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

THIRD INDUSTRY REVIEW DRAFT REQUEST FOR PROPOSALS, VOLUME II BOOK 2, TECHNICAL PROVISIONS

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

December 18, 2012

DATE AND TIME OF PROPOSAL SUBMISSION: [XXX]

CONTRACT ID:	[XXX]
WBS ELEMENT NO.	[XXX]
FEDERAL-AID NO.	[XXX]
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 RFP

NOTICE:

ALL PROPOSERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE PROPOSER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE PROPOSAL IS $30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. PROPOSERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOT WITHSTANDING THESE LIMITATIONS ON BIDDING, THE PROPOSER WHO IS AWARDED ANY PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF ANNOUNCEMENT OF BEST VALUE PROPOSER, REGARDLESS OF FUNDING SOURCES.

Table of Contents

Table of Contents i
1 GENERAL 2
1.1 Project Scope 2
1.1.1 Central Section 4
1.1.2 North Section 4
1.1.3 South Section 5
1.2 General Requirements 7
1.3 O&M Work and Handback Requirements 7
1.4 ETCS Requirements 9
1.5 NTP1 Work 9
2 PROJECT MANAGEMENT 11
2.1 General 11
2.2 Project Schedule 12
2.2.1 General Requirements 12
2.2.2 Required Submittals 15
2.3 Quality of the Work 19
2.3.1 General 19
2.3.2 Quality of Design Work 20
2.3.3 Quality of Construction Work 21
2.4 Developer Management Plan 23
2.4.1 Management & Staffing Plan 23
2.4.2 Quality Management Plan 24
2.4.3 Document and Data Management Plan 26
2.4.4 Disaster Recovery Plan (DRP) 27
2.4.5 Hazardous Waste Operations, Safety and Health Plan 28
2.4.6 Comprehensive Environmental Protection Program (CEPP) 28
2.5 Additional Required Schedules, Reports, and Submittals 34
2.5.1 Weekly Planning Schedule 34
2.5.2 Land Survey Records and Reports 34
2.5.3 Utility Work Plan 35
2.6 Meetings and Progress Reporting 35
2.7 Materials 36
2.7.1 Material Standards 36
2.7.2 Use of Materials 36
2.7.3 Control of Materials 36
2.8 Environmental Work Restrictions and Requirements 36

2.8.1 Noise Control 36
2.8.2 Vibration Monitoring 37
2.8.3 Burning Restrictions 37
2.9 Design Documents 37
2.9.1 Design Exceptions 37
2.9.2 Design Documents Submittals 38
2.9.3 Temporary Work 39
2.9.4 Final Right of Way Plans 39
2.9.5 As-Built Record Plans and Reports 39
2.10 As-Built Record Plans and Documentation 40
2.11 Certification 40
2.12 Corrections 41
2.13 Operations and Maintenance 41
2.13.1 Operations and Maintenance Plan 41
2.13.2 NCDOT Inspection and Testing 41
2.13.3 O&M Meetings 41
2.14 Personnel 42
2.14.1 Developer's Supervisory Personnel 42
2.14.2 Developer's Lead Functional Personnel 44
2.14.3 ISO 9001 Training Requirements 47
2.15 NCDOT Facilities and Space Requirements 47
2.16 Federal Energy Regulatory Commission (FERC) Approval 47
2.17 Deliverables 48
3 PUBLIC INFORMATION AND COMMUNICATION 50
3.1 General 50
3.2 Public Information and Communication Plan 50
3.2.1 Interface and Liaison with NCDOT 50
3.3 Communities and Public Outreach 51
3.3.1 Stakeholder Outreach and Information 51
3.3.2 Pre-Operations and Operations - Public Education and Awareness 52
3.3.3 Project website 52
3.3.4 New media 53
3.4 Media Relations 53
3.5 Project Marketing 53
3.5.1 Project Branding 53
3.5.2 Marketing Activities 53
3.6 Deliverables 54
4 ENVIRONMENTAL MANAGEMENT 55
4.1 General 55

4.2 Environmental Approvals 55
4.2.1 New Environmental Approvals and Amended NCDOT-Provided Approvals 55
4.2.2 Developer Submittals 55
4.2.3 Environmental Permits 56
4.3 Deliverables 58
5 THIRD PARTY AGREEMENTS 59
5.1 General 59
5.2 Third Party Agreements 59
5.3 Deliverables 59
6 UTILITY COORDINATION AND ADJUSTMENTS 60
6.1 General 60
6.2 Coordination Requirements 60
6.3 Utility Analysis and Utility Adjustment 60
6.4 Utility Analysis and Preliminary Routing (UAPR) 61
6.5 Required Items in Utility Assemblies 62
6.6 Design Plans Prepared by Developer 63
6.7 Design Plans Prepared by the Utility Owner 63
6.8 Construction Requirements 63
6.9 Utility Service Connections 64
6.10 As-Built Record Plans 64
6.11 Deliverables 64
7 RIGHT OF WAY 66
7.1 General 66
7.2 Developer Responsibilities 66
7.3 NCDOT Responsibilities 68
7.4 Deliverables 69
8 GEOTECHNICAL ENGINEERING 70
8.1 General 70
8.2 Design Requirements 70
8.2.1 Subsurface and Laboratory Geotechnical Investigation 70
8.2.2 Geotechnical Reports and Design Memoranda 71
8.2.3 Structure Foundations 71
8.2.4 Roadway Foundations, Slopes, Retaining Walls and Earth Embankments 71
8.2.5 Construction Requirements 72
8.3 Design Documents 72
8.3.1 Geotechnical Design Report 73
8.3.2 Foundation Design Report 73
8.4 Deliverables 73
9 LAND SURVEYING 74

9.1 General 74
9.2 Survey Requirements 74
9.2.1 Units 74
9.2.2 Survey Control Requirements 74
9.2.3 Conventional Method (Horizontal & Vertical Control) 74
9.2.4 Alignment Descriptions 75
9.2.5 Right of Way Surveys 75
9.2.6 ROW and Permanent Easement Monuments 76
9.3 Deliverables 78
10 ROADWAYS 79
10.1 General 79
10.2 Design Requirements 79
10.2.1 General 79
10.2.2 Ingress, Egress, Weaves and Termini for HOT Lanes 80
10.2.3 Roadway Geometry 80
10.2.4 Barriers, Walls, and Medians 82
10.2.5 Cut and Fill Slopes 83
10.2.6 Fence and Survey Monuments 83
10.2.7 Toll Zone Pull Off Areas 83
10.3 Construction Requirements 83
10.4 Deliverables 84
11 PAVEMENTS 85
11.1 General 85
11.2 Design Requirements 85
11.2.1 Pavement Design 85
11.2.2 Temporary Pavement 87
11.2.3 Widening Pavement 87
11.2.4 Existing Shoulders 87
11.2.5 Pavement Design Report 87
11.3 Pavement Drainage 87
11.4 Construction 88
11.5 Deliverables 88
12 HYDRAULICS 91
12.1 General 91
12.2 Design Requirements 91
12.3 Construction Requirements 92
12.4 Deliverables 92
13 EROSION AND SEDIMENTATION CONTROL 94
13.1 General 94

13.2 Design Requirements 94
13.3 Construction Requirements 95
13.4 Deliverables 96
14 STRUCTURES 98
14.1 General 98
14.2 Highway Bridge Design Requirements 98
14.2.1 Highway Bridge Types 99
14.2.2 Highway Bridge Design Parameters 100
14.2.3 Highway Bridge Decks and Superstructure 100
14.2.4 Highway Bridge Substructures 101
14.2.5 Highway Bridge Foundations 101
14.2.6 Highway Bridge Railings and Barriers 101
14.2.7 Retaining Walls 101
14.2.8 Structure Drainage Systems 102
14.2.9 Sign Supports and Tolling Gantries 102
14.2.10 Box Culvert 102
14.3 Construction Requirements 102
14.3.1 Steel Finishes 102
14.3.2 Barrier Rail and Railing System Finishes 103
14.4 Deliverables 103
15 AESTHETICS AND LANDSCAPING 104
15.1 General 104
15.2 Aesthetic Elements 104
15.2.1 Corridor Landscaping and Aesthetics Plan 104
15.3 Design Requirements 104
15.3.1 Landscaping 104
15.4 Construction Requirements 105
15.5 Deliverables 105
16 RAILROAD COORDINATION 106
16.1 General 106
16.2 Project Work Affecting Railroad Operations 106
16.2.1 Railroad Agreements 106
16.2.2 Agreement for Construction, Maintenance and Use of Right of Way 106
16.3 Construction Requirements 107
16.4 Deliverables 107
17 PAVEMENT MARKINGS & MARKERS 108
17.1 General 108
17.2 Design Requirements 108
17.3 Construction Requirements 108

