Engineers

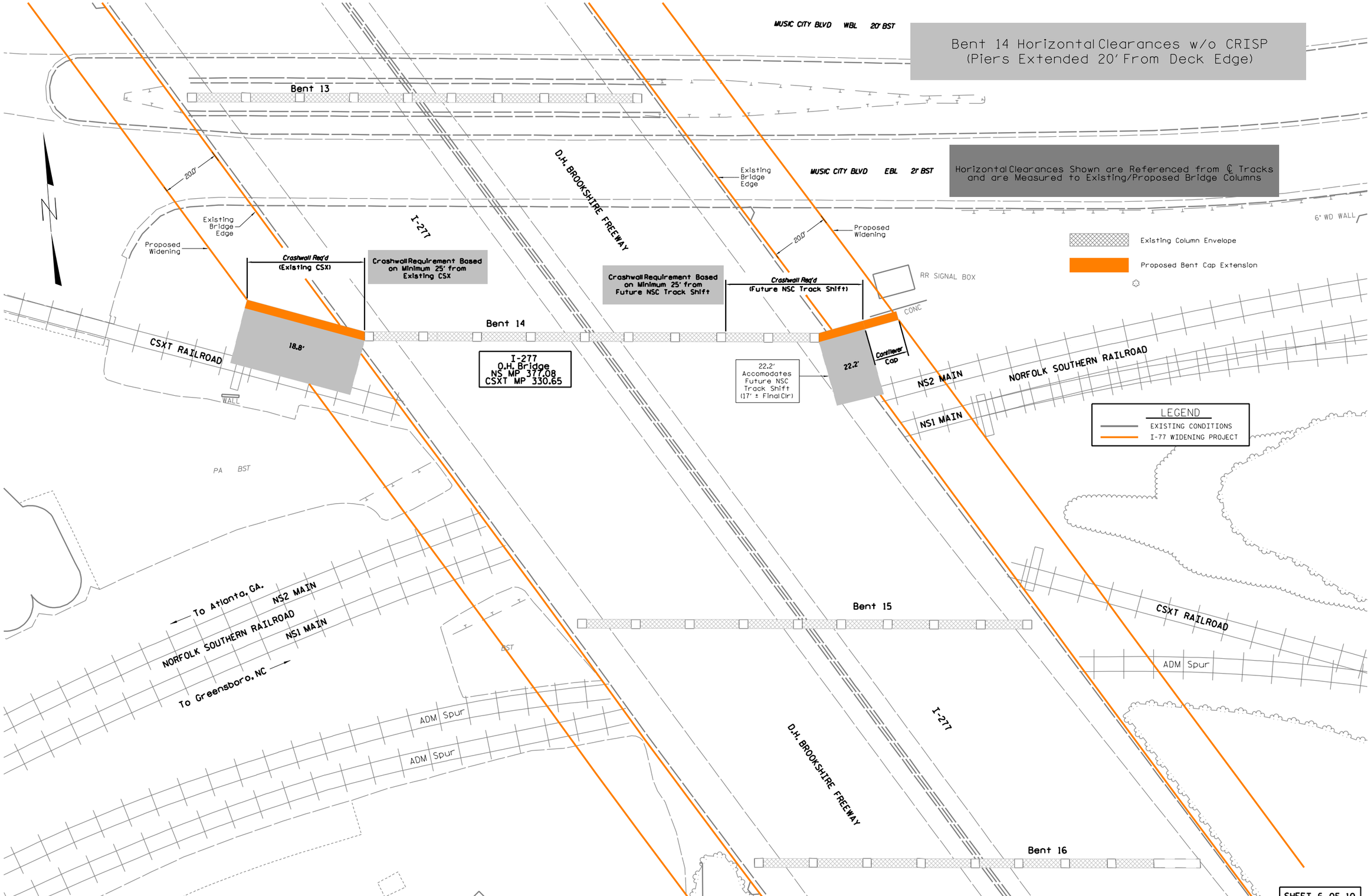

Horizontal Clearances
Existing Tracks
Existing I-277
(No Widening)
Existing Column Envelope
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
6" WD WALL
Bent 13
Bent 14
Bent 15
Bent 16
D.H. BROOKSHIRE FREEWAY
I-277
Existing Bridge Edge
RR SIGNAL BOX
CONC
CSXT RAILROAD
WALL
NS2 MAIN
NS1 MAIN
NORFOLK SOUTHERN RAILROAD
I-277
O.H. Bridge
NS MP 377.08
CSXT MP 330.65
18.8'
22.2'
29.0'
22.2'
55.0'
14.5'
11.7'
65.0'
PA BST
BST
CONC
To Atlanta, GA.
To Greensboro, NC
ADM SPUR
ADM SPUR
SHEET 1 OF 10


Horizontal Clearances
w/ CRISP Project
Existing I-277
(No Widening)
Existing Column Envelope
LEGEND
EXISTING CONDITIONS
Temp use during CRISP construction
CRISP PROJECT
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Bent 13
Bent 14
Bent 15
Bent 16
14.0'
51.0'
41.7'
8.1'
20.3'
25.3'
32.6'
41.1'
9.1'
10.5'
38.6'
35.7'
I-277
D.H. BROOKSHIRE FREEWAY
Existing Bridge Edge
RR SIGNAL BOX
CONC
6" WD WALL
CSXT RAILROAD
WALL
BST
I-277
O.H. Bridge
NS MP 377.08
CSXT MP 330.65
NS2 MAIN
NS1 MAIN
NORFOLK SOUTHERN RAILROAD
Temp CSX (For use during CRISP construction)
CSX Trough CRISP Project
Proposed CRISP ADM tracks to be re-designed/configured by railroad owner post I-277 widening to account for widening bent cap
ADM to NSC (For use during CRISP construction)
ADM SPUR
ADM to Temp CSX (For use during CRISP construction)
ADM to CSX (For use during CRISP construction)
To Atlanta, GA.
To Greensboro, NC
ADM Line (Proposed for CRISP)
NOTE: CRISP reference track, trough and design lines are based on 65% provided plans dated 11-30-12.
SHEET 2 OF 10

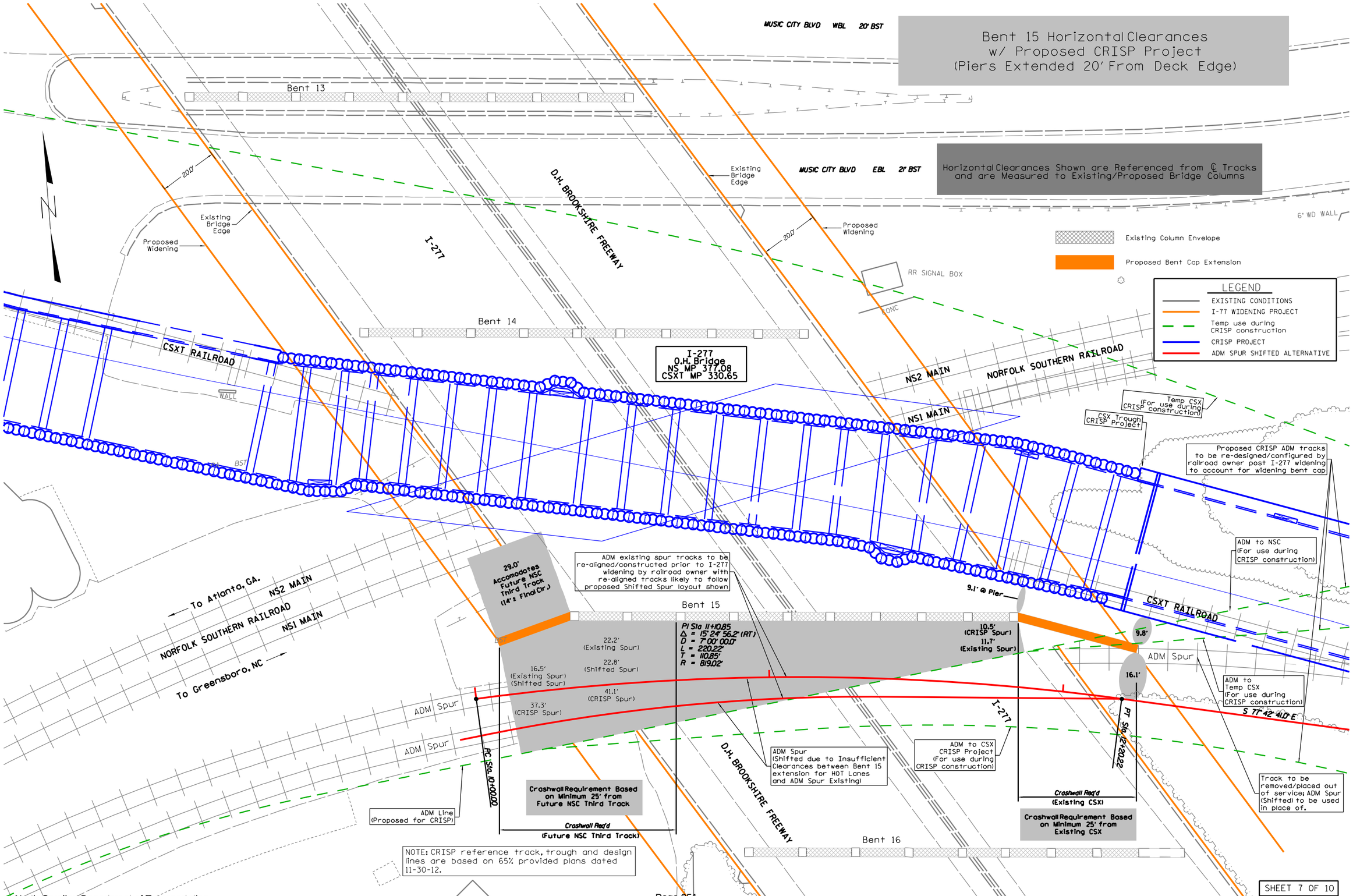

Bent 13 Horizontal Clearances
w/ Proposed CRISP Project
(Piers Extended 20' From Deck Edge)
Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns
Crashwall Req'd (Temp CSX)
Crashwall Requirement Based on Minimum 25' from the Temporary CSX Line (CRISP Project)
12.5'
14.0'
Bent 13
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Existing Bridge Edge
Proposed Widening
20.0'
D.H. BROOKSHIRE FREEWAY
I-277
6" WD WALL
RR SIGNAL BOX
CONC
Existing Column Envelope
Proposed Bent Cap Extension
LEGEND
EXISTING CONDITIONS
I-77 WIDENING PROJECT
Temp use during CRISP construction
CRISP PROJECT
Bent 14
I-277 O.H. Bridge NS MP 377.08 CSXT MP 330.65
CSXT RAILROAD
WALL
BST
NS2 MAIN
NS1 MAIN
NORFOLK SOUTHERN RAILROAD
Temp CSX (For use during CRISP construction)
CSX Trough CRISP Project
Proposed CRISP ADM tracks to be re-designed/configured by railroad owner post I-277 widening to account for widening bent cap
ADM to NSC (For use during CRISP construction)
To Atlanta, GA.
To Greensboro, NC
Bent 15
ADM Spur
ADM Spur (Existing To Be Replaced With ADM Line Proposed)
ADM to NSC (For use during CRISP construction)
ADM to Temp CSX (For use during CRISP construction)
ADM to CSX (For use during CRISP construction)
ADM Line (Proposed for CRISP)
Bent 16
NOTE: CRISP reference track, trough and design lines are based on 65% provided plans dated 11-30-12.
SHEET 3 OF 10

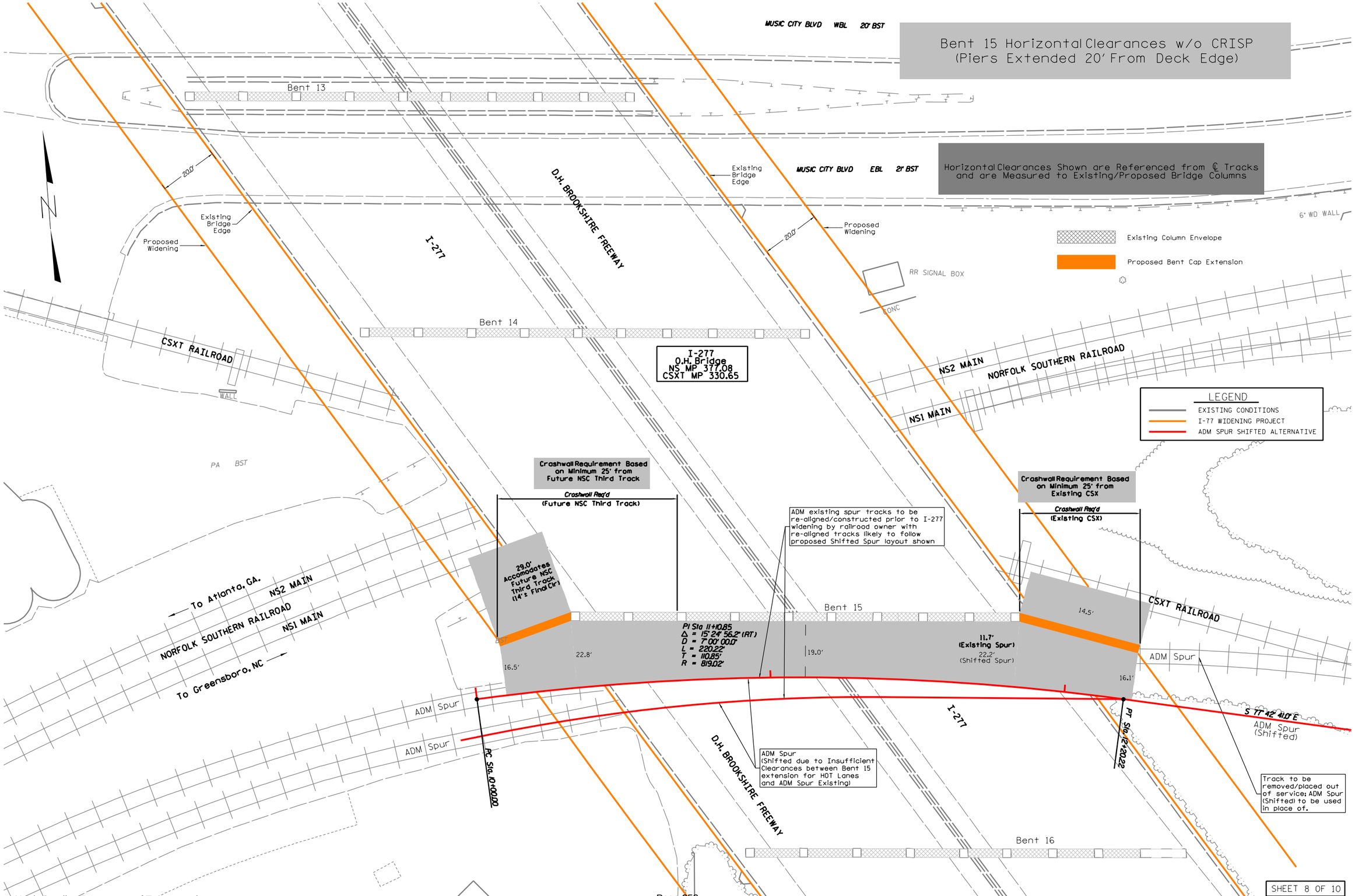

Bent 13 Horizontal Clearances w/o CRISP
(Piers Extended 20' From Deck Edge)
Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns
Crashwall Req'd (Temp CSX)
Crashwall Requirement Based on Minimum 25' from the Temporary CSX Line (CRISP Project)
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Bent 13
Bent 14
Bent 15
Bent 16
20.0'
Existing Bridge Edge
Proposed Widening
I-277
D.H. BROOKSHIRE FREEWAY
I-277
O.H. Bridge
NS MP 377.08
CSXT MP 330.65
RR SIGNAL BOX
CONC
6" WD WALL
Existing Column Envelope
Proposed Bent Cap Extension
CSXT RAILROAD
WALL
PA BST
NS2 MAIN
NS1 MAIN
NORFOLK SOUTHERN RAILROAD
LEGEND
EXISTING CONDITIONS
I-77 WIDENING PROJECT
To Atlanta, GA.
To Greensboro, NC
ADM Spur (Existing)
ADM Spur
ADM Spur
ADM Spur
BST
SHEET 4 OF 10


Bent 14 Horizontal Clearances
w/ Proposed CRISP Project
(Piers Extended 20' From Deck Edge)
Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Bent 13
Bent 14
Bent 15
Bent 16
3X3 COLUMN (TYP)
D.H. BROOKSHIRE FREEWAY
I-277
Existing Bridge Edge
Proposed Widening
Crashwall Req'd (Existing CSX)
Crashwall Requirement Based on Minimum 25' from Existing CSX
Crashwall Req'd (Future NSC Track Shift)
Crashwall Requirement Based on Minimum 25' from Future NSC Track Shift
47.7'
51.0'
20.0'
12.5'
11.5'
8.1'
20.3'
22.2'
22.2' Accomodates Future NSC Track Shift (17' ± Final Clr)
Cantilever Cap
RR SIGNAL BOX
CONC
6" WD WALL
WALL
BST
CSXT RAILROAD
NORFOLK SOUTHERN RAILROAD
NS2 MAIN
NS1 MAIN
To Atlanta, GA.
To Greensboro, NC
Existing Column Envelope
Proposed Bent Cap Extension
LEGEND
EXISTING CONDITIONS
I-77 WIDENING PROJECT
Temp use during CRISP construction
CRISP PROJECT
Temp CSX (For use during CRISP construction)
CSX Trough CRISP Project
Proposed CRISP ADM tracks to be re-designed/configured by railroad owner post I-277 widening to account for widening bent cap
ADM to NSC (For use during CRISP construction)
ADM to Temp CSX (For use during CRISP construction)
ADM to CSX (For use during CRISP construction)
ADM Spur
ADM Spur (Existing To Be Replaced With ADM Line Proposed)
ADM Line (Proposed for CRISP)
I-277 O.H. Bridge NS MP 377.08 CSXT MP 330.65
NOTE: CRISP reference track, trough and design lines are based on 65% provided plans dated 11-30-12.
SHEET 5 OF 10


Bent 14 Horizontal Clearances w/o CRISP
(Piers Extended 20' From Deck Edge)
Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns
Existing Column Envelope
Proposed Bent Cap Extension
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Bent 13
Bent 14
Bent 15
Bent 16
D.H. BROOKSHIRE FREEWAY
I-277
Existing Bridge Edge
Proposed Widening
20.0'
Crashwall Req'd (Existing CSX)
Crashwall Requirement Based on Minimum 25' from Existing CSX
Crashwall Requirement Based on Minimum 25' from Future NSC Track Shift
Crashwall Req'd (Future NSC Track Shift)
18.8'
22.2'
Cantilever Cap
22.2' Accomodates Future NSC Track Shift (17' ± Final Clr)
I-277 O.H. Bridge NS MP 377.08 CSXT MP 330.65
CSXT RAILROAD
NORFOLK SOUTHERN RAILROAD
NS2 MAIN
NS1 MAIN
RR SIGNAL BOX
CONC
6" WD WALL
WALL
PA BST
BST
To Atlanta, GA.
To Greensboro, NC
ADM Spur
LEGEND
EXISTING CONDITIONS
I-77 WIDENING PROJECT

SHEET 6 OF 10


Bent 15 Horizontal Clearances
w/ Proposed CRISP Project
(Piers Extended 20' From Deck Edge)
Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Bent 13
Bent 14
Bent 15
Bent 16
I-277
D.H. BROOKSHIRE FREEWAY
Existing Bridge Edge
Proposed Widening
20.0'
RR SIGNAL BOX
CONC
6" WD WALL
Existing Column Envelope
Proposed Bent Cap Extension
LEGEND
EXISTING CONDITIONS
I-77 WIDENING PROJECT
Temp use during CRISP construction
CRISP PROJECT
ADM SPUR SHIFTED ALTERNATIVE
CSXT RAILROAD
NS2 MAIN
NS1 MAIN
NORFOLK SOUTHERN RAILROAD
I-277 O.H. Bridge NS MP 377.08 CSXT MP 330.65
Temp CSX (For use during CRISP construction)
CSX Trough CRISP Project
Proposed CRISP ADM tracks to be re-designed/configured by railroad owner post I-277 widening to account for widening bent cap
ADM to NSC (For use during CRISP construction)
ADM to Temp CSX (For use during CRISP construction)
Track to be removed/placed out of service; ADM Spur (Shifted) to be used in place of.
ADM existing spur tracks to be re-aligned/constructed prior to I-277 widening by railroad owner with re-aligned tracks likely to follow proposed Shifted Spur layout shown
29.0' Accomodates Future NSC Third Track (14'± Final Ctr.)
To Atlanta, GA.
To Greensboro, NC
ADM Spur
ADM Line (Proposed for CRISP)
PC Sta. 10+00.00
PI Sta 11+10.85
Δ = 15°24' 56.2" (RT)
D = 7°00' 00.0"
L = 220.22'
T = 110.85'
R = 819.02'
22.2' (Existing Spur)
22.8' (Shifted Spur)
16.5' (Existing Spur) (Shifted Spur)
41.1' (CRISP Spur)
37.3' (CRISP Spur)
10.5' (CRISP Spur)
11.7' (Existing Spur)
9.1' @ Pier
9.8'
16.1'
PT Sta. 12+20.22
S 77° 42' 41.0" E
ADM to CSX CRISP Project (For use during CRISP construction)
ADM Spur (Shifted due to Insufficient Clearances between Bent 15 extension for HOT Lanes and ADM Spur Existing)
Crashwall Requirement Based on Minimum 25' from Future NSC Third Track
Crashwall Req'd (Future NSC Third Track)
Crashwall Req'd (Existing CSX)
Crashwall Requirement Based on Minimum 25' from Existing CSX
NOTE: CRISP reference track, trough and design lines are based on 65% provided plans dated 11-30-12.
SHEET 7 OF 10