17.4 Deliverables 109
18 SIGNING 110
18.1 General 110
18.2 Administrative Requirements 110
18.3 Design Requirements 110
18.3.1 Overhead Sign Assemblies 110
18.3.2 Monotube Sign Support Structures 111
18.3.3 Overhead Sign Supports 111
18.3.4 Project Signs outside the Project ROW 111
18.3.5 Toll Rate Signs and Other Toll Related Information Signs 111
18.3.6 Third-Party Signs 112
18.3.7 Overhead Signs Lighting 112
18.3.8 Additional Signing 112
18.3.9 Construction Requirements 112
18.4 Deliverables 113
19 SIGNALS 114
19.1 General 114
19.2 Design Requirements 114
19.2.1 Signalization 114
19.3 Construction Requirements 114
19.4 Deliverables 115
20 LIGHTING 116
20.1 General 116
20.2 Design Requirements 116
20.3 Construction Requirements 117
20.4 Deliverables 117
21 INTELLIGENT TRANSPORTATION SYSTEM 118
21.1 General 118
21.2 Design Requirements 118
21.2.1 Vehicle Detection System 119
21.2.2 CCTV System 120
21.2.3 DMS 120
21.2.4 Arterial DMS 120
21.2.5 Communications System 121
21.3 Advanced Traffic Management Software (ATMS) 121
21.4 ITS Interface with NCDOT 121
21.5 Construction Requirements 122
21.6 ITS Integration and Testing 123
21.6.1 Fiber Optic Splicing and Testing Plan 125

21.7 Deliverables 126
22 TRAFFIC MANAGEMENT 127
22.1 General 127
22.1.1 Traffic Management Plan 127
22.1.2 Road Closures 128
22.1.3 Lane Closures, Shoulder Closures, and Lane Width Reduction 129
22.1.4 Lane Closure and Lane Width Reduction 130
22.1.5 Detours 132
22.1.6 Hauling Restrictions 133
22.2 Design Requirements 134
22.2.1 Design Constraints 134
22.2.2 Access 136
22.2.3 Signing Requirements 136
22.2.4 Traffic Barrier Requirements 137
22.2.5 Traffic Control Device Requirements 138
22.2.6 Pavement Edge Drop off Requirements 138
22.2.7 Temporary Pavement Markings, Markers and Delineation 139
22.2.8 Temporary Signals 140
22.2.9 Miscellaneous 140
22.2.10 Additional Traffic Control Design Considerations 141
22.3 Construction Requirements 141
22.3.1 Developer Responsibility 141
22.3.2 Traffic Control Supervisor 141
22.3.3 Travel Demand Manager 141
22.3.4 Traffic Pattern Alterations 142
22.4 Deliverables 142
23 OPERATIONS, MAINTENANCE AND REHABILITATION 143
23.1 General Obligations 143
23.1.1 Specifications, Standards, Manuals and Guidelines 144
23.1.2 Performance Measures 144
23.1.3 Operations & Maintenance Plan 144
23.1.4 Maintenance Responsibilities during Construction 148
23.1.5 O&M Monthly Reports 148
23.1.6 O&M Annual Reports 150
23.1.7 Pavement and Bridges Inspections, Asset Condition Assessment, and Renewal Work on NCDOT Retained Elements 150
23.1.8 Renewal Work Plans 152
23.1.9 Emergency Reporting 153
23.1.10 Hazardous Materials/Fuel Spills 154

23.1.11 Staff Conduct and Appearance 154
23.1.12 Use of Pesticides 154
23.1.13 Winter Maintenance 154
23.1.14 Technology Enhancements 154
23.1.15 Stormwater Management 155
23.2 Maintenance Requirements 157
23.2.1 Roadway Maintenance Requirements 157
23.2.2 Structure Inspections and Maintenance 160
23.2.3 Other Structures Inspection and Maintenance 161
23.2.4 ITS Systems Maintenance 161
23.3 Operations Requirements 164
23.3.1 ITS Operations 164
23.3.2 Traffic Incident Management 165
23.3.3 Maintenance of Traffic (MOT) 167
23.3.4 Traffic Operation Systems (TOS) 167
23.3.5 Emergency Management 168
23.3.6 Traffic Operations 170
23.4 Minimum Requirements Subject To Construction Noncompliance Events 171
23.4.1 Construction Noncompliance Events with Temporary Cures 171
23.4.2 Notification of Construction Noncompliance Events and Closures During Construction 172
23.5 Minimum Requirements Subject To O&M Noncompliance Events 172
23.5.1 Notification of O&M Noncompliance Events and Closures during Operations 172
23.5.2 Mandatory Spare Parts 172
23.6 Handback 172
23.6.1 Handback Renewal Work Plan 172
23.6.2 Execution of the Handback Renewal Work Plan 174
23.6.3 Annual Handback Renewal Work Plan Updates 175
23.6.4 Handback Requirements 175
23.7 Deliverables 175
24 ELECTRONIC TOLL COLLECTION SYSTEM 210
24.1 Design Requirements 210
24.2 ETCS Operational Requirements 210
24.2.1 ETCS Systems Requirements 210
24.2.2 ETCS Functional Requirements 210
24.3 ETCS Performance Requirements 215
24.3.1 Roadside Performance Requirements 215
24.3.2 ETCS and Customer Service Performance Requirements 216
24.4 ETCS Performance Monitoring, Auditing, and Reporting 216
24.5 Testing and Commissioning 216

24.5.1 Testing Program for ETCS 217
24.5.2 Demonstration Period for ETCS 217
24.6 ETCS Design Documents 218
24.6.1 Conceptual Design Documents 218
24.6.2 Intermediate Design Document Submittal 218
24.6.3 Final Design Document Submittal 219
24.6.4 Factory Acceptance testing 220
24.6.5 Substantial Completion 220
24.7 ETCS Reporting Requirements 220
24.7.1 ETCS Activity Monthly Report 220
24.7.2 Traffic and Revenue Monthly Reports 222
24.7.3 Traffic and Revenue Annual Reports 222
24.8 Deliverables 223
25 List of Exhibits 225

1 GENERAL

As a part of the Strategic Highway Corridor, 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 the I-77 corridor. The Project generally involves the conversion of the Existing HOV Lane on I-77 within the Charlotte-Mecklenburg region, North Carolina, to a HOT Lane, the addition of a second HOT Lane, and the addition and extension of the HOT Lanes for approximately ten miles to the north and approximately two miles to the south of the Existing HOV Lanes on I-77 in each direction.

The Project generally consists of widening the existing main lines, rehabilitating the existing lanes of both the Existing HOV Lanes and Existing General Purpose Lanes, providing new Structures, widening or replacing existing Structures, installation of necessary Intelligent Transportation System (ITS), Electronic Toll Collection System (ETCS) infrastructure and systems to establish Open Road Tolling (ORT) operation on the HOT Lanes, and providing the maintenance, operation and rehabilitation of all highway assets within an approximately 26 mile 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 for the entire Term.