Bent 15 Horizontal Clearances w/o CRISP
(Piers Extended 20' From Deck Edge)
Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Existing Column Envelope
Proposed Bent Cap Extension
LEGEND
EXISTING CONDITIONS
I-77 WIDENING PROJECT
ADM SPUR SHIFTED ALTERNATIVE
Bent 13
Bent 14
Bent 15
Bent 16
I-277
O.H. BROOKSHIRE FREEWAY
I-277
O.H. Bridge
NS MP 377.08
CSXT MP 330.65
Existing Bridge Edge
Proposed Widening
20.0'
RR SIGNAL BOX
CONC
6" WD WALL
CSXT RAILROAD
WALL
NS2 MAIN
NS1 MAIN
NORFOLK SOUTHERN RAILROAD
To Atlanta, GA.
To Greensboro, NC
PA BST
Crashwall Requirement Based on Minimum 25' from Future NSC Third Track
Crashwall Req'd (Future NSC Third Track)
29.0' Accomodates Future NSC Third Track (14' ± Final Ctr)
Crashwall Req'd (Existing CSX)
Crashwall Requirement Based on Minimum 25' from Existing CSX
ADM existing spur tracks to be re-aligned/constructed prior to I-277 widening by railroad owner with re-aligned tracks likely to follow proposed Shifted Spur layout shown
PI Sta 11+10.85
Δ = 15° 24' 56.2" (RT)
D = 7° 00' 00.0"
L = 220.22'
T = 110.85'
R = 819.02'
16.5'
22.8'
19.0'
11.7' (Existing Spur)
22.2' (Shifted Spur)
14.5'
16.1'
ADM Spur
ADM Spur (Shifted)
S 77° 42' 41.0" E
PC Sta 10+00.00
PT Sta 12+20.22
ADM Spur (Shifted due to Insufficient Clearances between Bent 15 extension for HOT Lanes and ADM Spur Existing)
Track to be removed/placed out of service; ADM Spur (Shifted) to be used in place of.
SHEET 8 OF 10

Bent 16 Horizontal Clearances w/ Proposed CRISP Project (Piers Extended 20' From Deck Edge)

Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns

Existing Column Envelope

Proposed Bent Cap Extension

LEGEND
- EXISTING CONDITIONS
- I-77 WIDENING PROJECT
- Temp use during CRISP construction
- CRISP PROJECT
- ADM SPUR SHIFTED ALTERNATIVE

MUSIC CITY BLVD WBL 20' BST

MUSIC CITY BLVD EBL 21' BST

Bent 13

Bent 14

Bent 15

Bent 16

I-277 O.H. Bridge NS MP 377.08 CSXT MP 330.65

O.H. BROOKSHIRE FREEWAY

I-277

Existing Bridge Edge

Proposed Widening

20.0'

RR SIGNAL BOX

CONC

6" WD WALL

CSXT RAILROAD

WALL

BST

NS2 MAIN

NS1 MAIN

NORFOLK SOUTHERN RAILROAD

Temp CSX (For use during CRISP construction)

CSX Trough CRISP Project

Proposed CRISP ADM tracks to be re-designed/configured by railroad owner post I-277 widening to account for widening bent cap

ADM to NSC (For use during CRISP construction)

ADM existing spur tracks to be re-aligned/constructed prior to I-277 widening by railroad owner with re-aligned tracks likely to follow proposed Shifted Spur layout shown

PI Sta 11+10.85
Δ = 15° 24' 56.2" (RT)
D = 7° 00' 00.0"
L = 220.22'
T = 110.85'
R = 819.02'

ADM to NSC (For use during CRISP construction)

ADM Spur

ADM to Temp CSX (For use during CRISP construction)

S 77° 42' 41.0" E

PT Sta. 12+20.22

ADM Spur (Existing To Be Replaced With ADM Line Proposed)

PC Sta. 10+00.00

ADM Line (Proposed for CRISP)

ADM Spur (Shifted due to Insufficient Clearances between Bent 15 extension for HOT Lanes and ADM Spur Existing)

ADM to CSX (For use during CRISP construction)

Track to be removed/placed out of service; ADM Spur (Shifted) to be used in place of.

36.1'

30.0'

3X3 COLUMN (TYP)

To Atlanta, GA.

To Greensboro, NC

NOTE: CRISP reference track, trough and design lines are based on 65% provided plans dated 11-30-12.

SHEET 9 OF 10

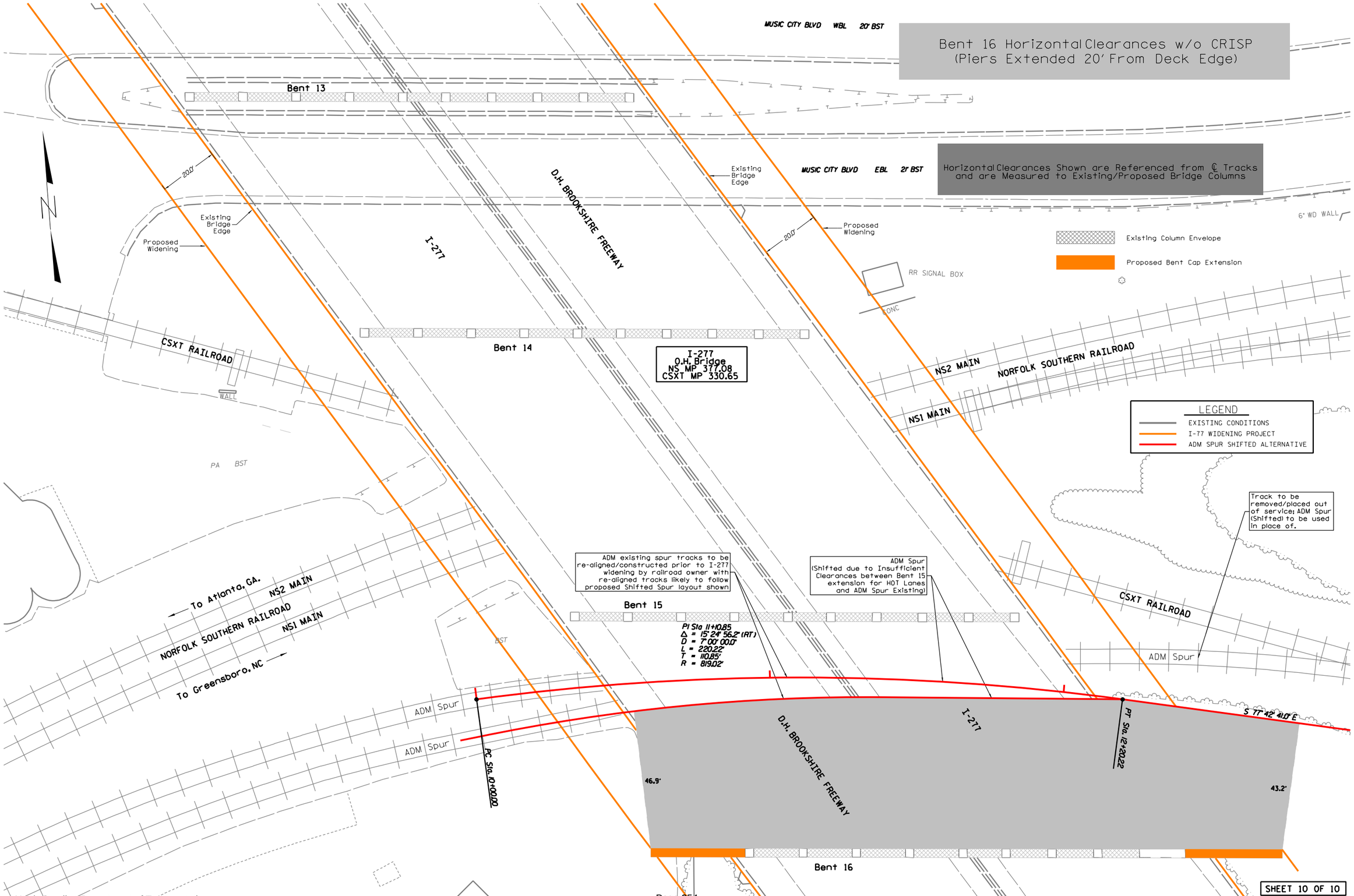
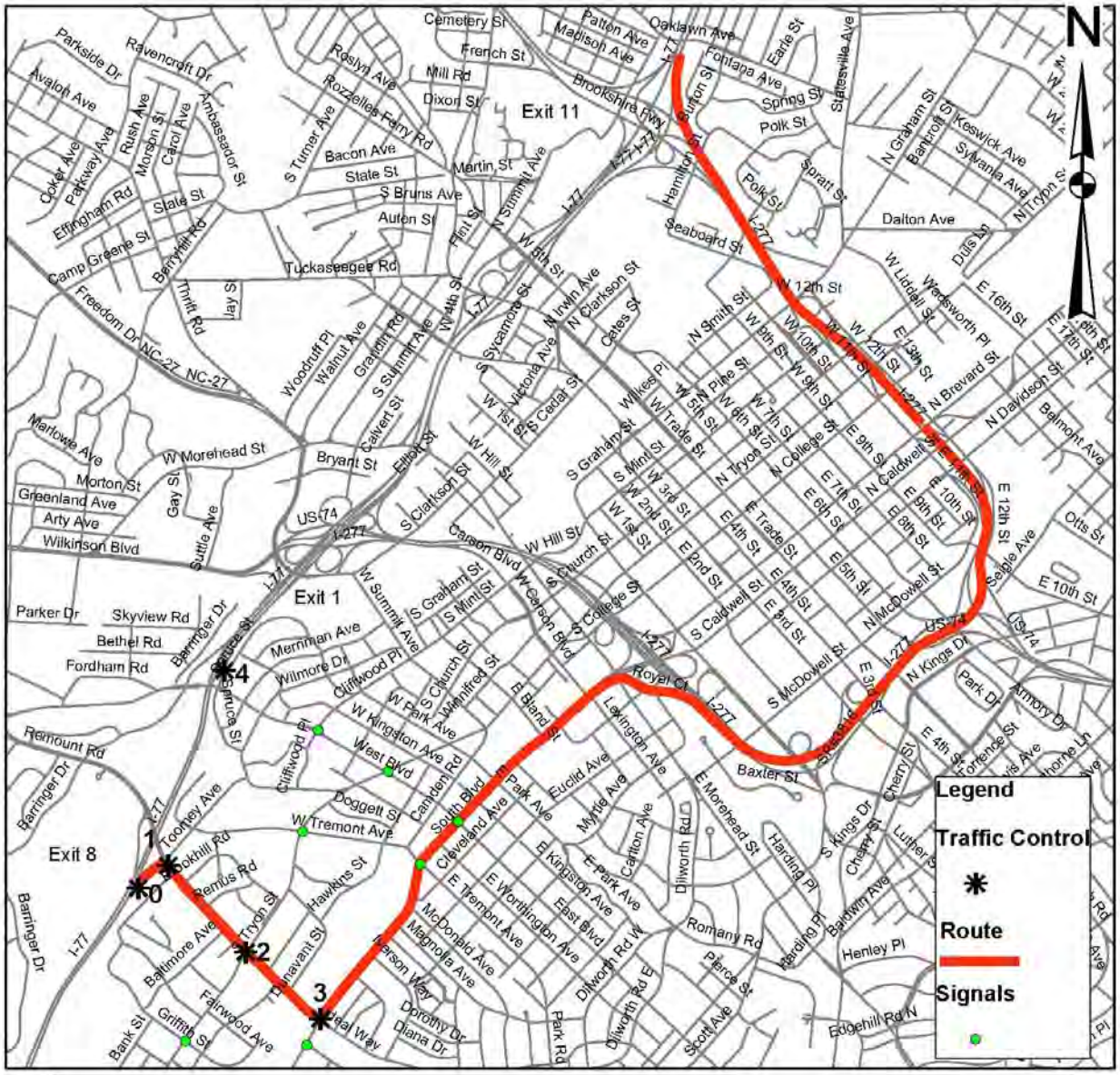

Bent 16 Horizontal Clearances w/o CRISP
(Piers Extended 20' From Deck Edge)
Horizontal Clearances Shown are Referenced from ℄ Tracks and are Measured to Existing/Proposed Bridge Columns
MUSIC CITY BLVD WBL 20' BST
MUSIC CITY BLVD EBL 21' BST
Bent 13
Bent 14
Bent 15
Bent 16
I-277
D.H. BROOKSHIRE FREEWAY
Existing Bridge Edge
Proposed Widening
20.0'
6" WD WALL
RR SIGNAL BOX
CONC
Existing Column Envelope
Proposed Bent Cap Extension
CSXT RAILROAD
WALL
NS2 MAIN
NS1 MAIN
NORFOLK SOUTHERN RAILROAD
I-277
O.H. Bridge
NS MP 377.08
CSXT MP 330.65
LEGEND
EXISTING CONDITIONS
I-77 WIDENING PROJECT
ADM SPUR SHIFTED ALTERNATIVE
PA BST
BST
To Atlanta, GA.
To Greensboro, NC
ADM Spur
Track to be removed/placed out of service; ADM Spur (Shifted) to be used in place of.
ADM existing spur tracks to be re-aligned/constructed prior to I-277 widening by railroad owner with re-aligned tracks likely to follow proposed Shifted Spur layout shown
ADM Spur (Shifted due to Insufficient Clearances between Bent 15 extension for HOT Lanes and ADM Spur Existing)
PI Sta 11+10.85
Δ = 15° 24' 56.2" (RT)
D = 7° 00' 00.0"
L = 220.22'
T = 110.85'
R = 819.02'
PC Sta. 10+00.00
PT Sta. 12+20.22
S 77° 42' 41.0" E
46.9'
43.2'
SHEET 10 OF 10

Exhibit 22-01

Emergency Detour Routes

Exhibit Book 2 # 22-01

I-77 NB
Exit 9A to Exit 9C
West Blvd to I-277 (John Belk Frwy)
(Page 1/2)

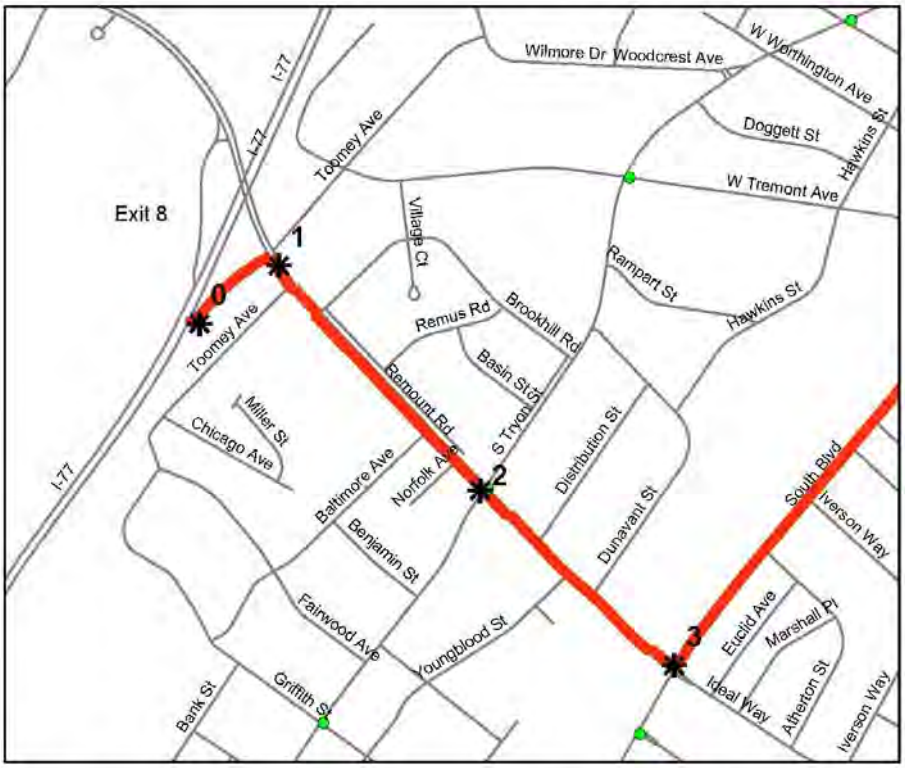


Detour Route
Remount Rd East to South Blvd North to I-277 NB (John Belk Frwy) to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic Onto Remount Rd	2
1	Direct Traffic at Off Ramp and Remount Rd	1
2	Direct Traffic at Remount Rd and NC 49 (Tryon St)	1
3	Direct Traffic at Remount Rd and South Blvd	2
4	Close I-77 NB On Ramp from West Blvd	1

Exhibit Book 2 # 22-01

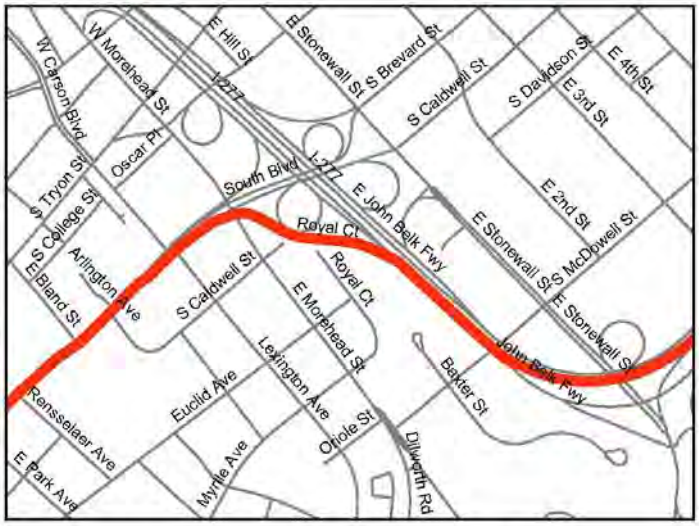
I-77 NB
Exit 9A to Exit 9C
West Blvd to I-277 (John Belk Frwy)
(Page 2/2)



Interchange Details - Exits 8
Traffic Control Points 0, 1, 2, & 3

Message Signs To Use
CMS0-0I0077N0000.21
CMS0-0I0077N0005.54

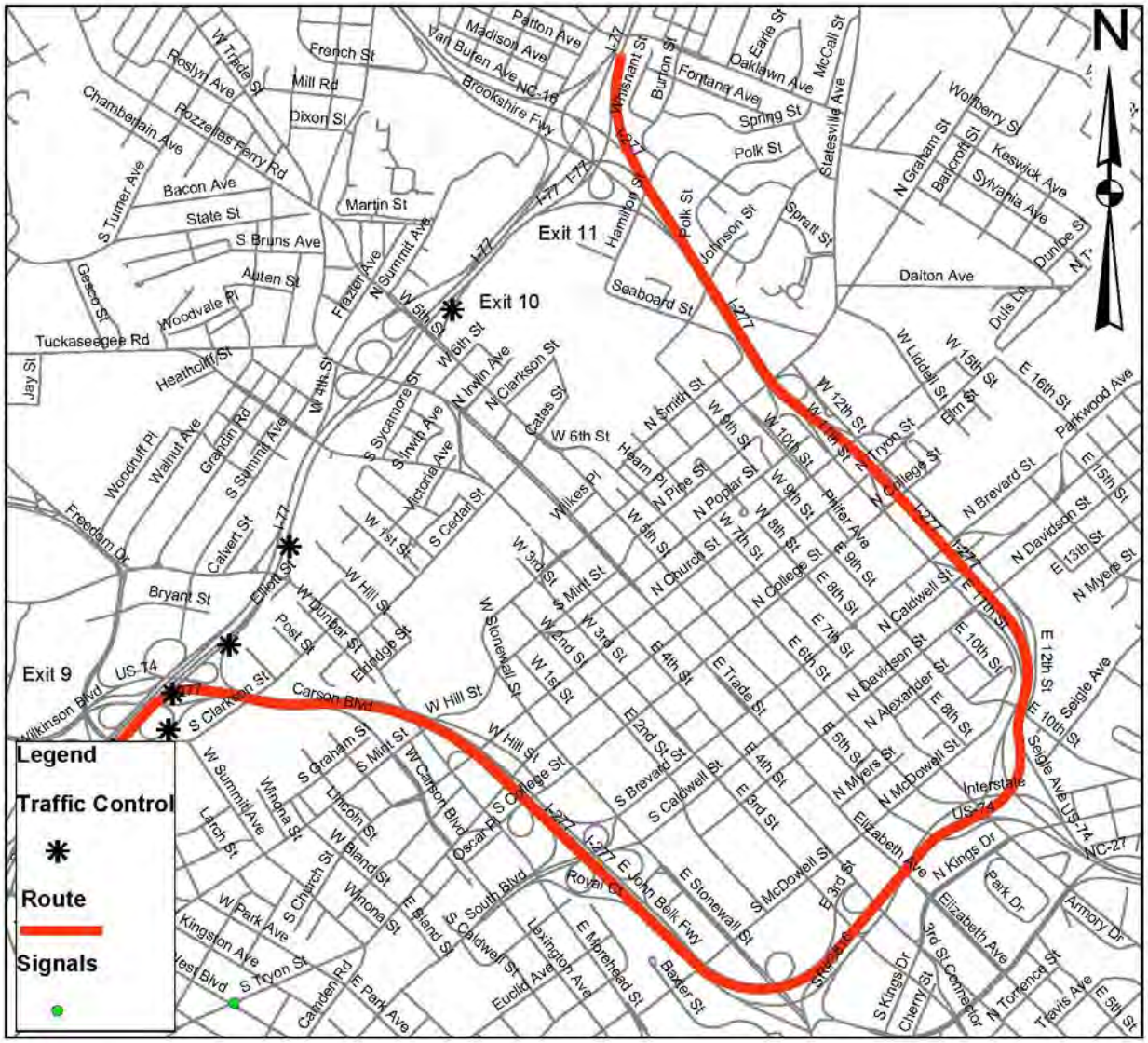
Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141



Interchange Details
South Blvd and I-277 (John Belk Frwy)

Exhibit Book 2 # 22-01

I-77 NB
Exit 9 to Exit 11
I-277 (John Belk Frwy) to I-277 (Brookshire Frwy)
(Page 1/2)