1.1 Project Scope

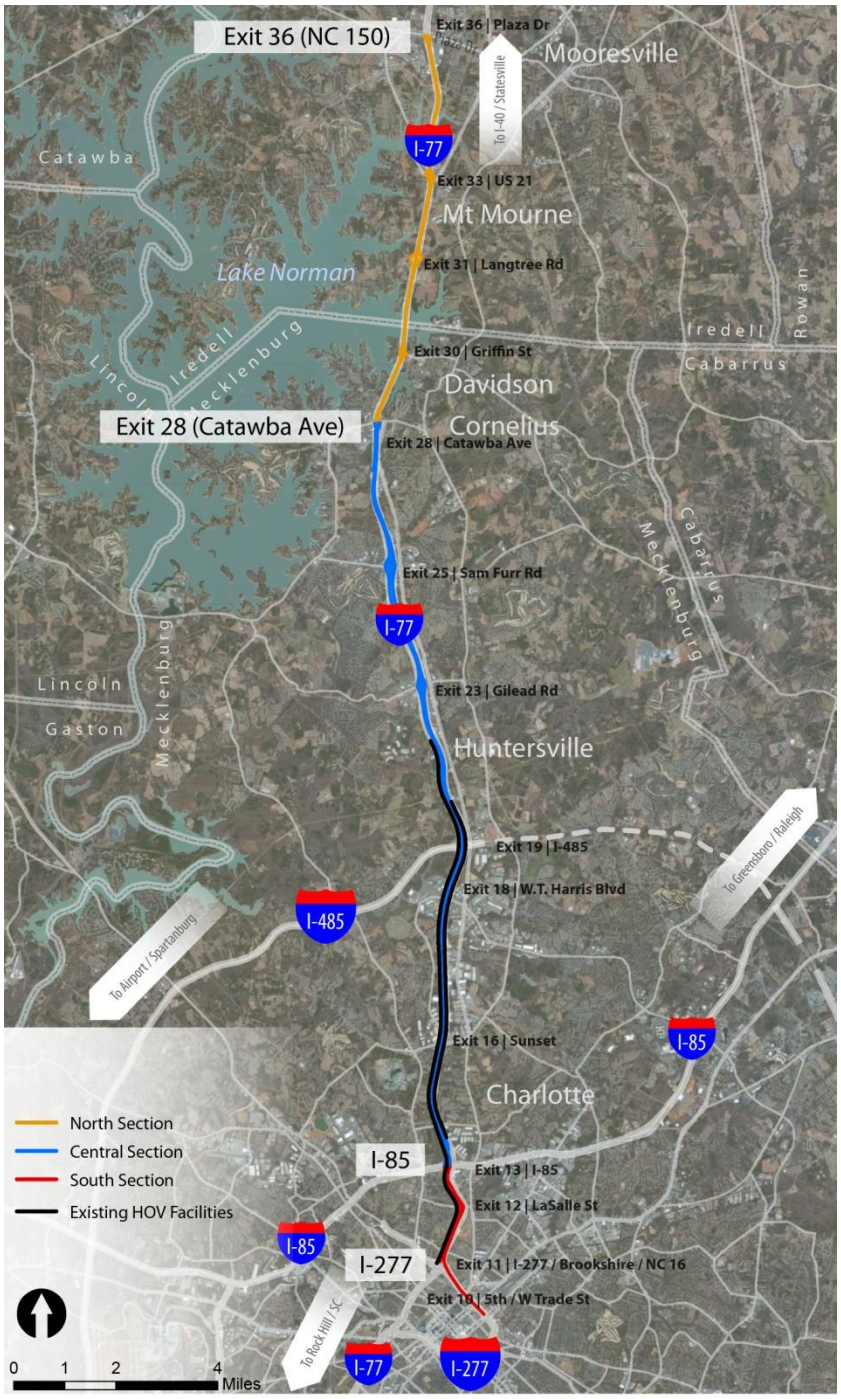
The Project is divided into three Project Sections as further described in Sections 1.1.1, 1.1.2, and 1.1.3 of the Technical Provisions: the North Section, the Central Section, and the South Section (see Figure 1).

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 ORT of the HOT Lanes and dynamic tolling, in accordance with Exhibit 4 of the Agreement and Section 24 of the Technical Provisions. Developer shall maintain safe travel conditions under a high level of service 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;
- extend the 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;
- extend the 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 overlay the NB and SB General Purpose Lanes, Shoulders, ramps, and loops 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;
- at a minimum, replace Bridge No. 590353 – Hambright Road (SR 2117) over I-77;
- at a minimum, replace Bridge No. 590362 – Westmoreland Road (SR 2147) over I-77;
- provide a minimum of two ingress/egress locations in each direction. 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 two locations identified below. Developer may provide additional ingress or egress points or, to the extent permitted by Environmental Approvals, provide direct access ramps to/from the HOT Lanes at Developer's discretion. The exact locations shall be determined by Developer, but shall be provided as a minimum at two points located:
    - on I-77 between Exit 13 I-85 and Exit 19 I-485;
    - on I-77 between Exit 19 I-485 and Exit 28 Catawba Avenue; this access point shall not be located in the vicinity of the future Westmoreland Road interchange; and
- all other Work required for the Project.

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 overlay the NB and SB General Purpose Lanes, Shoulders, ramps, and loops 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;
- at a minimum, replace Bridge No. 590364 – Griffith Street (SR 2158) over I-77;
- design and construct remedial Work on eastern side of causeway slope between approximate milepost (MP) 30 and approximate (MP) 31 per Section 10 of the Technical Provisions;
- drop the NB HOT Lane designation on I-77 and construct transition widening, with elimination of the buffer, between the HOT and General Purpose lanes, south of the Brawley School Road (Exit 35) bridge;
- 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 the NC 150 bridge;
- begin the SB HOT Lane designation on I-77 directly south of the Brawley School Road (Exit 35) bridge; and
- provide all other Work required for the Project.

1.1.3 South Section

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 to just north of the I-77 / I-85 interchange (Exit 13) at approximately MM 13.8 for approximately two miles, providing for a seamless, continuous HOT Lanes connection with the Central Section. The South Section includes a seamless, continuous HOT Lanes connection to I-277 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 shall be determined by Developer's Design Documents.

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 the beginning of the I-277 HOT Lane flyover (curved Bridge from I-77 to I-277);
- construct two NB HOT Lanes on I-77 from south of Oaklawn Avenue to approximately MM 13.8;
- convert the SB Existing HOV Lane to a HOT Lane from approximately MM 11.2 to approximately MM 13.8;
- construct one additional SB HOT Lane from approximately MM 11.2 to approximately MM 13.8;

- mill and overlay the NB and SB I-77 General Purpose Lanes, Shoulders, ramps, and loops 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;
- at a minimum, replace Bridge No. 590286 – Oaklawn Avenue over I-77;
- at a minimum, replace Bridge No. 590153 – LaSalle Street over I-77;
- at a minimum, replace Bridge No. 590297 – I-77 SBL over I-77 NBL at the I-85 interchange;
- construct a new two lane NB HOT Lane Bridge over I-77 SB just north of I-85;
- construct a new two lane NB HOT Lane Bridge over I-85;
- remove the existing pedestrian Bridge (Bridge# 590293) over I-77 located just north of LaSalle Street;
- extend existing box culvert (Structure # 590288) over Irwin Creek as defined in Section 14;
- drop the HOT Lane designation for the HOT Lane on I-77 within one half mile north of the Exit 11 I-77 interchange with I-277; and
- provide all other Work required for the Project.

Developer shall undertake all Work in the South Section on I-277 necessary to:

- construct a flyover to the I-277 median for one HOT Lane in each direction (curved Bridge from I-77 to I-277);
- add one EB additional lane starting between Hamilton Street and NC Music Factory Boulevard;
- at a minimum, replace Bridge No. 590335 – Hamilton Street over I-277;
- drop the EB HOT Lane designation between N. Church Street and N. Tryon Street;
- drop the additional outside lane EB immediately prior to, N. Brevard Street using a right lane drop providing a logical and safe terminus to the additional EB Lane;
- add one WB additional lane starting at N. College Street, providing a logical and safe beginning for the lane;
- start the WB HOT Lane designation between N. Church Street and N. Tryon Street;
- mill and overlay the EB and WB I-277 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 for the Project.

To the extent permitted by Environmental Approvals, Developer may provide direct access ramps to/from 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 the existing and proposed infrastructure 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.

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 4.2 of the Technical Provisions.

Prior to submitting any Conceptual Design Submittal, as detailed in Section 2 of the Technical Provisions and no later than 90 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 facilities 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 required during design development to determine the design criteria, standards, and specifications for the execution of the Work.

Developer shall initiate third party reviews of Developer's Design Documents, plans, processes, procedures and methodologies whether for permanent or Temporary Work and amendments to such designs plans, processes, procedures, and methodologies.

For any components of Work, which potentially or actually impact the infrastructure of any Governmental Entity or third party entity, Developer's Design Documents shall conform to the design requirements of such entity.