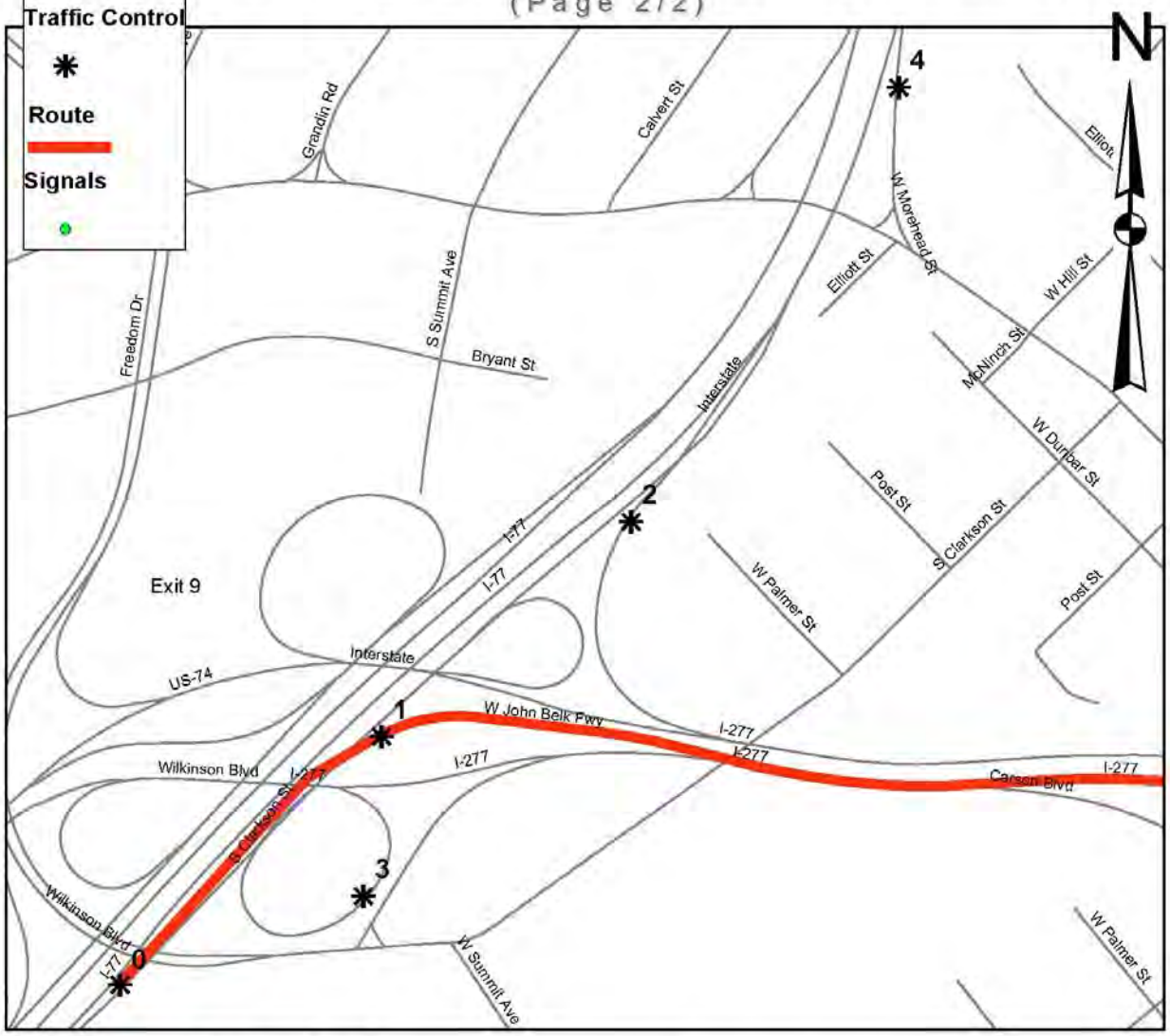


Detour Route
I-77 NB Collector to I-277 NB (John Belk Frwy) to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic Onto I-77 NB Collector	2
1	Close I-77 NB Collector, Direct Traffic onto I-277 NB (John Belk Frw y)	2
2	Close I-77 NB On Ramp From I-277 SB (John Belk Frw y)	1
3	Close I-77 NB On Ramp From US 29/74 EB (Wilkinson Blvd)	1
4	Close I-77 NB On Ramp from Moorehead	1
5	Close I-77 NB On Ramp from 5th St	1

Exhibit Book 2 # 22-01

I-77 NB
Exit 9 to Exit 11
77 (John Belk Frwy) to I-277 (Brookshire Frwy)
(Page 2/2)



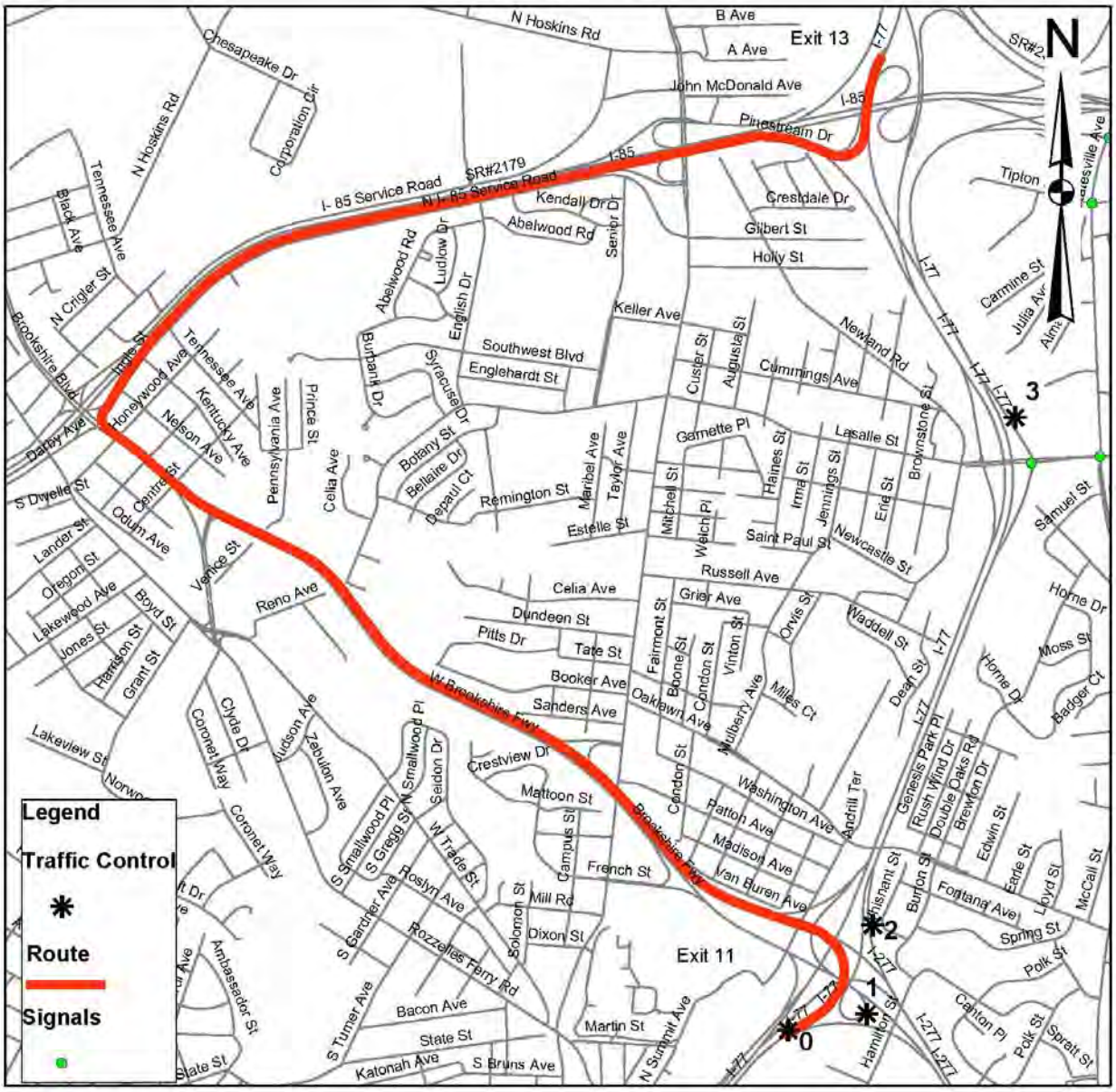
Interchange Details - Exits 9
Traffic Control Points 0, 1, 2, 3, & 4

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077N0000.21
CMS0-0I0077N0005.54

Exhibit Book 2 # 22-01

I-77 NB
Exit 11 to Exit 13
I-277 (Brookshire Frwy) to I-85
(Page 1/2)

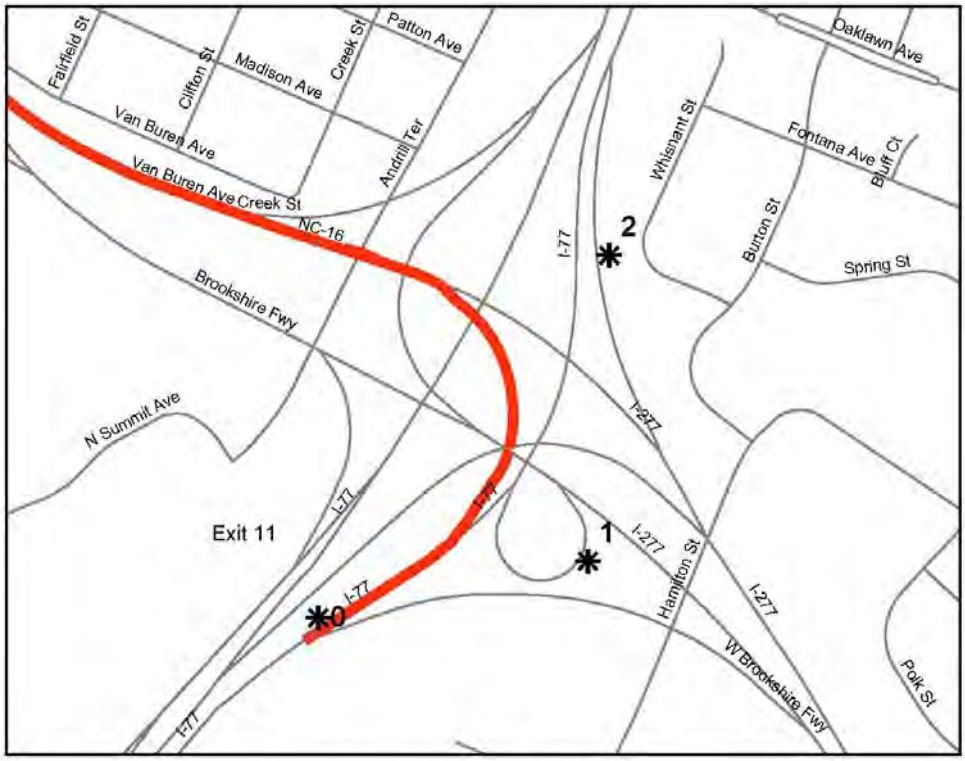


Detour Route
NC 16 NB (Brookshire Frwy) to I-85 NB to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic onto NC 16 (Brookshire Frwy)	2
1	Close I-77 NB On Ramp from NC 16 (Brookshire Frwy)	1
2	Close I-77 NB On Ramp from I-277 NB (Brookshire Frwy)	2
3	Close I-77 NB On Ramp From Lasalle St	1

Exhibit Book 2 # 22-01

I-77 NB
Exit 11 to Exit 13
I-277 (Brookshire Frwy) to I-85
(Page 2/2)



N

Legend

Traffic Control *

Route

Signals

Interchange Details - Exits 11
Traffic Control Points 0, 1, & 2

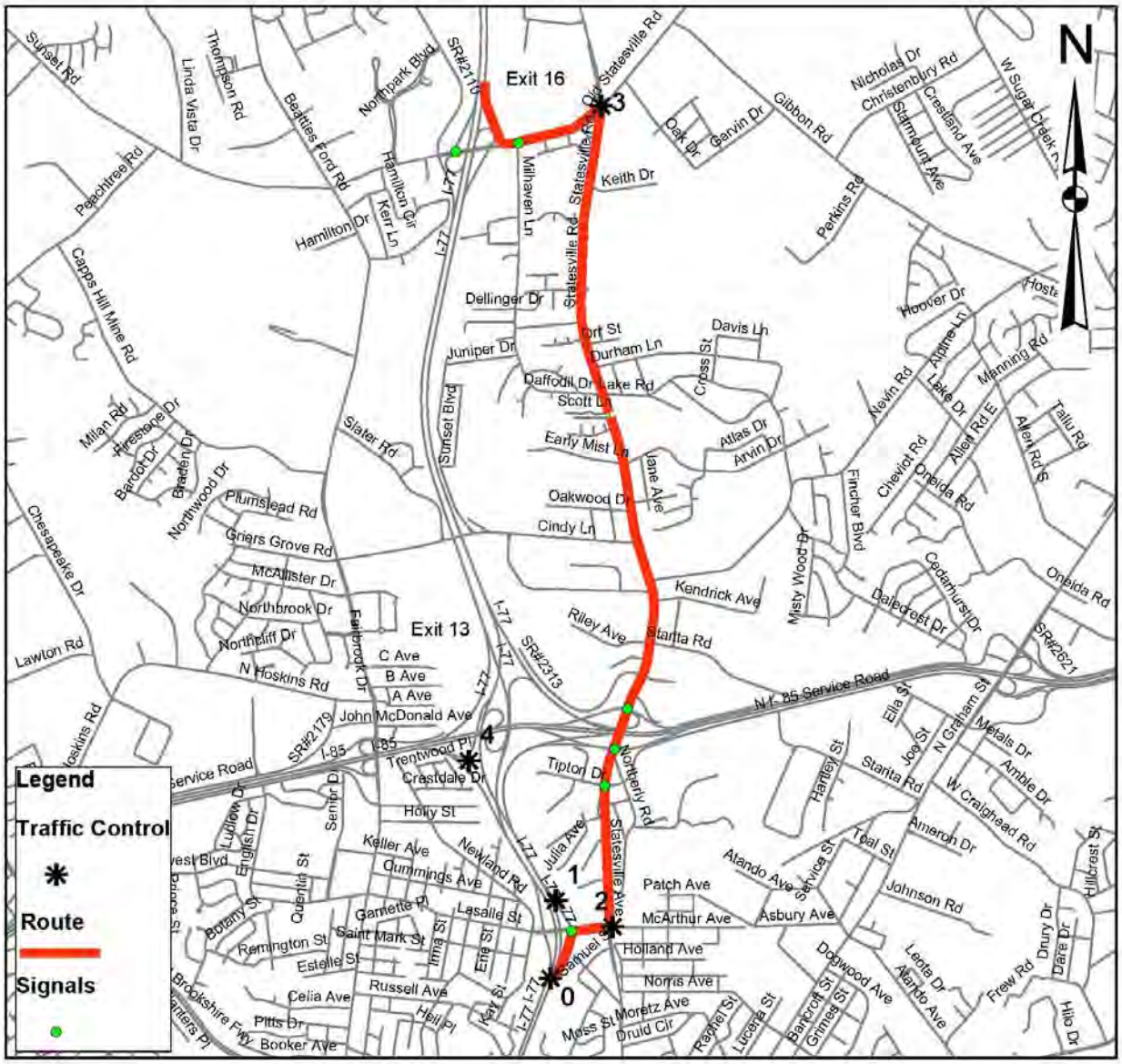
Message Signs To Use
CMS0-0I0077N0000.21
CMS0-0I0077N0005.54

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Ctr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Interchange Details
Brookshire Blvd and I-85

Exhibit Book 2 # 22-01

I-77 NB
Exit 13
I-85 Interchange
(Page 1/2)

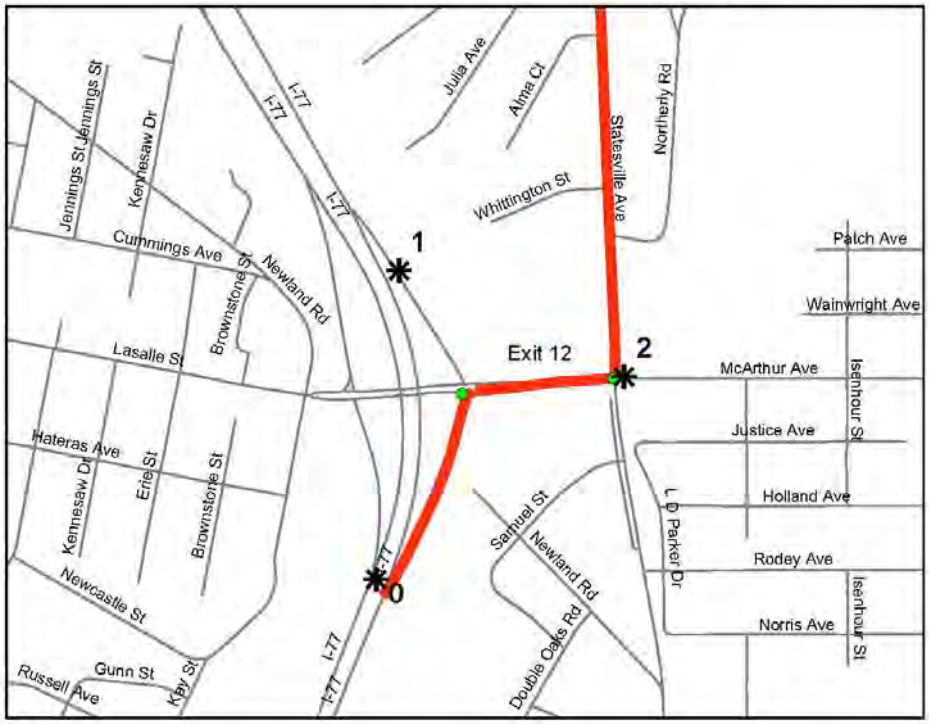


Detour Route
LaSalle St East to Statesville Ave North to Sunset Rd West to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic Onto LaSalle St	2
1	Close I-77 NB On Ramp from LaSalle St	1
2	Direct Traffic at LaSalle St and Statesville Ave	2
3	Direct Traffic at Statesville Ave and Sunset Rd	1
4	Close I-77 NB On Ramp from I-85NB	2

Exhibit Book 2 # 22-01

I-77 NB
Exit 13
I-85 Interchange
(Page 2/2)



N

Legend

Traffic Control ✱

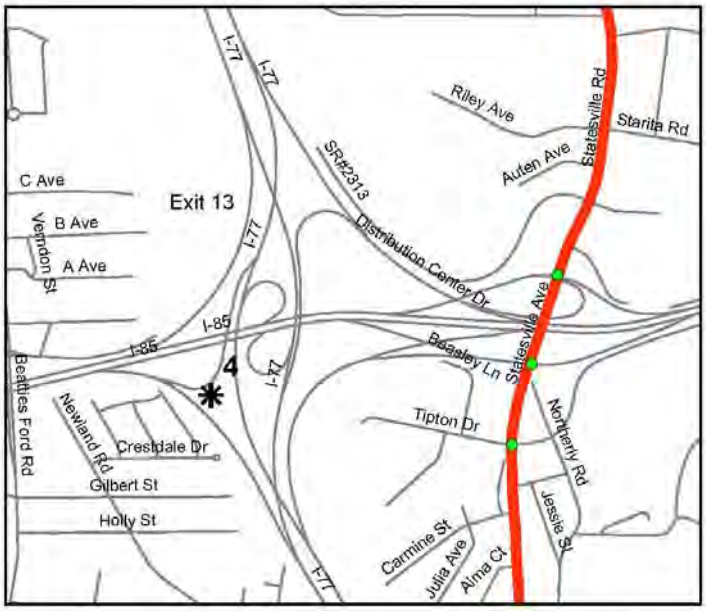
Route

Signals

Interchange Details - Exits 12
Traffic Control Points 0, 1, & 2

Message Signs To Use
CMS0-0I0077N0005.54
CMS0-0I0077N0011.97

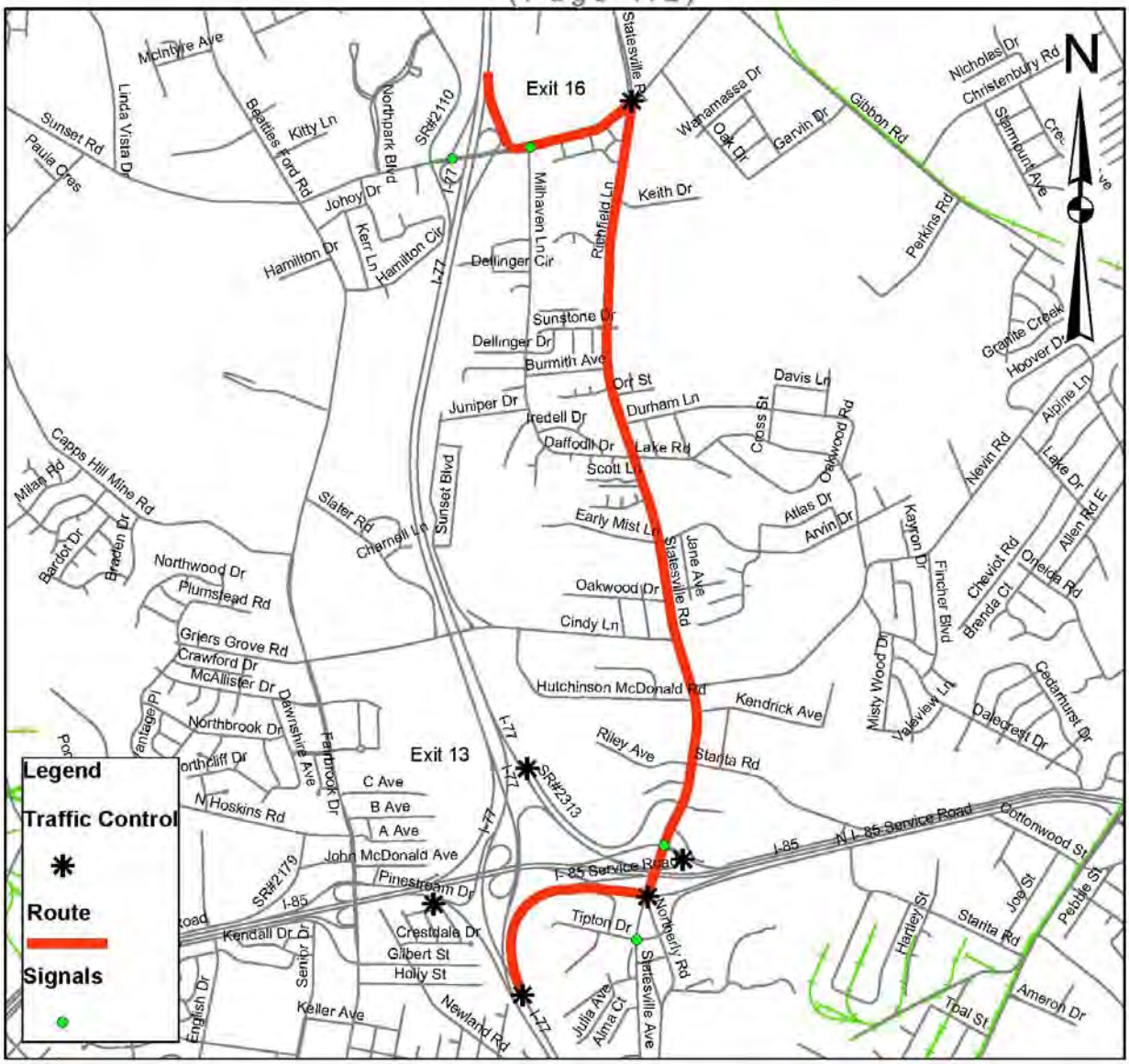
Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Ctr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141



Interchange Details - Exits 13
Traffic Control Points 4

Exhibit Book 2 # 22-01

I-77 NB
Exit 13 to Exit 16
I-85 to Sunset Rd
(Page 1/2)

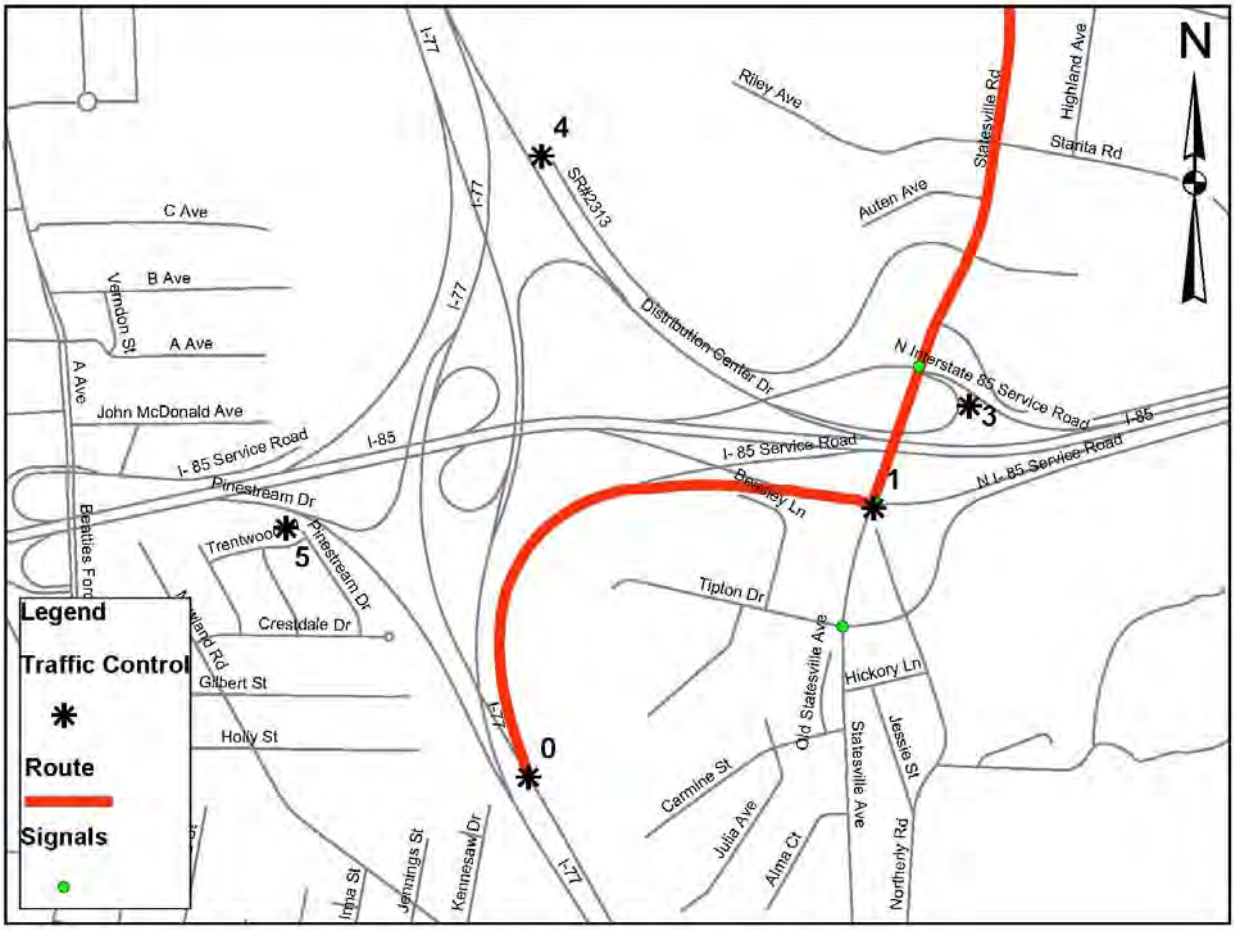


Detour Route
I-85 NB to Statesville Ave North to Sunset Rd West to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic Onto Ramp to I-85 NB and Statesville Ave	2
1	Direct Traffic at Off Ramp and Statesville Ave	2
2	Direct Traffic at Statesville Ave and Sunset Rd	2
3	Close I-77 NB On Ramp from Statesville Ave	1
4	Close I-77 NB On Ramp from I-85 SB	1
5	Close I-77 NB On Ramp from I-85 NB	1

Exhibit Book 2 # 22-01

I-77 NB
Exit 13 to Exit 16
I-85 to Sunset Rd
(Page 2/2)



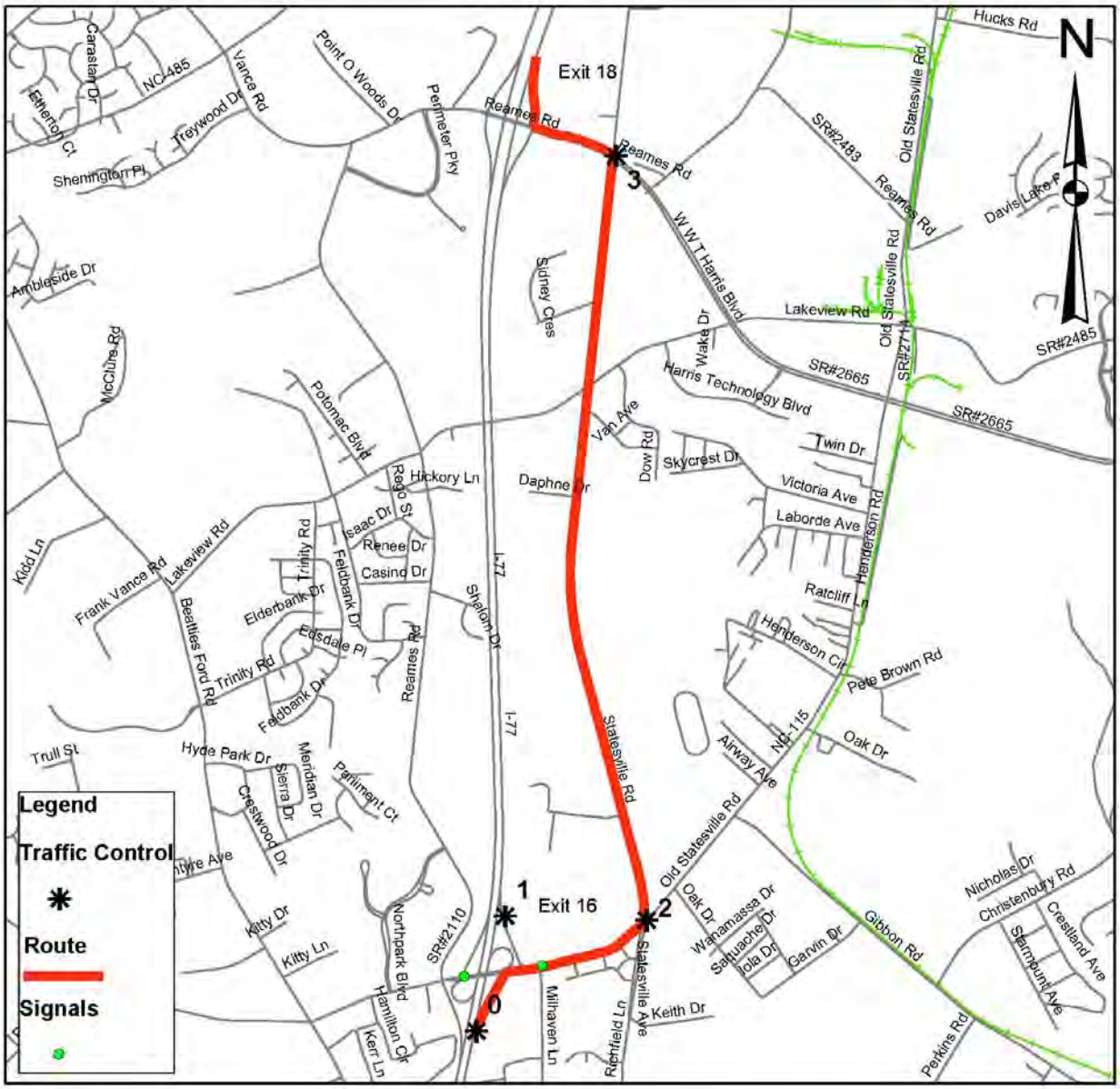
Interchange Details - Exits 13
Traffic Control Points 0, 1, 3, 4, & 5

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077N0005.54
CMS0-0I0077N0011.97

Exhibit Book 2 # 22-01

I-77 NB
Exit 16 to Exit 18
Sunset Rd to NC 24 (Harris Blvd)
(Page 1/2)

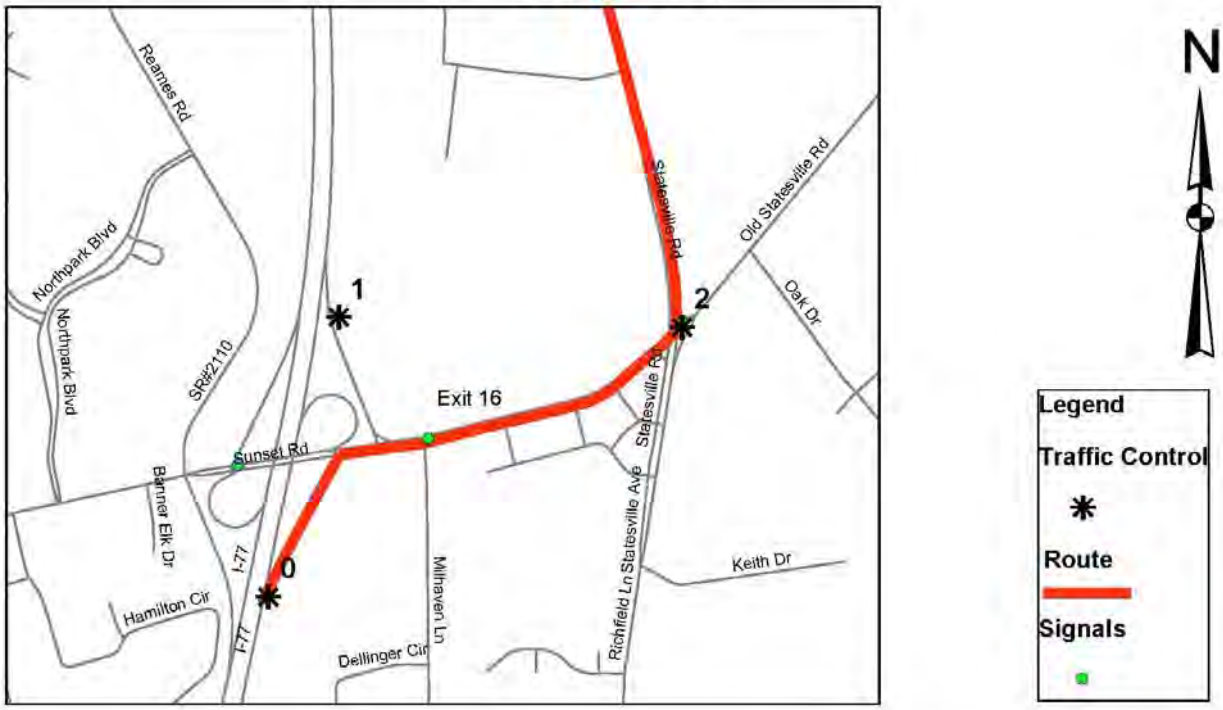


Detour Route
Sunset Rd East to US 21 (Statesville Rd) North to NC 24 (Harris Blvd) West to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic Onto Sunset Rd	2
1	Close I-77 NB On Ramp from Sunset Rd	1
2	Direct Traffic at Sunset Rd and US 21 (Statesville Rd)	1
3	Direct Traffic at US 21 (Statesville Rd) and NC 24 (Harris Blvd)	1

Exhibit Book 2 # 22-01

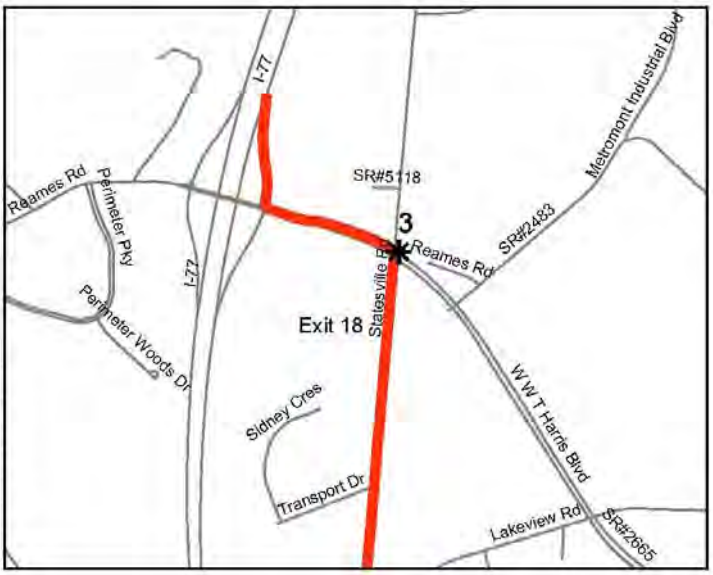
I-77 NB
Exit 16 to Exit 18
Sunset Rd to NC 24 (Harris Blvd)
(Page 2/2)



Interchange Details - Exits 16
Traffic Control Points 0, 1, & 3

Message Signs To Use
CMS0-0I0077N0005.54
CMS0-0I0077N0011.97

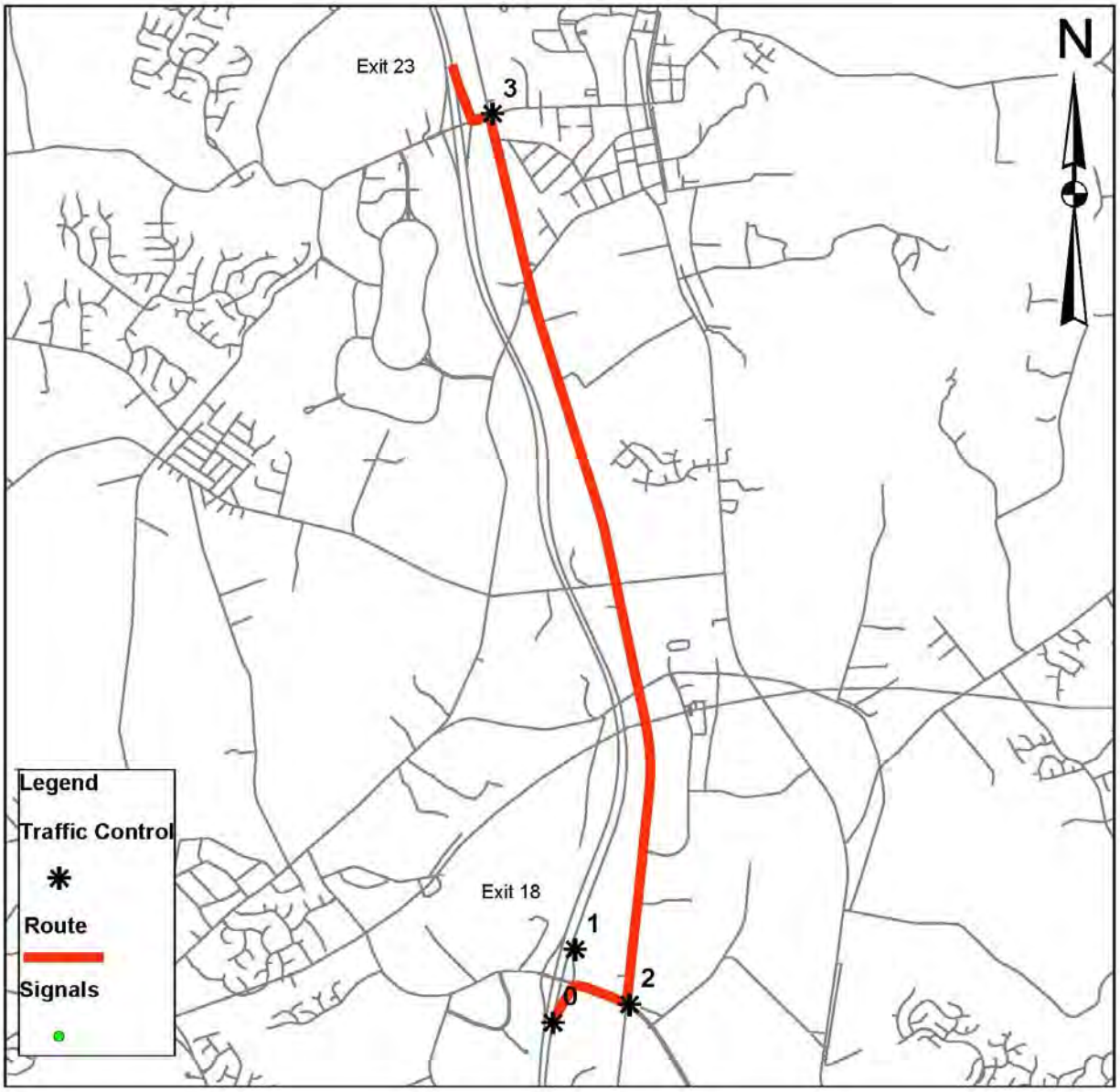
Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141



Interchange Details - Exits 18
Traffic Control Points 3

Exhibit Book 2 # 22-01

I-77 NB
Exit 18 to Exit 23
NC 24 (Harris Blvd) to Gilead Rd
(Page 1/2)

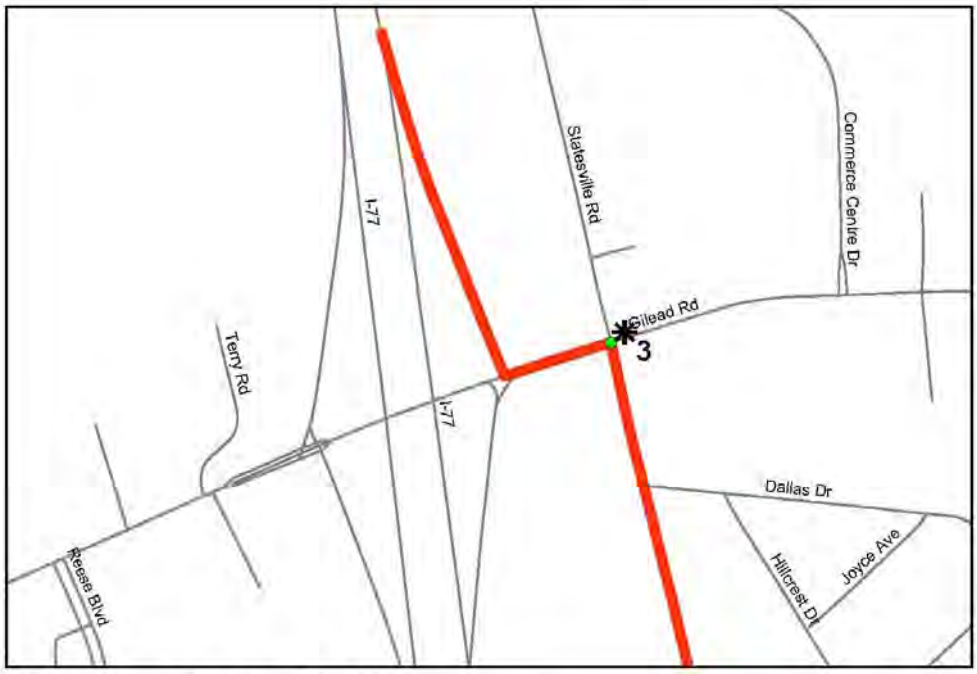


Detour Route
NC 24 (Harris Blvd) East to US 21 (Statesville Rd) North to Gilead Rd West to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic Onto NC 24 (Harris Blvd)	2
1	Close I-77 NB On Ramp from NC 24 (Harris Blvd0	1
2	Direct Traffic at NC 24 (Harris Blvd) and US 21 (Statesville Rd)	1
3	Direct Traffic at US 21 (Statesville Rd) and Gilead Rd	1

Exhibit Book 2 # 22-01

I-77 NB
Exit 18 to Exit 23
NC 24 (Harris Blvd) to Gilead Rd
(Page 2/2)