Any existing land, infrastructure, or other physical asset disturbed, impacted, or modified 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 to its pre-construction condition before the start of the Work as soon as possible after such Work is complete.

1.3 O&M Work and Handback Requirements

Developer shall provide the O&M Work beginning at the first Construction Commencement Date within the Project Right of Way until the end of the Term, and provide O&M Work for any additional Project Elements that may be installed by Developer outside the Project Right of Way. Developer shall be responsible for all O&M Work within the Project ROW, with the exception of the following, which shall be the responsibility of NCDOT:

- Renewal Work on NCDOT Retained Elements, subject to the conditions and limitations set forth in Section 23.1.7.1 of the Technical Provisions; and
- O&M Work on all Bridges and roadways carrying non-freeway traffic over the HOT Lanes as well as I-485 (including ramps and collectors) ; and
- Winter Maintenance activities on both the General Purpose Lanes and HOT Lanes.

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 and I-277 within the Project ROW and all other Project Elements within the 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.

The limit of the General Purpose Lanes shall be as specified in the definition of NCDOT Retained Elements. Developer shall establish a self-monitoring program in order to ensure a safe and reliable roadway system with the main objective of maximizing public safety, reliability, and roadway 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.

The scope of the O&M Work to be provided by Developer 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, 48 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 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 after the end of the Term by NCDOT.

Developer shall coordinate all aspects of the development of 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, and specified life of the respective Project assets remaining at the end of the Term.

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 all applicable federal and North Carolina Laws and regulations 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 Article 3 to the Agreement and do so without stopping or slowing down any vehicle using the HOT Lanes.

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 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 and as may change from time to time as agreed with NCDOT.

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 3.2.1 of the Technical Provisions;
3. preparation and submission 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. submission of the Project Baseline Schedule as required by Section 2.2.2.1 of the Technical Provisions;
6. submission of a complete Schedule of Values for all activities after NTP2 as required by Section 2.2.2.3 of the Technical Provisions;
7. submission 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 at Developer's home office closest to the Project as required by Section 2 of the Technical Provisions;
9. submission of a 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; and

12. any Design Work necessary, to complete the Work excluding preliminary 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 to Developer's NTP1 Work Schedule of Values per Developer's pre-proposal Submittal as per Section 6.2.2 of Volume I of the RFP (Instruction to Proposers).

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 for 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 Release for Construction Submittals to NCDOT until all previous NCDOT comments have been addressed.

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 scheduling software employed by Developer shall be compatible with the current and any future scheduling software employed by NCDOT. NCDOT's current software in use is Primavera version 6.2. Compatible, as used in this Section 2.2.1 of the Technical Provisions, shall mean that Developer-provided electronic file versions of the Project Schedule may be loaded or imported by NCDOT using NCDOT's scheduling software with no modifications, preparation, or adjustments.

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.

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.

All Float contained in the Project Schedule, as shown in the initial Project Baseline Schedule or as generated thereafter, shall be considered a shared resource between NCDOT and Developer available to each party as needed to absorb delay caused by Relief Events or other events, achieve interim completion dates and achieve Milestone Schedule Deadlines. Developer shall not utilize any method to sequester Float calculations will be prohibited without prior approval of NCDOT. Any schedule, including the Project Baseline Schedule and all updates thereto, showing an early completion date shall show the time between the scheduled completion date and the applicable Milestone Schedule Deadline as "Project Float."

The 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;
- financing competition;
- foundation construction;
- geotechnical investigation;
- 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;
- permits (including NEPA and building permits);
- public information and communication;
- rail road works;
- roadway construction;
- ROW acquisition;
- signal construction;
- signing and pavement markings;
- stakeholder and third party meetings;

- Structure construction;
- Developer Submittals;
- substructure construction;
- superstructure construction;
- surveys;
- testing 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 a 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 called out in 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 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 based on the Preliminary Project Baseline Schedule set forth 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 28 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 14 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 Baseline Project Schedule no later than 90 days after NTP1, Developer shall stop all Work except the Baseline Project Schedule 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 14 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 14 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

Concurrent with the Project Baseline Schedule, Developer shall submit to NCDOT a complete Schedule of Values for all activities as described below for NCDOT's approval. NCDOT approval of the Schedule of Values shall be a condition to the issuance of NTP2. Developer shall expand the WBS shown in Exhibit 2-06 of the Technical Provisions to reflect Developer's break down of activities and approach and phasing of the Work and submit to NCDOT for approval before or concurrently with the submission of the Schedule of Values.

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. NCDOT shall have 28 days to approve the revised Schedule of Values.

2.2.2.4 Progress Report

Each month, beginning with the first full month after NTP1, 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. Information shall be grouped based on the WBS;
- summary of QA/QC findings, 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 accepted during the period;
- identification of Schedule Activities planned for the upcoming month;
- identification of problems and issues that arose during the period and issues that remain to be resolved;
- summary of resolution of problems/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.

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. The "as-built schedule" that NCDOT determines is correct and complete will be a condition of each Final Acceptance.

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 of the last Project Section 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 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. Developer shall develop and submit to NCDOT for approval a comprehensive Quality Management Plan (QMP) as per Section 2.4.2 of the Technical Provisions. The QMP shall form part of the Developer Management Plan. 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. Individual quality systems for different Developer-Related Entities shall not be permitted.

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 of the design 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 the 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 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; and Developer shall submit such monthly reports to NCDOT for review and comment within seven days of the end of the month.

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. Nonconforming Work 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, assure compliance of Design Documents with the CA Documents and develop and implement, at a minimum:

- design quality control process to include policy, procedures and specific roles;
- methods by which all Final Design Documents will be independently reviewed, verified for constructability, completeness, clarity, and accuracy, and back-checked;
- procedures and responsibilities for preparing and checking the plans, drawings, specifications, estimated, calculations, computer application input data, notes, and other submittal items;
- procedures and responsibilities for verifying that Design Documents meet the CA Documents requirements, design standards, and design criteria;
- procedure for submitting Design Documents;
- procedure for resolution of NCDOT comments;
- process for stopping design Work or elevating an issue;
- Developer-Related Entity's review requirements and Developer's role in the review of Developer-Related Entity's 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
- 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.

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 concrete pavement;
- inspect materials or equipment at the source of supply, manufacture, and/or fabrication; however,
- 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;
- 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.

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

2.3.3.2 CEI Firm Responsibilities

The services of the CEI firm shall be part of Developer's Quality System. CEI Firm shall:

- provide the CEI Services per Exhibit 2-07;
- 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 to Developer and NCDOT for any Work that does not conform to requirements of the CA Documents.

2.3.3.3 NCDOT Responsibilities

NCDOT or NCDOT's agent will:

- perform 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.

Performance by NCDOT of such quality assurance, inspection, verification, sampling, and testing does not relieve Developer of 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 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) setting out Developer's Quality System;
- Document and Data Management Plan;
- Public Information and Communication Plan;
- Stormwater Management Plan;
- Hazardous Waste Operations, Safety, and Health Plan;
- Comprehensive Environmental Protection Program;
- Submittal procedures and process Hazardous Materials Management Plan;
- Disaster Recovery Plan (DRP);
- Erosion and Sedimentation Control Plan;
- 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 version 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 Baseline Project Schedule and the DMP until it obtains such approval.

2.4.1 Management & Staffing Plan

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

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. 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.

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:

- Design Work;
- Construction Work;
- O&M Work;
- Erosion and Sedimentation Control;
- Quality Control Program Notification of Placing Order;
- 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 Quality Plan 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 schedules.

2.4.2.1 Erosion and Sedimentation Control Plan

Developer shall develop and implement an Erosion and Sedimentation Control QMP that establishes 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 this 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, that 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 Erosion and Sedimentation Control Plan

Developer shall develop and implement Stormwater Management Program (SMP) that establishes processes and procedures to assure compliance with SMP requirements in Section 13 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 program is 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 procedure and 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 Operations and Maintenance Specific Requirements

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 and reporting. The QMP shall detail the quality assurance systems and procedures provided for validating the information accuracy and results in the O&M Monthly Reports, O&M Annual Reports and Renewal Work Reports. 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 determine that Developer audits are not ensuring compliance with the DMP and/or CA Documents, NCDOT shall have the right to require the auditing 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.