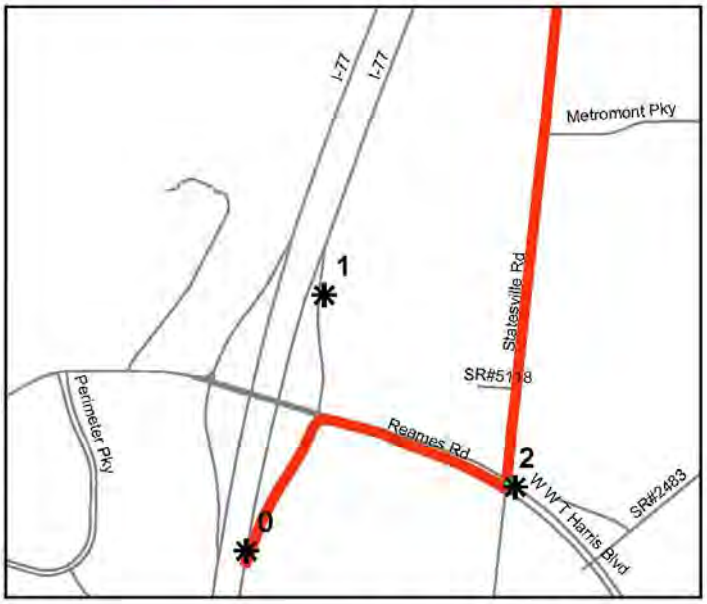
Legend

Traffic Control ✱

Route

Signals

Interchange Details - Exits 23
Traffic Control Points 3



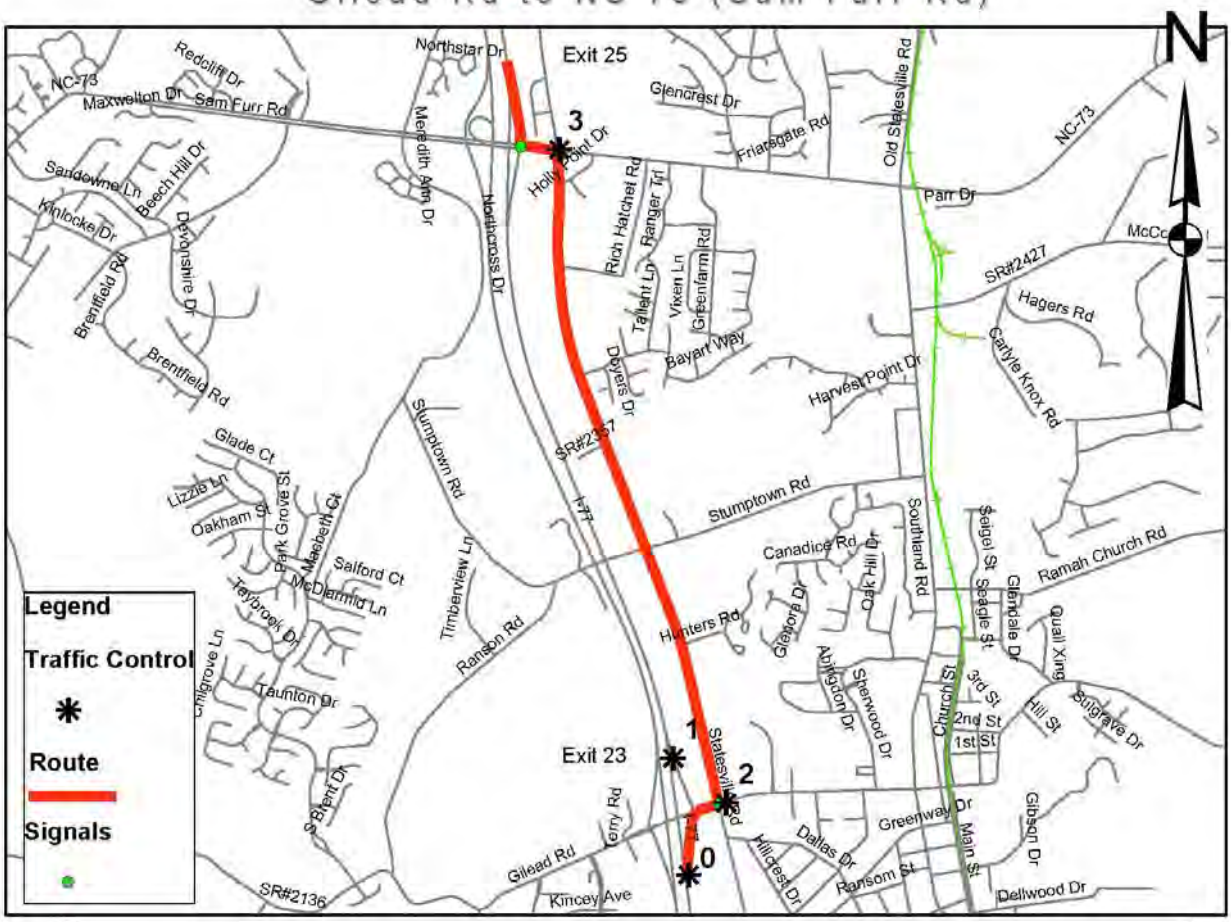
Interchange Details - Exits 18
Traffic Control Points 0, 1, & 2

Message Signs To Use
CMS0-0I0077N0011.97
CMS0-0I0077N0016.87

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Exhibit Book 2 # 22-01

I-77 NB
Exit 23 to Exit 25
Gilead Rd to NC 73 (Sam Furr Rd)



Detour Route
Gilead Rd East to US 21 (Statesville Rd) North to NC 73 (Sam Furr Rd) West to I-77 NB

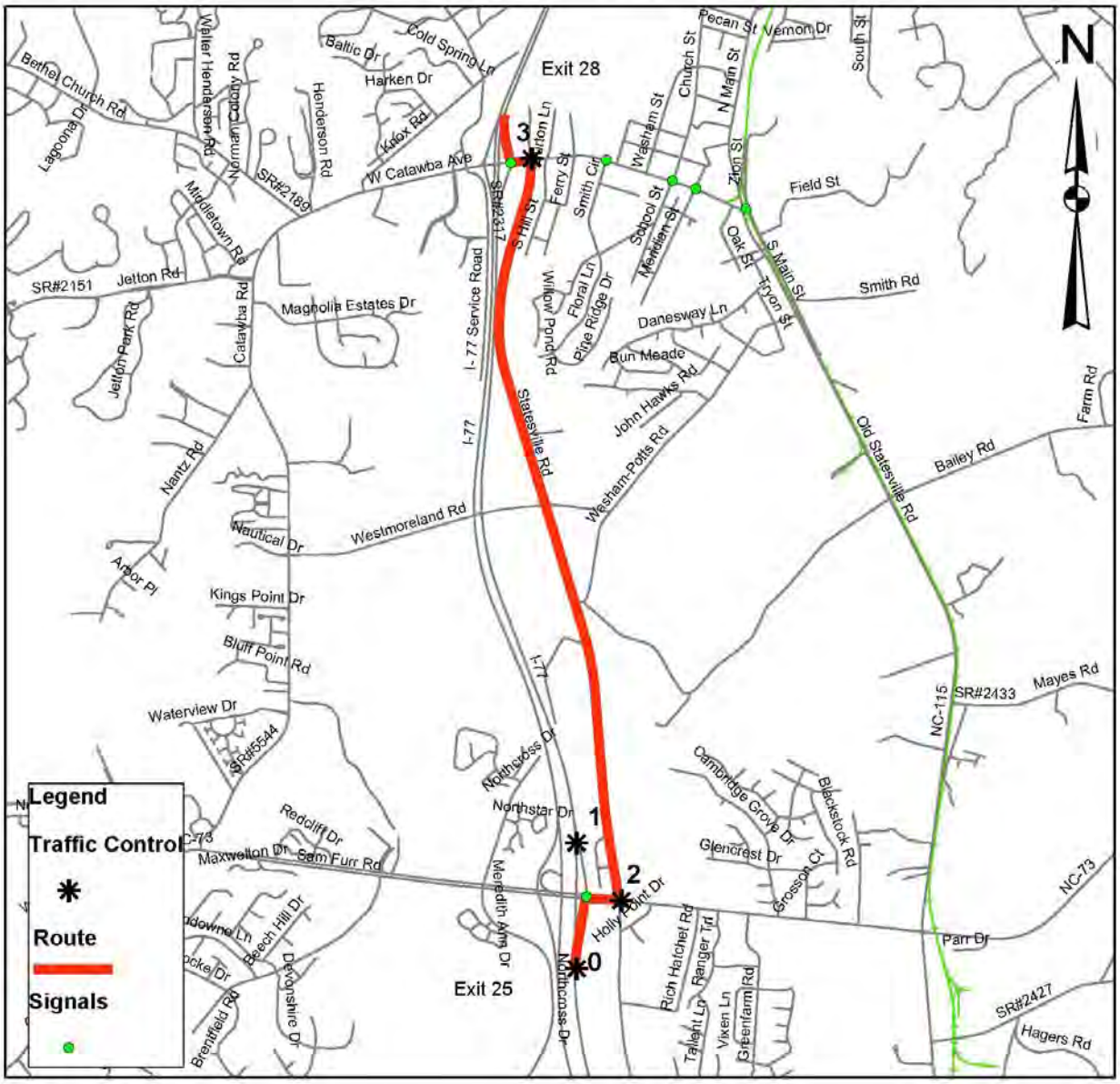
ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic onto Gilead Rd	2
1	Close I-77 NB On Ramp from Gilead	1
2	Direct Traffic at Gilead Rd and US 21 (Statesville Rd)	1
3	Direct Traffic at US 21 (Statesville Rd) and NC 73 (Sam Furr Rd)	1

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Ctr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077N0011.97
CMS0-0I0077N0016.87

Exhibit Book 2 # 22-01

I-77 NB
Exit 25 to Exit 28
Sam Furr Rd to Catawba Ave
(Page 1/2)

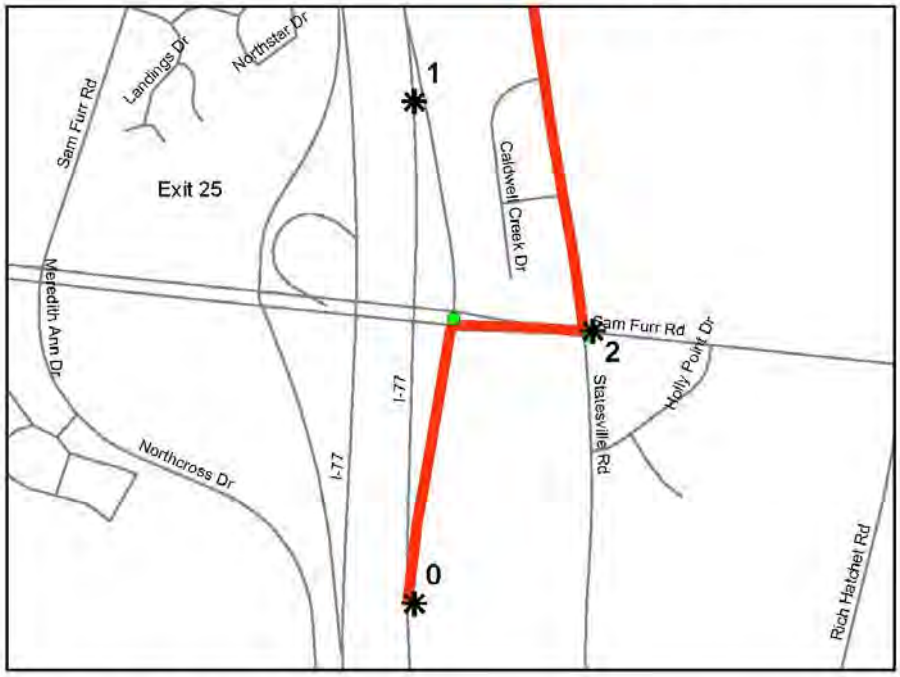


Detour Route
Catawba Ave East to NC 115 (Old Statesville Rd) North to Griffith St West to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic onto NC 73 (Sam Furr Rd)	2
1	Close I-77 NB On Ramp from NC 73 (Sam Furr Rd)	1
2	Direct Traffic at NC 73 (Sam Furr Rd) and US 21 (Statesville Rd)	1
3	Direct Traffic at US 21 (Statesville Rd) and Catawba Ave	1

Exhibit Book 2 # 22-01

I-77 NB
Exit 25 to Exit 28
Sam Furr Rd to Catawba Ave
(Page 2/2)



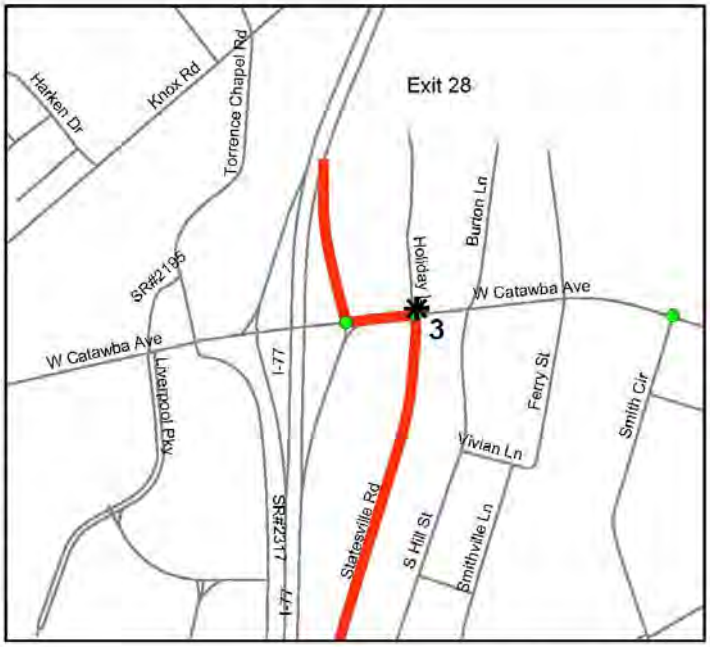
Legend

Traffic Control ✱

Route

Signals

Interchange Details - Exits 25
Traffic Control Points 0, 1, & 2



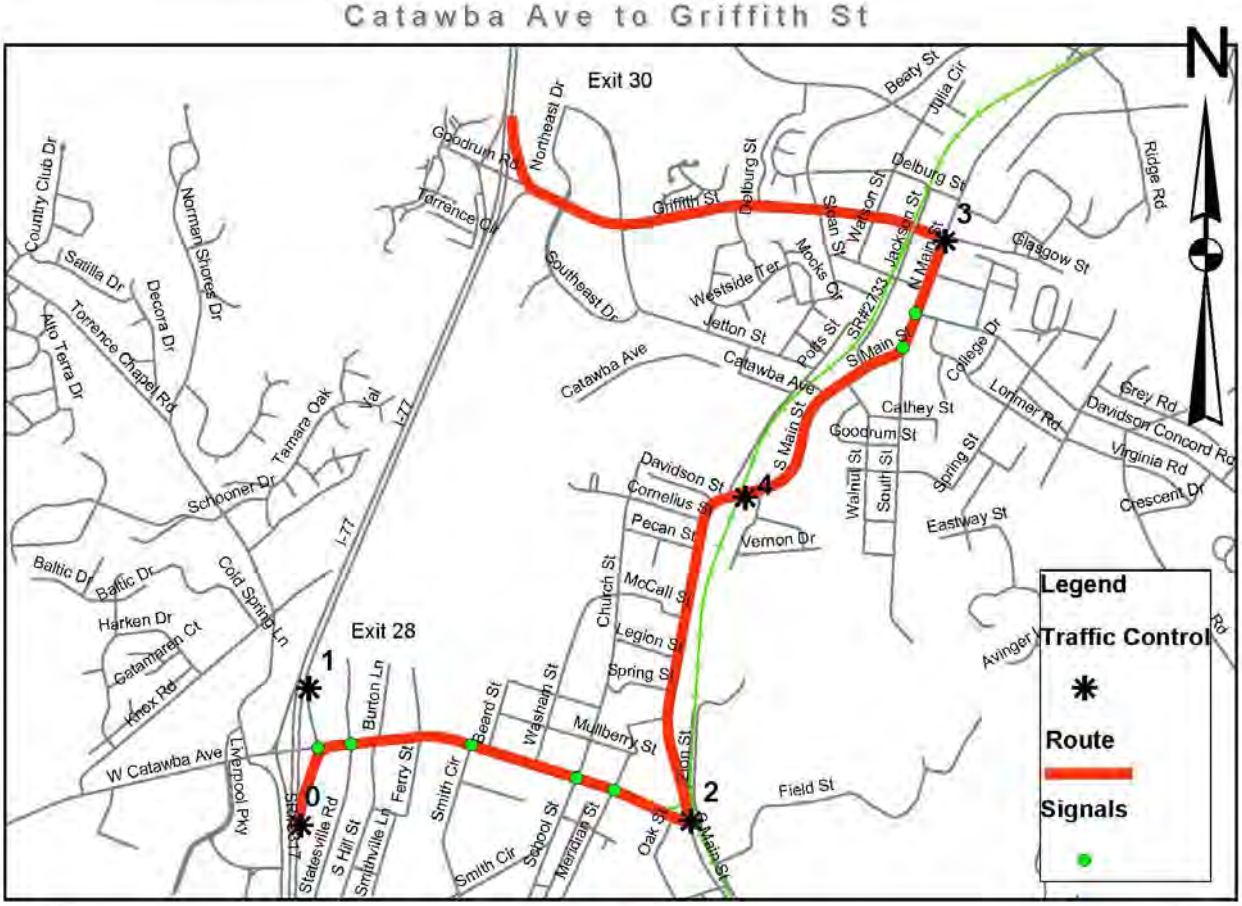
Message Signs To Use
CMS0-0I0077N0011.97
CMS0-0I0077N0016.87

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Interchange Details - Exits 28
Traffic Control Points 3

Exhibit Book 2 # 22-01

I-77 NB
Exit 28 to Exit 30
Catawba Ave to Griffith St



Detour Route
Catawba Ave East to NC 115 (Old Statesville Rd) North to Griffith St West to I-77 NB

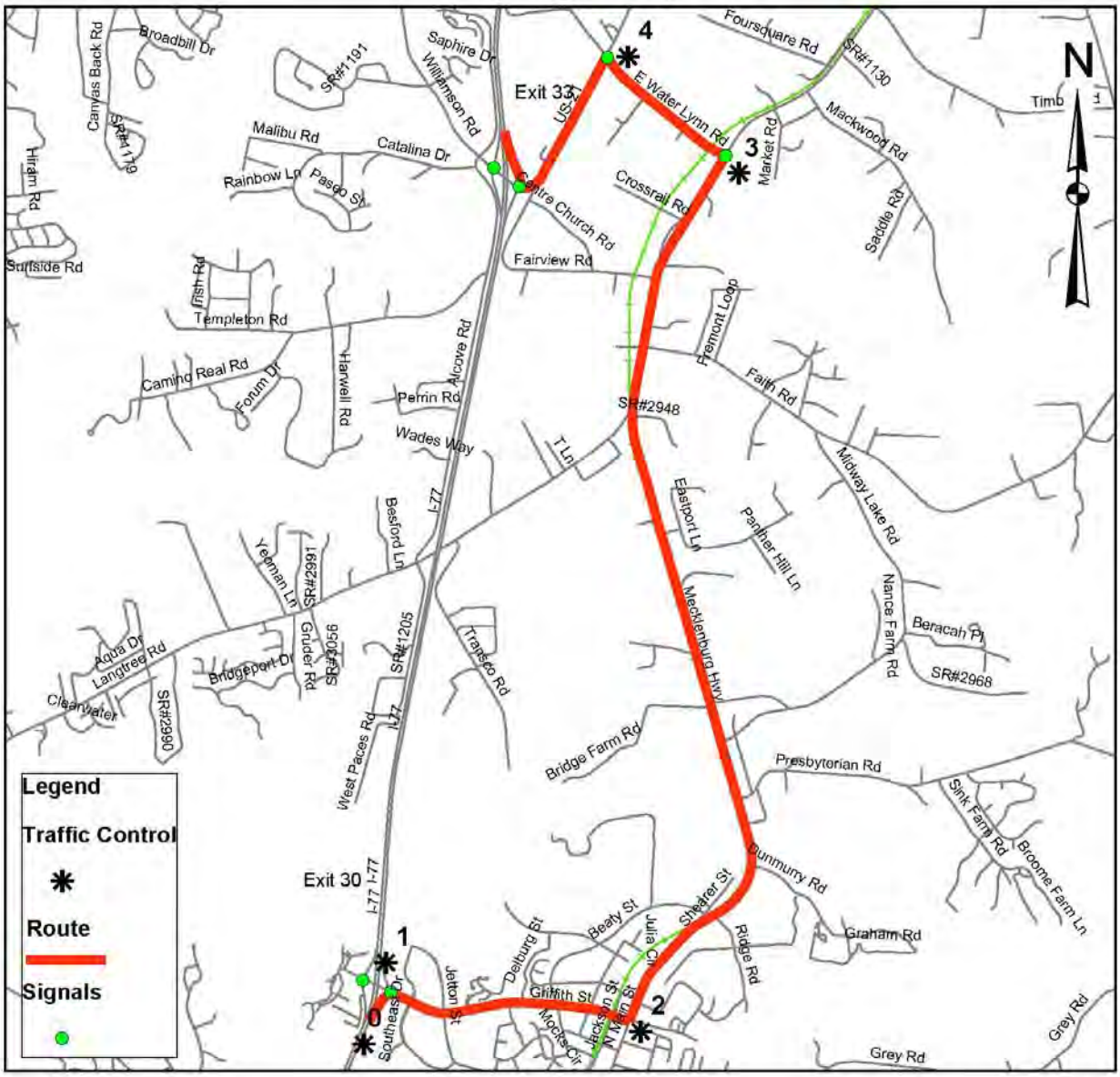
ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic onto Cataw ba Ave	2
1	Close I-77 NB On Ramp from Cataw ba Ave	1
2	Direct Traffic at Cataw ba and NC 115 (Old Statesville Rd)	1
3	Direct Traffic at NC 115 (Old Statesville Rd) and Griffith St	1
4	Monitor Railroad Underpass on NC 115 for w ide load traffic	1

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077N0011.97
CMS0-0I0077N0016.87

Exhibit Book 2 # 22-01

I-77 NB
Exit 30 to Exit 33
Griffith St to Williamson Rd
(Page 1/2)