2.4.2.8 Quality Management Plan Review and Approval

The QMP and DMP shall be revised when it is evident that Noncompliance with the CA Documents is not being properly registered as a Noncompliance within the Quality System.

Developer shall submit any revision to NCDOT in accordance with the requirements for submission of the DMP. Until the revised DMP and QMP are approved by NCDOT, Developer will cease, at Developer's expense all Work except for safety and environmental activities until the DMP and QMP are approved. If NCDOT elects in its sole discretion to accept an update to only a component plan rather than the full DMP, then only Work covered by the revised plan shall be ceased until the revised plan is approved.

2.4.3 Document and Data Management Plan

Developer shall prepare a Document and Data Management Plan (DDMP) as part of the DMP. 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 retrieve all Project-related documents.

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 and procedures compatible with those employed by NCDOT and implement any new operating practices required as a result of NCDOT's amendments to any such systems, standards and procedures;
- provide a secure location for any interface as may be provided by NCDOT, such that only authorized users have access and that it is protected from loss theft, damage, and unauthorized or malicious use;
- employ appropriate standards and procedures, and Developer shall, at Developer's expense, train Developer personnel to operate any NCDOT data management system which NCDOT may require Developer to incorporate into the Document Management System;
- provide a mechanism for the electronic transfer of meta 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; and
- provide NCDOT staff with training in all systems provided by Developer.

All Project-related documents shall be searchable and legible. In the Document and Data Management Plan, Developer shall describe:

- methods by which all Project-related documents will be uniquely coded, stored and retrieved. Retrievable documents shall be capable of retrieval in a user friendly format;
- the routing, filing, control and retrieval methods for all documents;
- methods to facilitate 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 Elements that will support records required to be submitted by Developer to NCDOT under the CA Documents. These data Elements shall include as a minimum: document class, document type/subtype, document name, form number, NCDOT records series item number, turnover media, turnover frequency, submission type, special requirements, and remarks.

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.

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

2.4.4 Disaster Recovery Plan (DRP)

Developer shall prepare a DRP as part of the DMP. 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 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.

2.4.5 Hazardous Waste Operations, Safety and Health Plan

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

Developer shall prepare, implement, manage, operate and as required update a Hazardous Waste Operations, Safety and Health Plan 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 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 Hazardous Waste Operations, Safety and Health Plan shall address procedures for immediately notifying NCDOT of all Incidents arising out of or in connection with the performance of the Work, whether on or adjacent to the Project.

2.4.6 Comprehensive Environmental Protection Program (CEPP)

Developer shall develop and implement a CEPP, applicable throughout the Term to establish the approach, requirements and procedures to be employed to protect the Environment.

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.

Developer shall set out in the CEPP how Developer shall ensure compliance with all Environmental Laws and Environmental Commitment. Developer shall incorporate the CEPP into the Developer Management Plan (DMP). The CEPP shall establish the measures to be taken to ensure protection for the Environment. The CEPP shall also establish the process to be implemented by Developer to record and document the measures taken during the performance of the Work to avoid and 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, the environmental scope as set forth herein, and shall describe the processes that will be followed during the course of the Work to comply with those Environmental Approvals, mitigate the impacts and measures to be adopted to ensure compliance with all environmental legislations.

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 activities. 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).

2.4.6.1 Environmental Compliance and Mitigation Plan (ECMP)

The ECMP shall document and fully detail compliance strategies and procedures to be employed to cause Work performance to be in accordance with requirements of applicable environmental requirements. This plan 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 mitigation requirements, including mitigation requirements identified after completion of the ECMP and all relevant executive orders.

The ECMP shall include the following components:

- 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
- Standard Operating Procedures.

2.4.6.1.1 Compliance Action Plan (CAP)

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. 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 Environmental Approvals and commitments.

2.4.6.1.2 Environmental Permits, Issues, and Commitments (EPIC) Sheets

Developer shall develop and maintain EPIC sheets. Applicable permits and Environmental Commitments shall be identified on EPIC sheets and updated throughout the Term to identify on-Site conditions.

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

Developer shall document how they will 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 life of the Project. The documentation at a minimum shall include:

- 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.

2.4.6.1.4 Clean Water Act - Sections 402: National Pollutant Discharge Elimination System (NPDES)

Developer shall document how they 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. The documentation at a minimum shall include:

- 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.

2.4.6.1.5 State Listed Species and Unregulated Habitat

Developer shall document how they shall comply with the State Listed Species and Unregulated Habitat. The documentation at a minimum shall include:

- process for communicating any commitments regarding State listed species and unregulated habitat; and
- procedures for complying with any commitments contained in the FHWA approvals. Developer shall mitigate according to the terms of the FHWA approvals (CE approval, FONSI or ROD) as listed in Section 2.4.6.1 of the Technical Provisions.

2.4.6.1.6 Endangered Species Act and Fish and Wildlife Coordination Act

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. The documentation at a minimum shall include:

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

2.4.6.1.7 Noise

Developer shall document how they will address traffic noise mitigation, including at a minimum the following:

- process for carrying out noise mitigation measures in accordance with the Environmental Approvals;
- 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 of the Agreement; and
- process to handle changes that may occur to proposed permanent noise mitigation in the Environmental Approvals that meets the requirements of NCDOT.

2.4.6.1.8 Well Impacts and Requirements

Developer shall document how they will address wells (such as municipal, domestic, irrigation, or monitoring and observations wells) encountered during the life of the Project. The documentation at a minimum shall include:

- process for training personnel on recognition of wells;
- procedures for addressing wells;
- procedures for addressing contamination of a well that results from Developer's Work; and
- procedures to notify NCDOT and the appropriate regulatory agencies.

2.4.6.1.9 Cultural Resource Studies

Developer shall be responsible for ensuring compliance with cultural resource Laws on the Project through the Term. NCDOT shall perform consultation for the Project according to current procedures for implementing Section 106 of the National Historic Preservation Act.

If evidence of a possible archaeology site is encountered during the course of the Work, Developer shall immediately cease Work in the immediate area and contact NCDOT to initiate post-review discovery procedures among NCDOT, State Historical Preservation Office (SHPO), FHWA, and Advisory Council on Historic Preservation (ACHP), as well as the MOA between NCDOT and the SHPO. 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.

2.4.6.1.10 Floodplain Requirements

Developer shall be responsible for obtaining all necessary approvals for any regulated activity within floodplains. Developer shall obtain from the NC Floodplain Mapping Program (NCFMP) (http://www.ncfloodmaps.com/default_swf.asp) the Effective Flood Insurance Studies (FIS) for Iredell and Mecklenburg (http://mapserver.mecklenburgcountync.gov/3dfz/ and ftp://ftp1.co.mecklenburg.nc.us/luesa/stormwater/) Counties, and the Effective Digital Flood Insurance Rate Maps (DFIRMs) that cover the Project area. 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), or a Non-Encroachment Area (for streams studied with Limited Detailed Methods). Developer shall be responsible for obtaining the necessary floodplain approvals as follows:

- when an activity is proposed within a floodway or Non-Encroachment Area (including Bridges and culverts), or within an SFHA where a floodway or Non-Encroachment Area has not been established, Developer shall determine if the proposed activity will result in an increase in the Base Flood Elevation (BFE);
- if a BFE increase will occur, Developer shall be responsible for obtaining a Conditional Letter of Map Revision (CLOMR) from Mecklenburg County (or from NCFMP for activities within Iredell County) prior to construction of the regulated activities. After completion of the Project, Developer shall prepare As-Built Record Plans covering the regulated activities and obtain a Letter of Map Revision (LOMR) from Mecklenburg County (or from NCFMP for activities within Iredell County). Developer shall be responsible for all fees associated with the CLOMR and LOMR applications; and
- if the Project will not result in any increase in the BFE, then Developer shall be responsible for obtaining approval from NCFMP in accordance with the conditions outlined in the Memorandum of Agreement (MOA) between NCFMP and NCDOT. Developer shall be responsible for preparing and providing all documentation required for the MOA Submittal and any documentation requested by NCFMP during the review process. NCDOT shall provide all fees in accordance with the MOA.
- when an activity is proposed within an SFHA, but outside of a floodway or Non-Encroachment Area, Developer shall be responsible for coordinating with Mecklenburg County and Iredell County Floodplain Administrators (FPA) to obtain a local Floodplain Development Permit, as required.

2.4.6.1.11 Standard Operating Procedures

Developer shall develop standard operating procedures for the following activities and include them in the ECMP:

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

2.4.6.2 Environmental Protection Training Plan (EPTP)

Developer shall develop and implement 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 the overall importance of environmental issues to constructing, operating and maintaining a successful 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 workers, NCDOT's and Developer's commitment to zero tolerance for violations.

2.4.6.3 Hazardous Materials Management Plan (HMMP)

Developer shall prepare an HMMP 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.

The HMMP shall include procedures compliant with all applicable Environmental Laws and include, at a minimum:

- for all chemicals to be used on the Project, Developer shall keep and update Material Safety Data Sheets (MSDS), per OSHA requirements, for the Term of the Agreement;
- designated individuals responsible for implementation of the plan;
- 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 unanticipated contaminated sites encountered during construction;

- procedures for mitigation of contamination during the Operating Period of the Project;
- procedures for developing a detailed Spill Response Plan for the Term of the Agreement;
- process for training personnel for responding to and mitigating Incidents involving contamination or waste;
- provisions for appropriate storage and disposal of all waste encountered or disposed of on the Project for the Term;
- provision for a Hazardous Materials training module as an Element of the EPTP component of the CEPP;
- procedures for preparing an Investigative Work Plan (IWP) and Site Investigative Report (SIR) in the event that Hazardous Materials are discovered during construction, operations or maintenance activities; and
- identification and contact information for designated responsible individuals.

The HMMP shall include provisions for making all on-Site workers aware of the potential Hazardous Materials to which they may be exposed, limiting Contractors 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 Project 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

Land survey records shall be submitted to NCDOT in both hardcopy and electronic file format. They shall be delivered to NCDOT within 60 days of completion of the survey Work.

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 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. 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 (UO);
- a detailed description of Developer's plan to coordinate activities with the UOs on unknown or newly discovered utilities; and
- a detailed description of how Developer shall either relocate or replace all affected utilities.

2.6 Meetings and Progress Reporting

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 Developer shall meet with NCDOT 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.

Before Developer or Developer-Related Entities begin actual construction, NCDOT will call a preconstruction conference 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 meeting minutes for attendee review and comment for all meetings within three days of the meeting.

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 or Developer-Related Entity.

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. Developer is required to operate and maintain those temporary Structures, facilities, and systems as detailed in the CA Documents. Temporary Structures, facilities and systems may include, but will not be limited to, interim water supply, interim power, and lighting.

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 and traveling public and adjacent properties and occupants and Project 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.

2.9 Design Documents

All Design Documents other than for Temporary Work shall be prepared by or under the 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 NCDOT and AASHTO design guidelines and the requirements set out in the CA Documents. Where Developer is seeking exceptions to any of these requirements for any reason, Developer shall prepare Design Exceptions for NCDOT and FHWA approval and explain proposed mitigation measures. Any Design Exceptions that are not approved by 45 days prior to the Proposal Due Date shall be the responsibility of Developer.

Prior to incorporating a Design Exception into the Design Documents, Developer shall obtain approval from NCDOT and FHWA. Once approval is obtained, Developer shall be responsible for the final development of the Design Document which may include the approved Design Exceptions.

Design Exceptions currently under review by FHWA, but not yet approved, include:

- Median Shoulder width adjacent to the HOT lanes
- Horizontal curve radius for existing ramp along I-277
- Stopping sight distance for Shoulder widths along several Bridges
- Vertical clearance
- Median Shoulder width adjacent to the HOT lane ingress and egress locations
- Outside Shoulder width adjacent to the HOT lanes

If Developer's Design Documents require Design Exceptions that have not previously been granted, Developer shall be solely responsible for obtaining the necessary Design Exceptions. If Developer's Design Documents require changes to previously approved Design Exceptions, Developer shall be solely responsible for securing a modification to the previously approved Design Exceptions. Developer shall coordinate all requests for Design Exceptions with NCDOT for FHWA and NCDOT review and approval and shall provide NCDOT with copies of all documentation associated with Design Exceptions prepared. 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.

2.9.2 Design Documents Submittals

All Design Documents shall be submitted to NCDOT as part of Developer' 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 and other applicable submittal requirements. 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 as provided in Section 6.3.2.5 of the Agreement. Design Documents Submittals, including those required for NTP1 Work, shall be provided in accordance with the CA Documents, the Project Baseline Schedule, and the Developer Management Plan 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.

Design Documents Submittals, shall be complete for the corresponding level of design and include all information material to the evaluation of the Submittal, along with all supporting information necessary for NCDOT to conduct a review. Developer may submit Design Documents and proceed with construction for portions of the Project smaller than a Project Section. Developer shall bear the risk of any required modifications to the Element 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 as defined herein 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 the CA Document requirements. The contents 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 the CA Document requirements. 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 NCDOT's comments resulting from the Conceptual Design Submittal have been addressed. 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 the CA Document requirements. 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 NCDOT's comments resulting from the Intermediate Design Submittal have been addressed. 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 3 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 as required by Project Special Provision titled Submittal of Working Drawings.

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 herein for Final Right of Way Plans.

2.9.5 As-Built Record Plans and Reports

2.9.5.1 Contents

Developer shall produce As-Built Record Plans and Reports documenting the location of the as-built alignments and profiles of each permanent Element of the Work built, installed, or relocated by Developer including, roadway, Structures, utilities, drainage, signage, ITS, ETCS and survey control monument placement. The 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 shall also include a description of each permanent Element of the Work including each Structure and details of maintenance assumptions made by the Lead Design Firm and measures incorporated into the design to accommodate these assumptions.

The As-Built Record Plans shall be separated so that Elements of the Work 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 or NCDOT until the end of Term.

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 Portable Document Format (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 Portable Document Format (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 professionally endorsed (signed, sealed and certified) by Developer's Engineer of Record.

2.10 As-Built Record Plans and Documentation

No later than 90 days after Substantial Completion of a Project Section, Developer shall submit to NCDOT for review and comment a complete set of draft As-Built Record Plans for that portion of the Project. The draft As-Built Record Plans and supporting documentation including design certificates, design calculations, quality records, specifications and Punch Lists shall be an organized, complete record of plans and supporting calculations and details that accurately represent what Developer designed and constructed and shall include an index of all plans and documents.

After completion of the Punch List and no later than 45 days of Final Acceptance, Developer shall make any amendments necessary to the As-Built Record Plans and documentation and submit to NCDOT for review and comment.

Developer shall ensure that the As-Built Record Plans and documentation reflect the actual condition of the constructed Work and any comments made by NCDOT.

2.11 Certification

Developer shall control through the Quality System a technical approval and certification system. As 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 Projects 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 of the Technical Provisions are set out in the exhibits attached to this Section 2 of the Technical Provisions.

2.12 Corrections

For Work that Developer or Developer-Related Entities constructs incorrectly or otherwise does not meet the requirements of the CA Documents, Developer has the prerogative to submit an acceptance proposal to NCDOT for NCDOT's approval in its sole discretion. The acceptance proposal shall describe the error or Defect and either describe remedial action for its correction or propose a method for its acceptance. In either case, the acceptance proposal shall address structural integrity, aesthetics, maintainability, and the effect on the Project Schedule. Developer's Engineer of Record shall perform a technical assessment and this shall form part of the Submittal to NCDOT.

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 23.1.3 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 update.

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 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. The items to be discussed shall include, but not be limited to:

- O&M Work for the previous quarter, including Incidents/Emergencies and Incident Response coordination, Closures and Permitted Closures;
- calculation of assessment of Noncompliance Points, Construction Noncompliance Events, O&M Noncompliance Events, Closures, and any other pertinent information related to payment adjustments and Noncompliance Points calculation per the CA Documents;

- anticipated O&M Work 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 as Developer's agent. 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 for which they are responsible being undertaken.

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 as 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.

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 as 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, at the discretion of Developer.

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 issues directly with NCDOT and Developer's Project Manager. The Quality Manager 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 Quality Manager shall be working full time and exclusively for the Project.

2.14.1.7 Engineer of Record

The Engineer of Record (EOR) shall be a Professional Engineer registered in the State of North Carolina retained by Developer or the Lead Design Firm that performs the design and analysis, and shall be responsible 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 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.