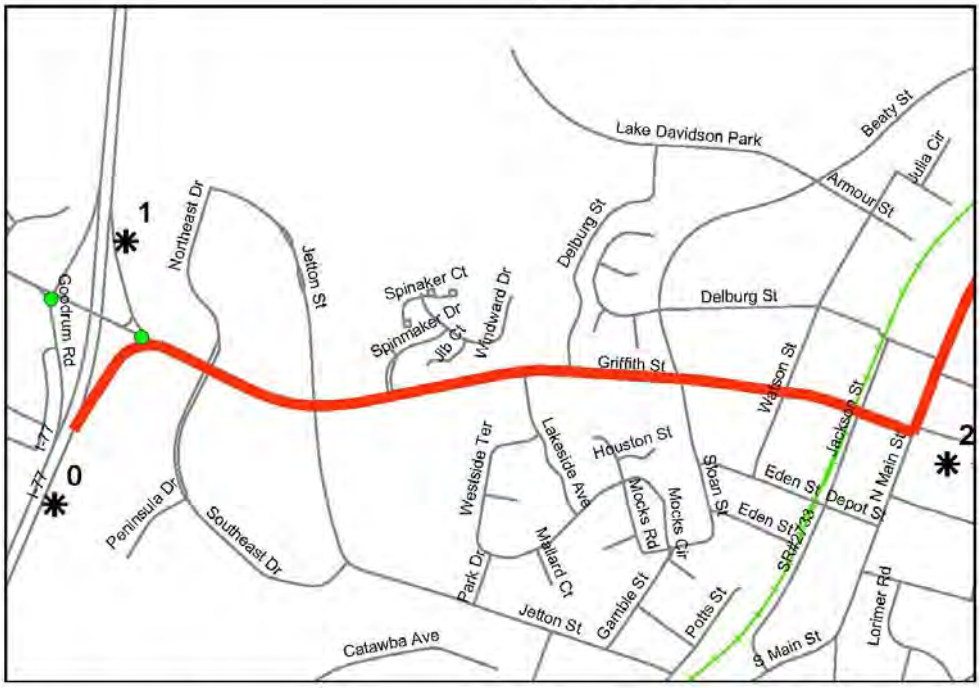


Detour Route
Griffith St East to NC 115 (Old Statesville Rd) North to Waterlynn Rd West to US 21 South to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic Onto Griffith St	2
1	Close I-77 NB On Ramp at Griffith St	1
2	Direct Traffic at Griffith St and NC 115 (Old Statesville Rd)	1
3	Direct Traffic at NC 115 (Old Statesville Rd) and Waterlynn Rd	1
4	Direct Traffic at Waterlynn Rd and Williamson Rd	1

Exhibit Book 2 # 22-01

I-77 NB
Exit 30 to Exit 33
Griffith St to Williamson Rd
(Page 2/2)



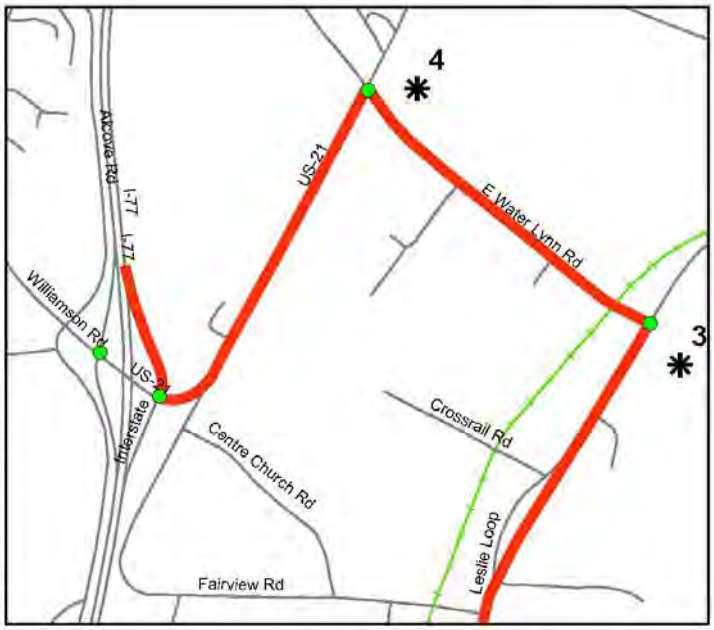
Legend

Traffic Control ✱

Route

Iredell Signals

Interchange Details - Exits 30
Traffic Control Points 0, 1, & 2



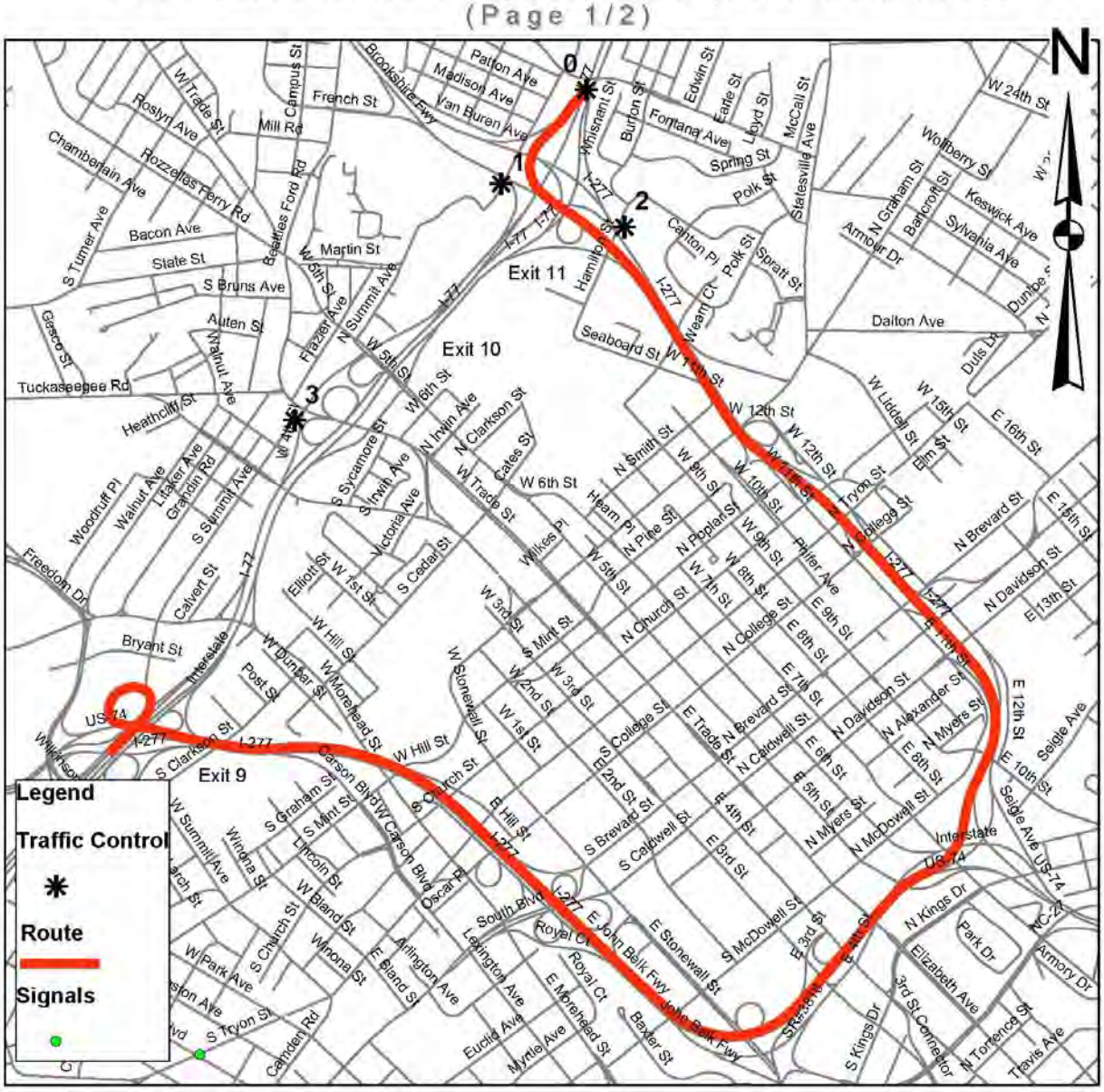
Interchange Details - Exits 33
Traffic Control Points 3 & 4

Message Signs To Use
CMS0-0I0077N0011.97
CMS0-0I0077N0016.87

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Exhibit Book 2 # 22-01

I-77 SB
Exit 11 to Exit 9
I-277 (Brookshire Frwy) to I-277 (John Belk Frwy)
(Page 1/2)

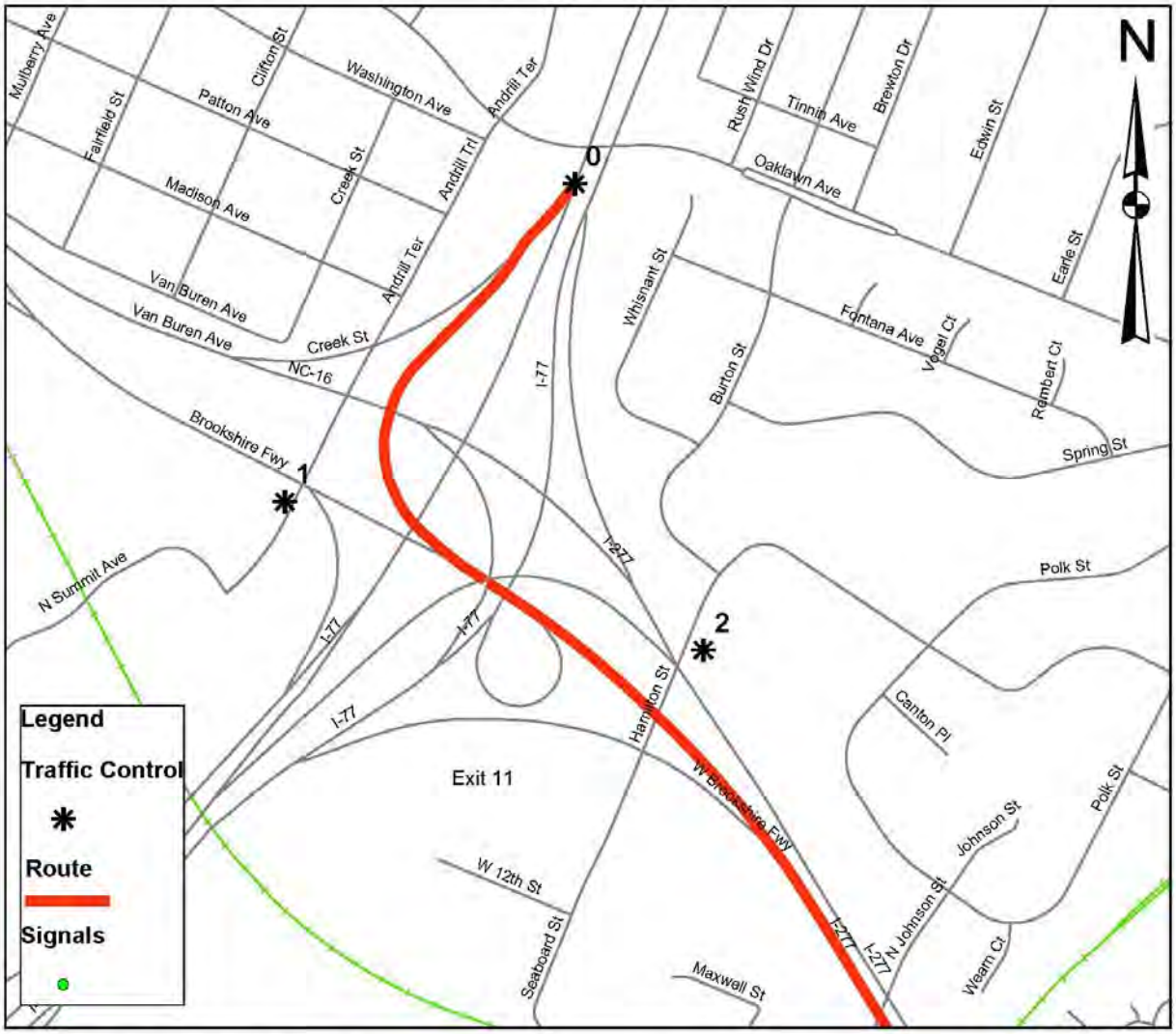


Detour Route
I-277 SB (Brookshire Frwy/John Belk Frwy) to I-77 SB Colector to I-77 SB

ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto I-277 SB (Brookshire Frwy)	2
1	Close I-77 SB On Ramp from NC 16 SB (Brookshire Frwy)	1
2	Close I-77 SB On Ramp from I-277 NB (Brookshire Frwy)	1
3	Close I-77 SB On Ramp from Trade St	1

Exhibit Book 2 # 22-01

I-77 SB
Exit 11 to Exit 9
I-277 (Brookshire Frwy) to I-277 (John Belk Frwy)
(Page 2/2)



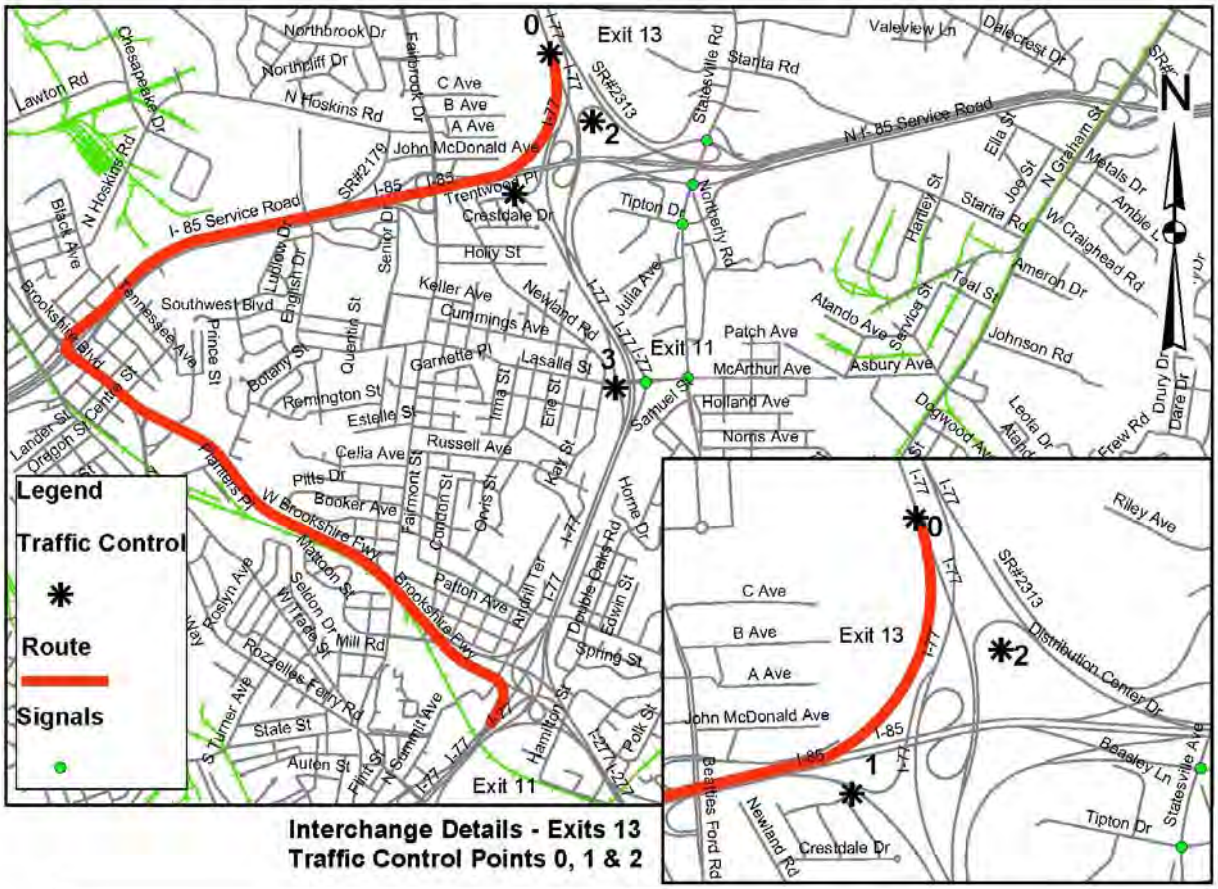
Interchange Details - Exits 11
Traffic Control Points 0, 1, 2

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077SB0014.45
CMS0-0I0077SB0011.97

Exhibit Book 2 # 22-01

I-77 SB
Exit 13 to Exit 11
I-85 to I-277 (Brookshire Frwy)



Detour Route
I-85 SB to NC 16 SB (Brookshire Frwy) to I-77 SB

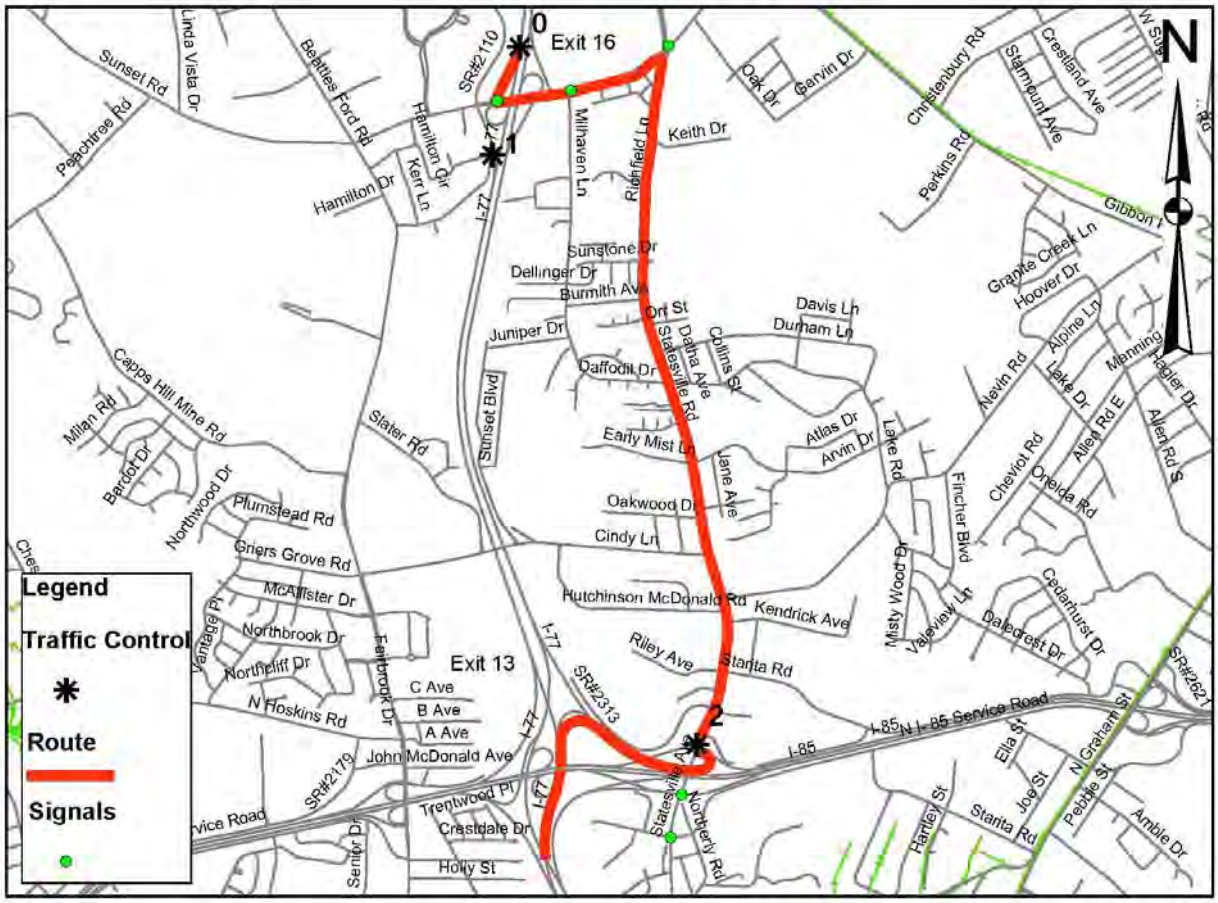
ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto I-85 SB	2
1	Close I-77 SB On Ramp from I-85 NB	1
2	Close I-77 SB On Ramp from I-85 SB	2
3	Close I-77 SB On Ramp from LaSalle St	1

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077SB0021.86
CMS0-0I0077SB0014.45

Exhibit Book 2 # 22-01

I-77 SB
Exit 16 to Exit 13
Sunset Rd to I-85



Detour Route
Sunset Rd East to Statesville Rd South to I-77 SB Access Ramp West to I-77 SB

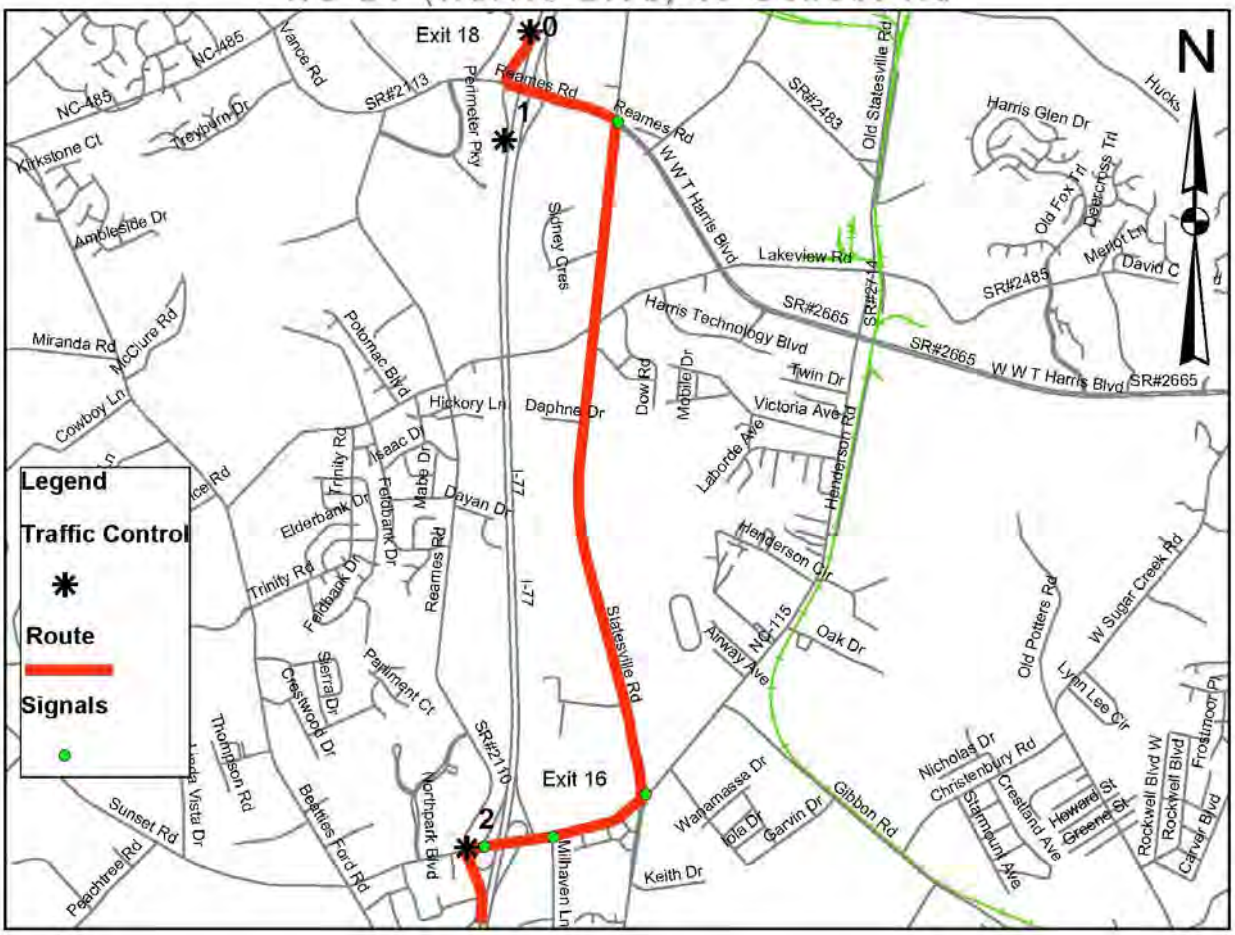
ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto Susnet Rd East	2
1	Close I-77 SB On Ramp from Sunset Rd	1
2	Direct Traffic at Statesville Ave and I-77 SB Access Ramp	2

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077SB0021.86

Exhibit Book 2 # 22-01

I-77 SB
Exit 18 to Exit 16
NC 24 (Harris Blvd) to Sunset Rd



Detour Route
NC 24 (Harris Blvd) East to US 21 (Statesville Rd) South to Sunset Rd West to I-77 SB

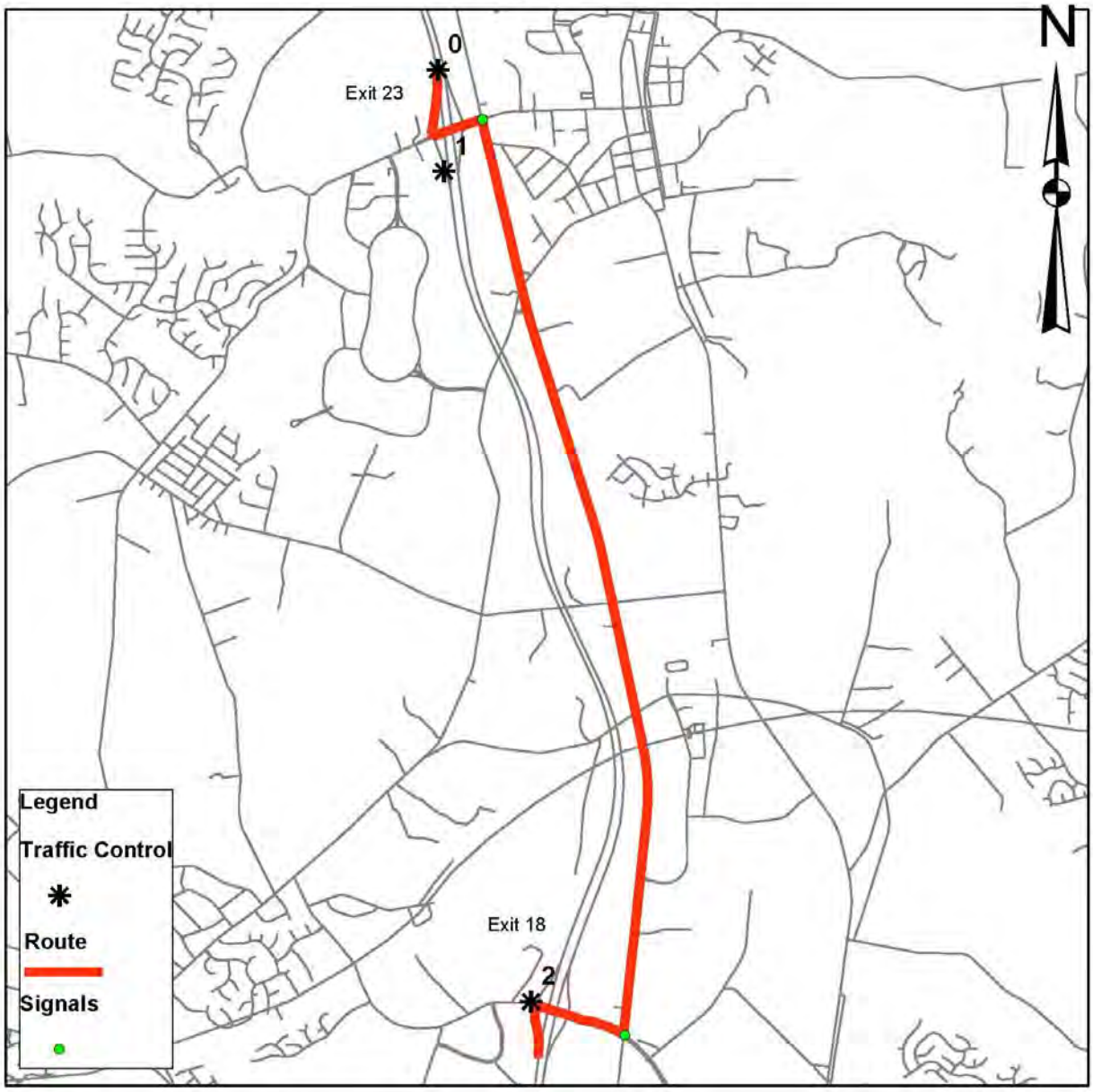
ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto NC 24 (Harris Blvd)	2
1	Close I-77 SB On Ramp from NC 24 (Harris Blvd), Direct Traffic at Ramp and NC 24	1
2	Direct Traffic at Sunset Rd and I-77 SB On Ramp	1

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Ctr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
CMS0-0I0077SB0021.86

Exhibit Book 2 # 22-01

I-77 SB
Exit 23 to 18
Gilead Rd to NC 24 (Harris Blvd)
(Page 1/2)

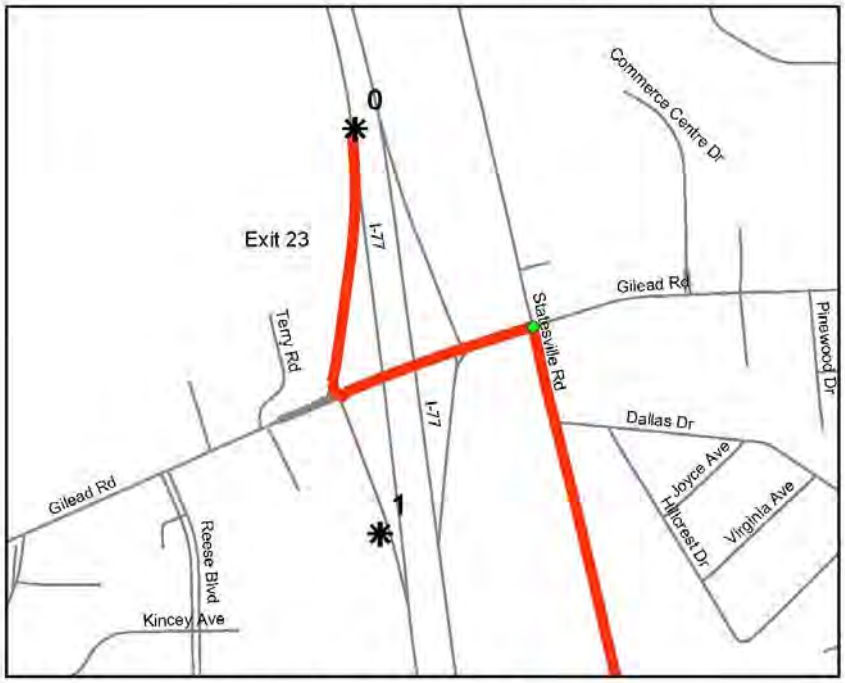


Detour Route
Gilead Rd East to US 21 (Statesville Rd) South to NC 24 (Harris Blvd) West to I-77 SB

ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto Gilead Rd	2
1	Close I-77 SB On Ramp from Gilead Rd, Direct Traffic at Ramp and Gilead Rd	1
2	Direct Traffic at NC 24 (Harris Blvd) and I-77 SB On Ramp	1

Exhibit Book 2 # 22-01

I-77 SB
Exit 23 to 18
Gilead Rd to NC 24 (Harris Blvd)
(Page 2/2)



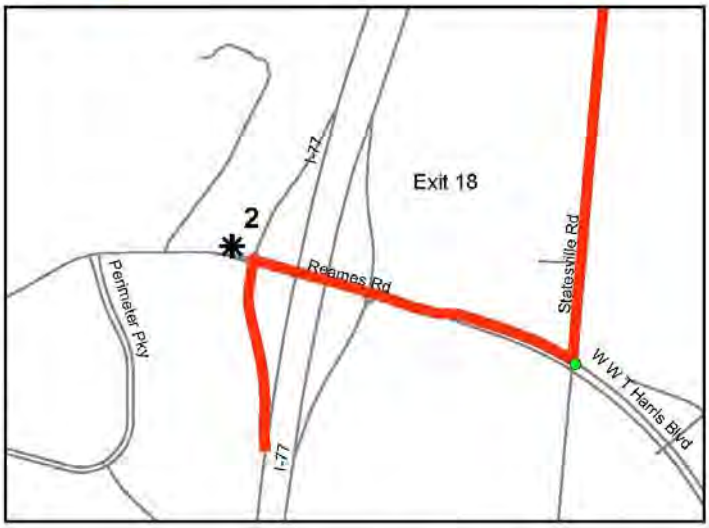
Legend

Traffic Control ✱

Route

Signals

Interchange Details - Exits 23
Traffic Control Points 0 & 1



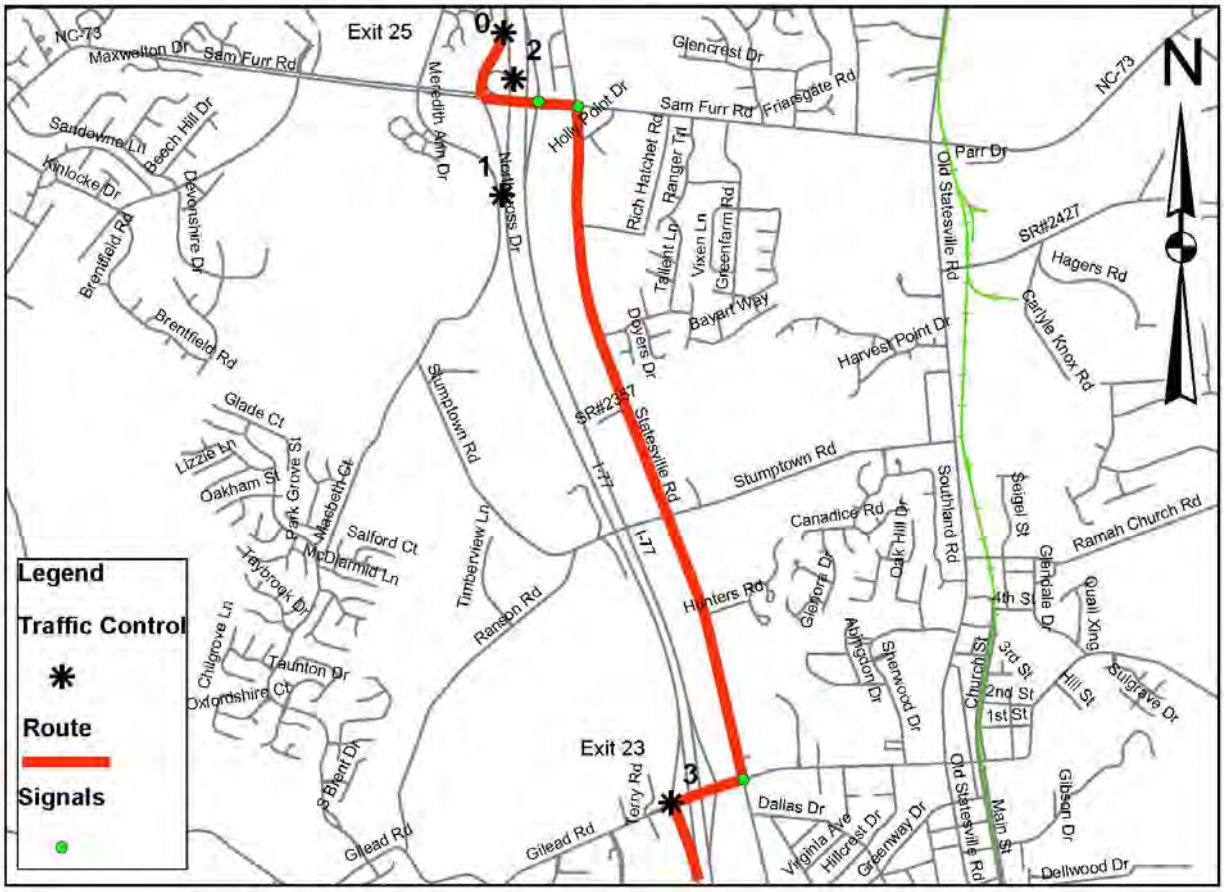
Interchange Details - Exits 18
Traffic Control Points 2

Message Signs To Use
Dak-77SBmm55

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Exhibit Book 2 # 22-01

I-77 SB
Exit 25 to Exit 23
Sam Furr Rd to Gilead Rd



Detour Route
NC 73 (Sam Furr Rd) East to US 21 (Statesville Rd) South to Gilead Rd West to I-77 SB

ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto NC 73 (Sam Furr Rd)	2
1	Close I-77 SB On Ramp from NC 73 (Sam Furr Rd) EB, Direct Traffic at Ramp and NC 73	1
2	Close I-77 SB On Ramp from NC 73 (Sam Furr Rd) WB	1
3	Direct Traffic at Gilead Rd and I-77 SB On Ramp	1

Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141

Message Signs To Use
Dak-77SBmm55

Exhibit 23-01

Mowing and Herbicide Policy and Guidelines

The Mowing and Herbicide Policy and Guidelines (Guidelines) establish a uniform standard of maintenance of highway roadside vegetation on a statewide basis commensurate with varying climates, topography, and grasses. The Guidelines integrate roadside vegetation management practices which utilize both mowing and herbicides to achieve an acceptable level of service in the most cost-effective manner. It is understood these guidelines cannot prescribe action for all situations; however the width of the roadside mowing, exclusive of interchanges, should be variable between 40 feet and 60 feet to provide an aesthetically acceptable appearance.

Policy:

NCDOT policy is to maintain State Highway System roadsides in a pleasing and safe condition commensurate with the function and service rendered by individual highway segments, other priority needs for highway maintenance and funds available. Grass height within established mowing zones will be maintained between four (4) inches and eighteen (18) inches along interstate, primary, major paved secondary and urban routes.

Mowing Cycles

A minimum four inch mowing height will be maintained with bahia, centipede, and bermuda or other low growing turf. All other areas of the state (cool season – fescue) will maintain a minimum six inch mowing height. Based on average growth rates, this level of service can be maintained on all interstate, primary, and major secondary routes by an average of five (5) annual mowing cycles but the number of mowing cycles will vary depending on the growing conditions. At least three (3) of these cycles should be conducted as routine mowing and up to two (2) cycles should be conducted as cleanup mowing as outlined in these guidelines.

The vegetation management plan shall be evaluated when deciding the starting dates for each mowing cycle. The first cycle is the most critical cycle of the entire mowing operation. Past experience has indicated if initial mowing cycle is delayed too long, it is likely that unsatisfactory results will persist through the balance of the year. Mowing cycles should begin before grass reaches ten (10) inches in height. Mowing cycle times will vary but not exceed five week intervals. An inactive period between cycles is acceptable, and the length of these periods will be dictated by turf growth, density, sight distance, and level of service required.

Routine Mowing

As a guide, perform routine mowing three times per year and continuing propagation of low growing turf species may reduce future cycles as needed. Routine mowing indicated on the typical sections should be conducted over the specified area only to maximize resources allocated for mowing. Excessive mowing beyond routine should be minimized.

Cleanup Mowing

Cleanup mowing will be performed within the limits in Attachment A. Effort should be placed on maintaining mowing patterns for consistency and safety. Cleanup mowing will be performed on the last mowing cycle of the season, and on either the first or second cycle.

Sight Distances

Sight distances are considered critical areas and should be maintained on every mowing cycle on interstate, primary, any secondary routes. All routes should be scheduled in accordance with normal priorities, i.e., interstate and major primary routes, minor primary and secondary collector routes, other paved secondary routes, and finally unpaved secondary routes.

Machine Clearing

Machine clearing utilizes heavy duty mowers with extension arms such as motorgrader mowers, A-boom mowers, and similar units for mowing beyond limits of routine mowing or in areas not accessible by regular mowers. The purpose of machine mowing is to provide a safe lateral clearance, maintain adequate safety sight distance, eliminate shady areas for snow removal purposes, and to provide an acceptable appearance beyond the limits of regular mowers.

It should be noted that the use of the equipment is not acceptable in all cases. A separate individual or crew may be required to hand cut or "dress up" particularly unsightly areas. In some urban or residential areas, hand cutting may be the required alternative. Additionally, special consideration is to be given when performing necessary tree maintenance around NC Champion Big Trees. Prior to trimming a Champion tree; consult with NCDOT prior to any trimming being performed.

When machine clearing, additional passes should be made to "mulch" debris, or it should be chipped or otherwise removed from the site. Every effort should be made to coordinate mowing and brush control herbicide treatments into a complete vegetation management program to attain the maximum productivity and longevity for each cycle.

Herbicide Treatments

Herbicide Treatment including plant growth regulators and selective species release programs have proven effective in managing roadside vegetation. Plant growth regulators, properly timed, can provide reduced plant growth during the early season and ultimately reduce seed head growth. These treatments can potentially eliminate some mowing cycles needed on interstate and primary systems. The plant growth regulators also include weed control materials to assist with creating aesthetically pleasing turf with uniform height and unwanted species reduction.

Selective species release programs utilize herbicides and growth regulators to promote growth of low growing turf species and eliminate weedy growth that often triggers mowing activities.

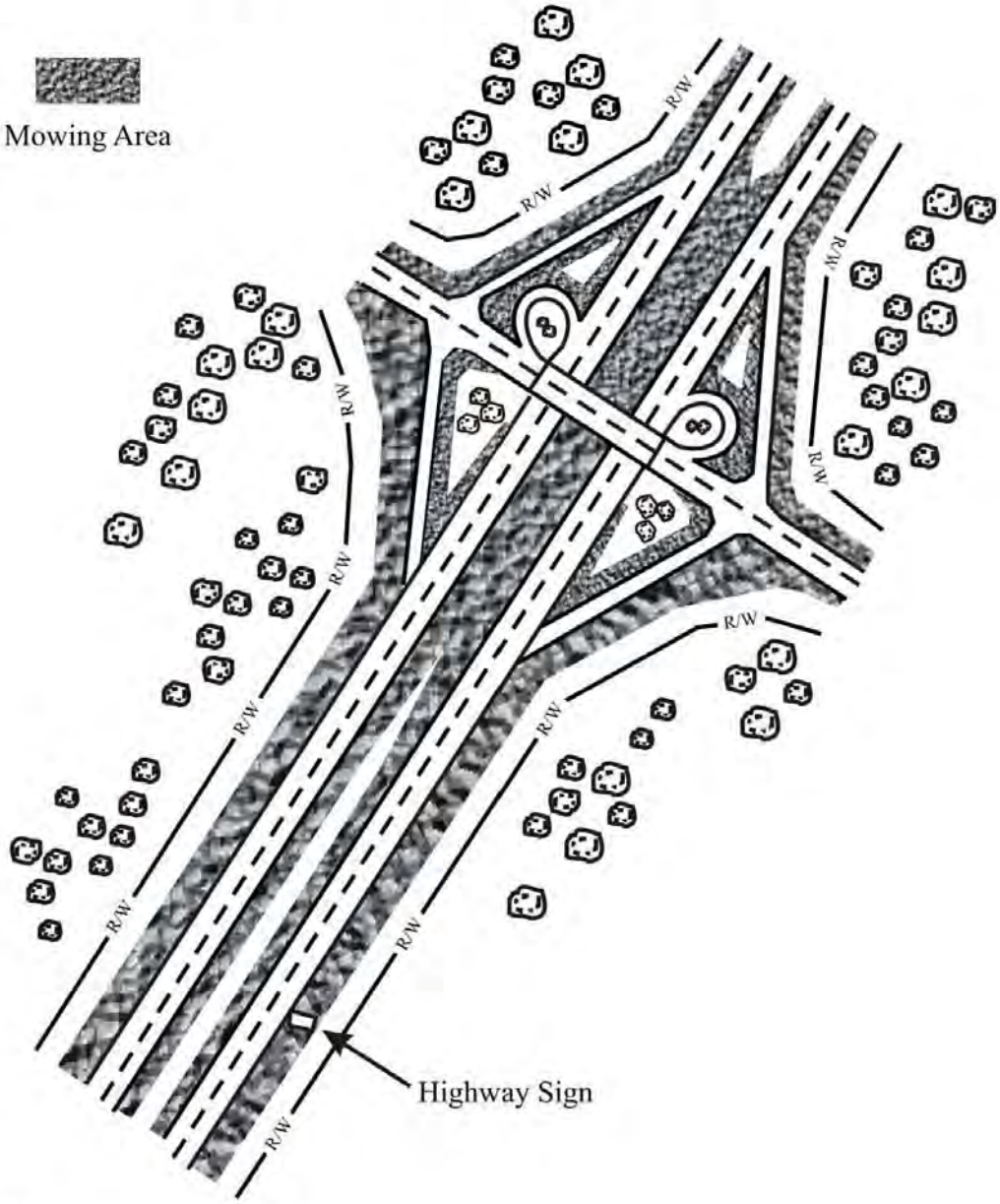
Herbicide treatment can be an effective tool to relieve mowing pressure on interstate and primary routes in early season and allow more attention for mowing secondary routes which can present sight distance problems quickly in the spring and early summer. General areas of use for treatments are as follows:

- under guardrail to control and eliminate vegetation;
- around sign supports and delineators to eliminate vegetation;
- at Bridge ends, around structures, signs, and along roadside backslopes to control woody vegetation;
- areas of routine mowing to eliminate weeds and particular "pest" plant varieties such as johnsongrass;

- areas of routine mowing to control growth of grass and to provide for "release" of desired grass varieties;
- along fence lines to eliminate vegetation;
- on paved Shoulders and island areas to eliminate growth of grass and weeds from joint/crack areas; and,
- around facilities to reduce hand labor needed to control weeds and brush.