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 ORT 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 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 the Construction Commencement Date 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 Traffic Control Supervisor

The Traffic Control Supervisor shall be an individual 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. The Traffic Control Supervisor shall be certified by NCDOT as a Qualified Work Zone Supervisor and shall have a minimum of 10 years experience in a similar role.

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, Darwin ME or the 1993 AASHTO Guide for Design of Pavement Structures.

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 to provide utility coordination expertise and shall be knowledgeable of NCDOT procedures for accommodating and relocating utilities. The Utility Coordination Manager shall manage all utility coordination and utility design activities required for Utility Adjustment.

2.14.2.7 Toll System Integrator

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 shall have undertaken this role on at least three all electronic ORT projects.

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 not less than 90 days prior to scheduled Testing and Commissioning required by Section 24.8 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 above in this paragraph. 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 of the Agreement. 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 prior to and required for any handling of Hazardous Materials;
- 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). This 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.

2.14.3 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, not less than 30 days prior to the first 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 as 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 not less than 60 days prior to the first 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 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 12 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;
- Utility Work Plan for review and comment 45 days prior to commencing Utility Adjustment Plans;
- 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;
- proposed replacement Personnel prior to Personnel performing Work;
- 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

Developer's Public Information and Communication Plan shall include the Public Information Plan required in Section 22 of the Technical Provisions and the Communication, Public Outreach and Community Education Plan required in this Section 3 of the Technical Provisions. Developer shall prepare and implement processes and procedures for media relations and public information 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 prepare protocols for coordination between Developer and NCDOT, third party stakeholders and the general public including the traveling public and the Users. 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;
- 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. Developer shall provide NCDOT with advance copies of all communications materials for their approval at least 30 days prior to dissemination. Where such communication is in response to an Incident or Emergency where the 30 day

period is not available, Developer shall coordinate with NCDOT to enable NCDOT to approve the communication in the time available.

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 VII of Exhibit 18 of the Agreement. The Project 'brand' material shall be submitted to NCDOT for approval 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 NCDOT's goals for the Project. Developer's Communication, Public Outreach and Community Education Plan will form the basis for all communication activities during the Term of the Project.

The Communication, Public Outreach and Community Education Plan 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 new media and a Project website.

Developer's Communication, Public Outreach and Community Education Plan shall provide a detailed outline of communication tools and strategies to be employed during each phase of the Project development, delivery and operation, including the matters listed above. The plan will 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.

The Communication, Public Outreach and Community Education Plan shall be updated annually by Developer thirty days prior to the anniversary of the approval of the preceding years. Communication, Public Outreach and Community Education Plan Developer shall submit the updated Communication, Public Outreach and Community Education Plan to NCDOT for review and comment.

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:

- 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 Pre-Operations and Operations - Public Education and Awareness

Developer shall ensure that motorists are educated about the features and benefits of the Project.

Developer shall develop a Public Education and Awareness Program, to fit within the above mentioned Communication, Public Outreach and Community Education Plan for the Project. 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 direct impact to area property owners.
- 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. Developer shall provide website copy to NCDOT for review and comment a minimum of seven days prior to posting except in Emergency situations or to accommodate the communication of live traffic conditions to the public. The website will at a minimum contain a graphical Project overview, contact information, plan of Work for the coming month, overall Project Schedule (no dates but on a quarter level), a frequently asked questions area and updated Project photos. The website shall be at a minimum, updated weekly throughout the duration of the Construction Period and at three month intervals thereafter.

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 protocol and procedures required in Section 3.3.1 of the Technical Provisions. Developer shall follow State records retention and IT security policies and Laws.

3.4 Media Relations

Developer shall act in the best interests of the Project and its Customers 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:

- develop and provide to NCDOT for review and comment a set of media protocols governing responsibilities and reporting in relation to contact with the media, including guidelines for information sharing, policies to promote consistent messages, and procedures specific to managing emergencies and Incidents;
- proactively build and maintain relationships with local media;
- provide timely response to media inquiries and keep NCDOT public affairs informed of media inquiries regarding the Project and the nature of responses and documented as mutually agreed;
- 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 as set out in Section 3.1 of the Technical Provisions.

3.5 Project Marketing

3.5.1 Project Branding

Developer shall develop and provide 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 work with NCDOT to establish division of responsibilities for 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 work with NCDOT to establish division of responsibilities for 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 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 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.

For any NCDOT-Provided Approval not acquired prior to the Proposal Due Date, a NCDOT Change will be made in the event the applicable NCDOT-Provided Approval contains certain unforeseen commitments as itemized below, to the extent that the commitment adversely and materially modifies or hinders the implementation of the requirements of the Technical Provisions:

- any commitment that prohibits the acquisition or use of a parcel required for the construction of the Project as required by the Technical Provisions;
- any commitment that requires construction of Project Elements for the purposes of National Historic Preservation Act Section 106 or Department of Transportation Act of 1966 Section 4f mitigation; or
- any other commitment that prohibits a portion of the Project from being constructed as specified in the Technical Provisions.

Developer shall develop and submit to NCDOT a Comprehensive Environmental Protection Program (CEPP) in accordance with Section 2.4.6 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 Section 1.1 of the Technical Provisions. Such approvals may require re-evaluation, amendment, or supplement as the Work progresses or in order to accommodate actions not identified in NCDOT-Provided Approvals or covered specifically by existing resource agency coordination. Changes by Developer to the Project design from what is contained in the in Section 1.1 of the Technical Provisions or incorporation of Additional Properties into the Project may trigger re-assessment of NCDOT-Provided Approvals.

Developer shall coordinate with NCDOT, FHWA, and other Governmental Entities as necessary to obtain new 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 other Work associated with obtaining the new Environmental Approvals.

Developer shall ensure compliance with the conditions and schedules set forth in amendments to any NCDOT-Provided Approvals or new Environmental Approvals. Subject to Section 6.2.5 of the Agreement, NCDOT will provide assistance in securing new Environmental Approvals or amendments 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 2.4.6.1 of the Technical Provisions Any action by NCDOT, including

submission of a permit application to Governmental Entities, does not assure approval by 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 construction requirement for the Project. Permit applications shall be required for the: US Army Corps of Engineers (USACE) Section 404 Permit, The North Carolina Department of Environmental and Natural Resources (NCDENR) Division of Water Quality (DWQ) Section 401 Water Quality Certification and NCDENR State Stormwater Permit. 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 shall not have direct contact with representatives of the environmental agencies, either by phone, e-mail or in person, without representatives of NCDOT present.

NCDOT will schedule meetings with the environmental 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 designed by Developer. 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 jurisdictional impacts, including all Utility Adjustment. The permit application shall consist, at a minimum, of the following:

- cover letter;
- minutes from Pre-Application Meetings;
- permit drawings;
- half-size plans; and
- completed forms (Section 404 ENG 4345, etc.) 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 or one permit application for each Project Section. Developer shall not submit multiple applications to develop a "staged permitting" process to expedite construction activities in a phased fashion.

Direct coordination between Developer, NCDOT's Transportation Program Management Director, Resident Engineer, Division Environmental Officer (DEO) and the Project Development and Environmental Analysis Branch - Natural Environment Unit (PDEA-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. 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 and impacts of haul roads and Utility Adjustment on jurisdictional areas. Developer shall also identify all proposed borrow and waste sites. Further, Developer shall describe the methods of construction of all Structures. The description of the temporary impacts (haul roads, utility relocations, work Bridges, etc.) 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 should allow 11 months after NTP1 to accurately and adequately complete all designs necessary for permit application, submit application to NCDOT, and obtain approval for the permits from the environmental agencies. Agency review time will be 90 days to 120 days from receipt of a "complete" package. With the exception of location and survey Work, Utility Adjustment outside jurisdictional areas 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).

Developer needs to be aware that the timeframes listed above for review by PDEA, NCDWQ, and the USACE, to review any permit applications and/or modifications 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 the Project construction. 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 agencies. Developer shall provide each of its Contractors and/or agents associated with the construction or maintenance of this Project with a copy of the permits.

If Developer discovers any previously unknown historic or archaeological remains while accomplishing the authorized Work, he shall immediately notify NCDOT, who will initiate the required State/Federal coordination.

4.3 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

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 with the third parties in the execution of the Work.

5.2 Third Party Agreements

Developer's Design Documents for the Project shall accommodate the terms of the third party agreements to the extent practicable. Developer shall coordinate the Work with all affected third parties. Developer shall contact each third party, provide information regarding the proposed Work and solicit input from the third party regarding the impact of the Work on the terms of their agreement with NCDOT.

Developer shall coordinate with all potentially impacted third parties.

When Developer provides NCDOT intermediate roadway and final roadway Design Document Submittals or other Design Documents Submittals as appropriate for review and comment, Developer shall provide NCDOT documents for review and comment that identify the effect of the Work on the terms of existing agreements NCDOT has with the third parties in areas affected by such work. This Submittal shall be in additional to Submittal requirements elsewhere in the Technical Provisions. When Developer's design affects the terms of existing agreements with third parties, NCDOT will enter into revised agreements with the third parties as necessary to affect the change.

When Developer's design requires modification of existing agreements NCDOT has with a third party, Developer shall prepare all revised agreements with any 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. Upon notification by Developer, NCDOT will provide such assistance to Developer within seven days. 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.

5.3 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 5.2 of the Technical Provisions; and
- completed third party agreements for NCDOT approval and execution 90 days prior to performing Work that affects the terms of 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. 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 30 days prior to commencing any Utility Adjustment Plans. 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 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 for the duration of all Utility Adjustment activities that shall be responsible for coordinating the Utility Adjustment design with the overall Project design during the planning, design, and construction phases of the Work. 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, or 3) the utility is not in conflict with other Project Work and can remain in place without requiring protection. 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 provide Utility Agreements executed by Utility Owner 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 for review and comment, including Utility Assembly Checklists, 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. After review the Utility Assembly submitted by Developer, NCDOT will review and approve applicable Utility Agreement and applicable Utility Adjustment cost estimate. NCDOT will submit to Developer and Utility Owner copy of Utility Adjustment Plans, applicable Utility Agreement, cost estimate and any applicable comments. If the Utility Adjustment Plans are approved with changes noted, Developer shall coordinate the 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, Developer shall submit a letter to the NCDOT indicating that no relocation or Protection in Place will be required 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. 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, 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, and utilities that will need either relocation or protection, the letter shall indicate the approximate location of the utilities that can remain in place without protection, by reference to MP, mile markers, or interchange locations, or otherwise as appropriate to identify their approximate locations.

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 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 (one original 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 CA Documents. Developer shall be responsible for obtaining all Governmental Approvals required for its 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 NCDOT 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 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 this Section 6 of the Technical Provisions.

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

6.9 Utility Service Connections

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. 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 of 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 prior to construction Work at the location of such Utilities;
- Final Utility Analysis & Preliminary Routing Report with Intermediate Roadway for review and comment prior to submission of the Utility Assembly;
- Utility Service Connections Plans for approval prior to utility service connection installation;
- As-Built Record Plans of all Utility Adjustment Work performed by Developer and/or Utility Owner 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 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 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 Intermediate Roadway Plans 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:

- perform land surveys to verify and precisely delineate Existing Right of Way and Proposed Right of Way and Additional Properties at locations where properties are to be acquired;
- 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 Right of Way Services. 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;
- appraisal over $1,000,000.00 must have a second appraisal;
- prepare Value Findings and / or Narrative Appraisals, not claim reports, for all property acquisitions;
- 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;
- deliver all executed and recorded deeds and easements to NCDOT;
- prepare all condemnation packages to include applicable items identified in the Checklist for Condemnation Packages, Exhibit 7-01 of the Technical Provisions;
- cooperate and provide all reasonable assistance associated with condemnation proceedings;
- provide relocation assistance; and
- provide to NCDOT Right of Way Parcel Certification that the property has been acquired and vacated 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 not 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.

If Developer proposes or is required to relocate a grave, 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 grave. Developer shall be responsible for the identification of relatives however NCDOT will be responsible for discussions with 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, at Developer's discretion, 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.

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.

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 access;

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 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 Requirements.

A minimum of 1 standard penetration test (SPT) boring, cone penetration test (CPT) boring or rock core boring (all referred to hereafter as boring) shall be performed within the distance specified in Table 8-1 from the center of the proposed bent locations.

Table 8-1
Maximum Distance of Borings from Foundation

Foundation Type	Maximum Distance to Boring
Piles	200 feet
Drilled Piers (multiple per footing)	100 feet
Drilled Pier (single pier per column)	75 feet

If a foundation type other than driven piles or drilled piers is selected as a foundation choice for any of the interior bents on the bridge, the Design-Build Team's Technical Proposal shall specify the locations and details of any additional geotechnical investigations that will be performed to develop design parameters.

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 Standard 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 Standard 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, 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 the ultimate configuration, as well as any interim configuration required. Developer shall confirm that the strength and serviceability requirements of the foundation are satisfied through engineering analyses and load 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.

Foundation types and locations can be "grouped" to where Developer can apply a series of foundations to one particular load test. For driven piles, Developer's testing shall consist of Pile Driving Analyzer with CAPWAP (Case Pile Wave Analysis Program) or Static Load Testing with grouping of pile tests only allowed at each bridge site. For drilled piers, Developer's testing shall consist of Statnamic Testing or Osterberg Cell Testing. 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 for the Project.

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 roadway 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 roadway 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 less than the settlement specified above in this Section 8.2.4 of the Technical Provisions. Developer shall provide a Bridge approach slab for all Bridges regardless of the anticipated settlement.

For slopes over ten feet in height; slopes over soft soils; slopes placed over material that classifies 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. 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 and erosion control 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.

For new pavement construction on I-77 and I-77 ramps on an embankment, Developer shall construct the top three feet of the embankment in accordance with the following requirements. Developer shall construct the top one foot of the embankment to have a minimum Dynamic Cone Penetrometer (DCP) penetration rate of 15 blows and the next two feet of embankment shall have a minimum cumulative DCP penetration rate of 20. For cut sections, Developer shall construct the top one foot of subgrade to have a minimum DCP penetration rate of 15 blows directly beneath the pavement except in locations where chemical stabilization is used. Developer shall verify the requirements are satisfied utilizing DCP testing at intervals of no greater than 250 feet for each constructed lane where proof-rolling is conducted and at intervals no greater than 100 feet for each constructed lane where proof-rolling is not conducted. The DCP testing should meet requirement of ASTM D 6951 for the DCP with the 17.6 pound hammer. NCDOT will accept a correlation of 1 blow per foot as approximately equal to a CBR of one (example 12 BPF = 12 CBR).

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.

Improve pavement subgrade as needed to meet the subgrade conditions assumed in the pavement design 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 certified for their accuracy, validity and correctness by Developer's Design Geotechnical Engineer.

Developer shall notify the NCDOT at least 14 calendar 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 Bridge 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 as 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, and recommended ground improvement measures, stability of retaining wall Structures and embankment slopes and seismic performance criteria. The Foundation Design Report shall also document that the any 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 14 calendar 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 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 grid 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.

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 Conventional Method (Horizontal & Vertical Control)

When conventional survey methods are used, 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).

9.2.3.1 Horizontal Accuracy Requirements for Conventional Surveys

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: 50,000	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: 50,000 (2,500 feet)	
Positional Tolerance of Any Monument	*AC*/ 50,000	*AC* = length of any course in traverse
Adjusted Mathematical Closure of Survey (No Less Than)	1: 200,000	

9.2.3.2 Vertical Accuracy Requirements for Conventional Surveys

Developer shall establish vertical control, at a minimum, to 2nd Order (Error of Closure = 0.026’ √ K, where K= kilometers of loop traverse).

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 Submittal 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 Submittal set out in Section 2.9 of the Technical Provisions. All property boundary 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 ROW and easement monumentation throughout the duration of the Project. These right of way monuments shall be documented in tabular format along with the survey control and calibration sheets included in the Design Document Submittal 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…)	1:50,000	1:50,000	

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 ROW and easement monuments including replacement of any ROW monumentation. These initial monuments shall be installed prior ROW acquisition or to commencing any construction activities and the location of these markers shall be recorded

on the Intermediate Roadway Plans or Right of Way Plans submitted to NCDOT in accordance with Section 22 of the Technical Provisions. These monuments shall be placed at all points of curvature