TYPICAL SECTIONS

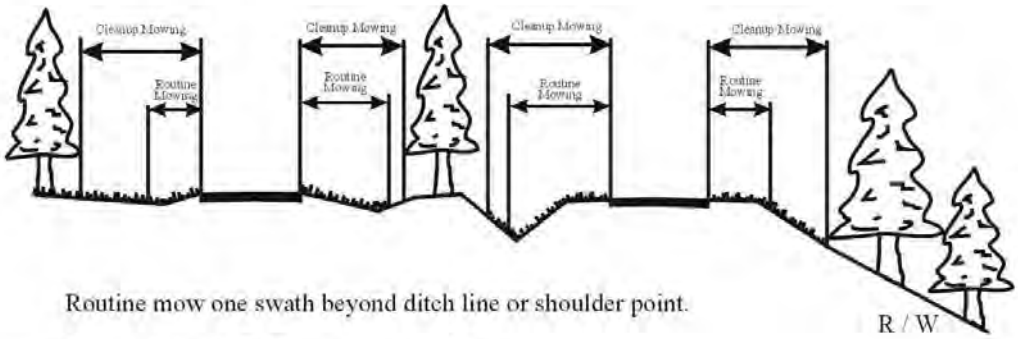
TYPICAL MULTI-LANE HIGHWAY



Note:
On divided highways, mowing in the median shall be performed in accordance with the established mowing patterns.

TYPICAL FOUR LANE HIGHWAY SECTION SPREAD MEDIAN

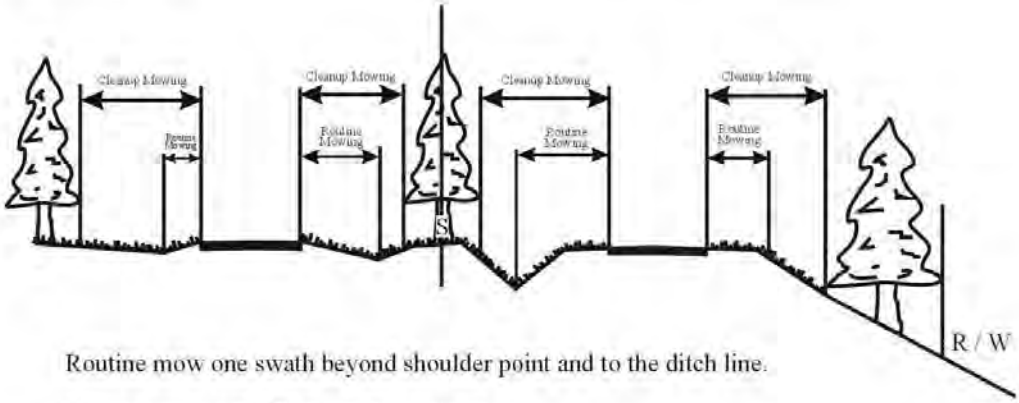
For Swath Contracts:



Routine mow one swath beyond ditch line or shoulder point.

Cleanup mow to R/W or mowing pattern.

For Ditch Contracts:



Routine mow one swath beyond shoulder point and to the ditch line.

Cleanup mow to R/W or mowing pattern.

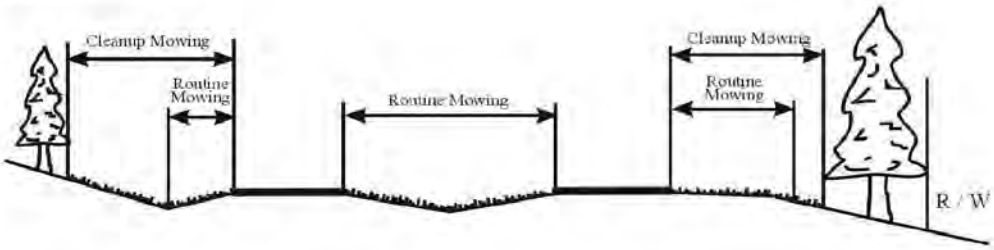
TYPICAL FOUR LANE HIGHWAY SECTION NARROW MEDIAN

For Swath Contracts:

Routine mow one swath beyond ditch line or shoulder point.

Cleanup mow to R/W or mowing pattern.

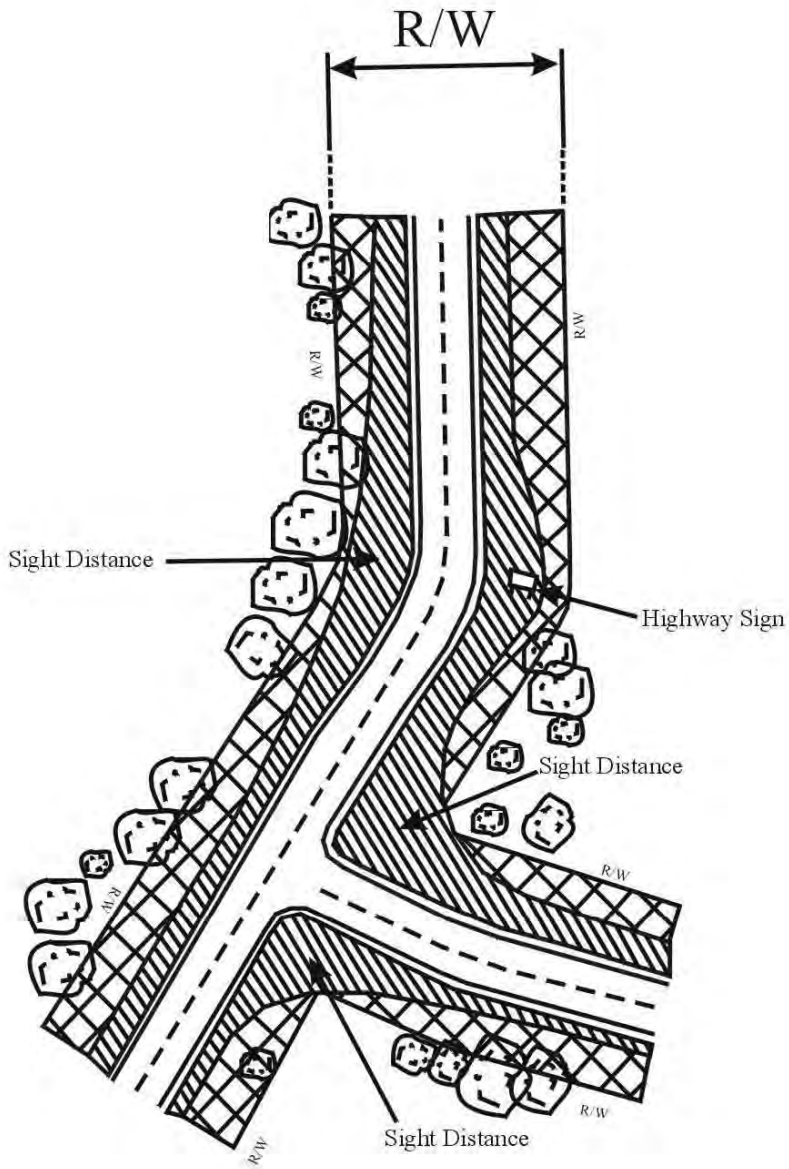
For Ditch Contracts:



Routine mow one swath beyond shoulder point and to the ditch line.

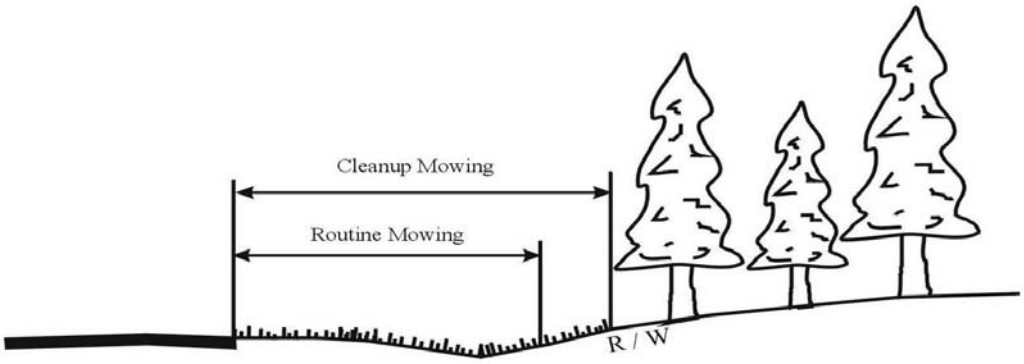
Cleanup mow to R/W or mowing pattern.

TYPICAL TWO LANE HIGHWAY



TYPICAL CUT SECTION WITH SLOPE FLATTER THAN 2:1

For Swath Contracts:

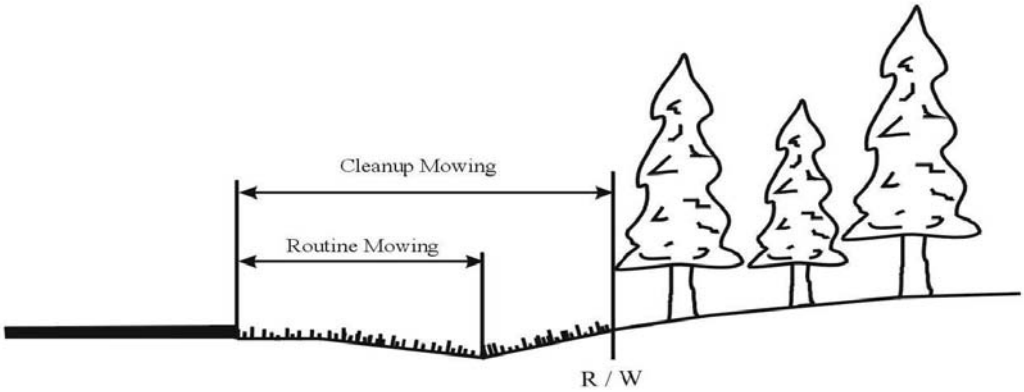


TYPICAL CUT SECTION WITH SLOPE FLATTER THAN 2:1

Routine mowing to one swath beyond ditch line.

Cleanup mow to established mowing pattern line or R/W.

For Ditch Contracts:



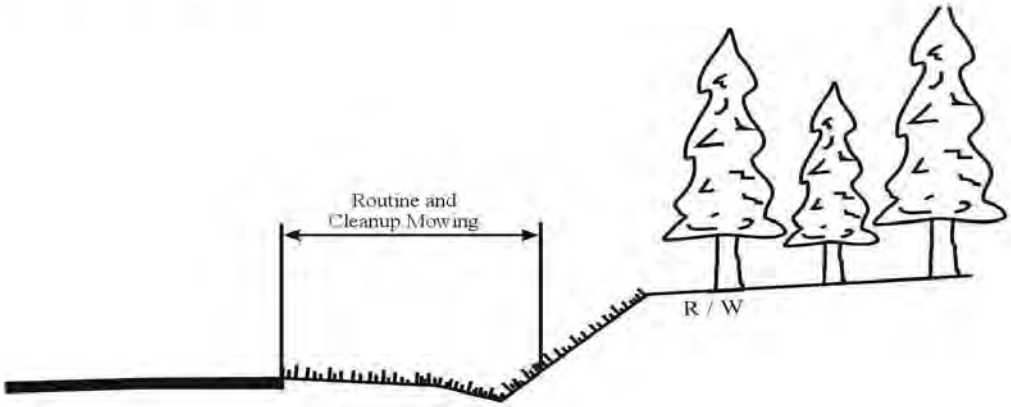
TYPICAL CUT SECTION WITH SLOPE FLATTER THAN 2:1

Routine mowing to ditch line.

Cleanup mow to established mowing pattern line or R/W.

TYPICAL CUT SECTION WITH SLOPE 2:1 AND STEEPER

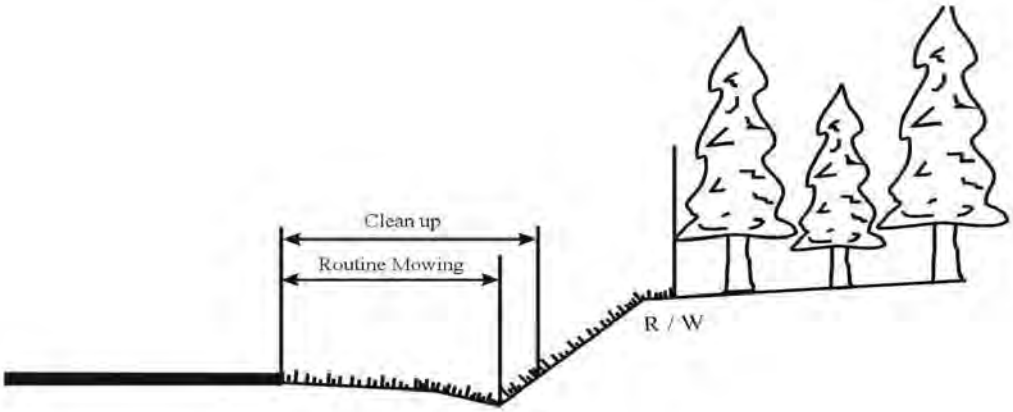
For Swath Contracts:



TYPICAL CUT SECTION WITH SLOPE 2:1 AND STEEPER.

Routine and cleanup mowing to ditch line and one swath onto cut slope.

For Ditch Contracts:

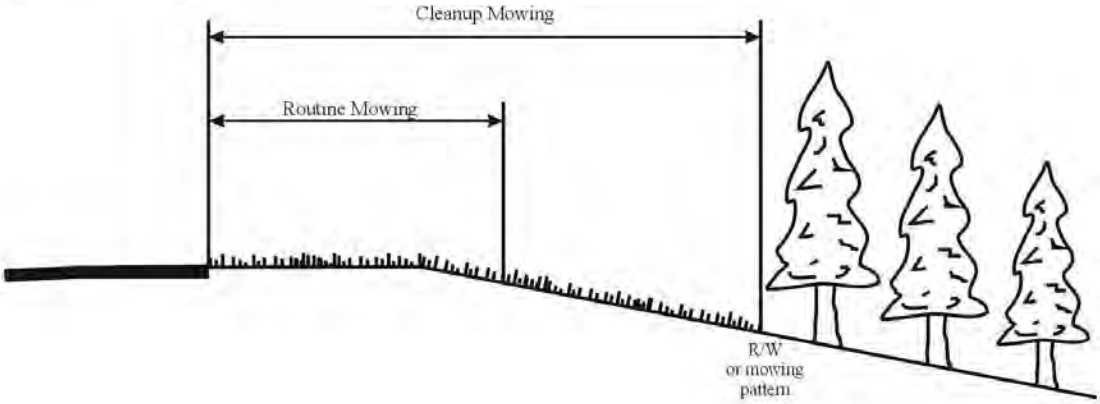


TYPICAL CUT SECTION WITH SLOPE 2:1 AND STEEPER.

Routine mowing to ditch line.
Clean up mowing one swath up cut slope.

TYPICAL FILL SECTION WITH SLOPE FLATTER THAN 2:1

For Swath and Ditch Contracts:

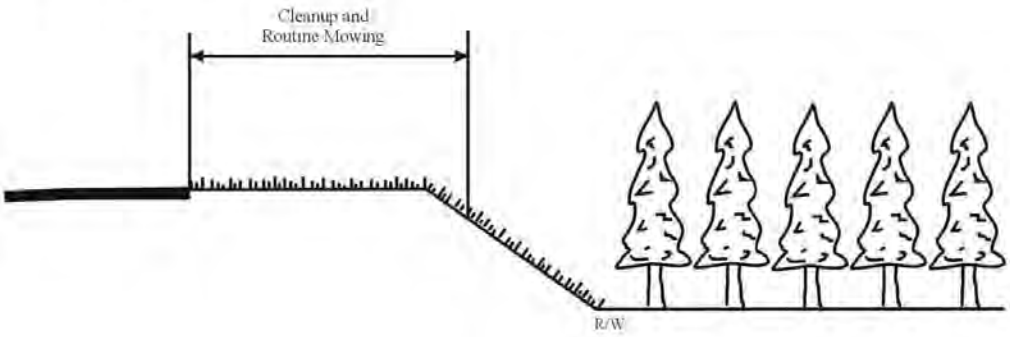


TYPICAL FILL SECTION WITH SLOPE FLATTER THAN 2:1.

Routine mow one swath beyond shoulder point.
Cleanup mow to R/W or mowing pattern.

TYPICAL FILL SECTION WITH SLOPE 2:1 AND STEEPER

For Swath and Ditch Contracts:

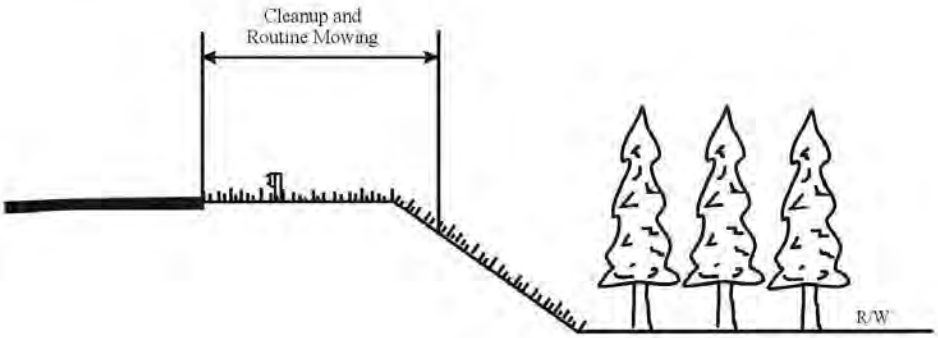


TYPICAL FILL SECTION WITH SLOPE 2:1 AND STEEPER.

Routine and cleanup mow shoulder and one swath beyond shoulder point.

TYPICAL FILL SECTION WITH ROOM BEHIND GUARDRAIL FOR MOWER

For Swath and Ditch Contracts:

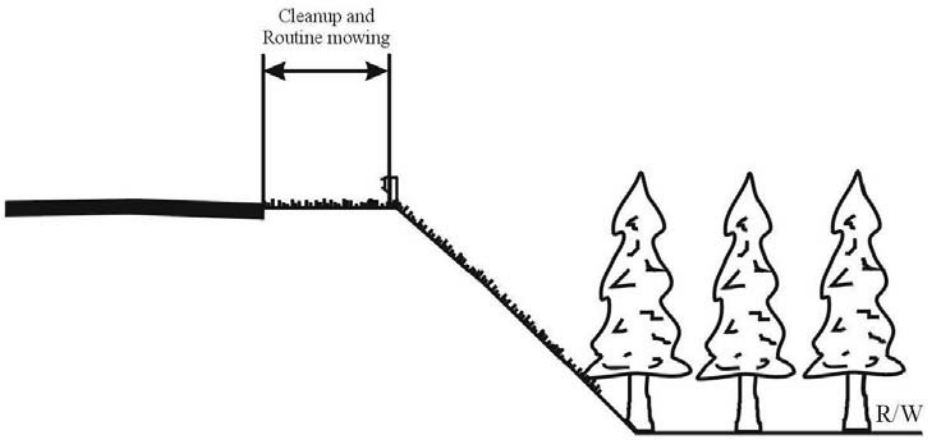


TYPICAL FILL SECTION WITH ROOM BEHIND GUARDRAIL FOR MOWER.

Routine and cleanup mow one swath behind guardrail and one swath down fill slope.

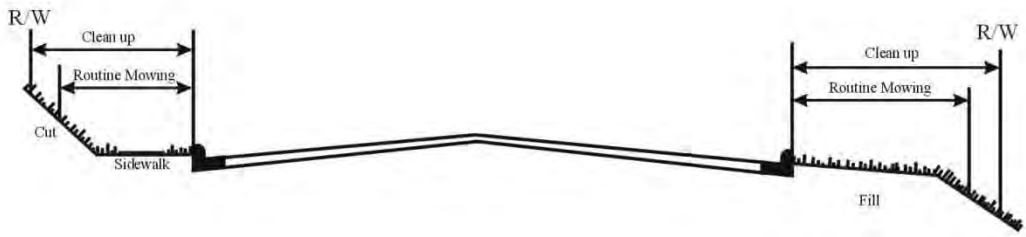
TYPICAL FILL SECTION WITH GUARDRAIL NEAR SHOULDER POINT

For Swath and Ditch Contracts:



TYPICAL FILL SECTION WITH GUARDRAIL NEAR SHOULDER POINT.

Routine and cleanup mow to guardrail.

TYPICAL CURB AND GUTTER SECTION

For Swath and Ditch Contracts: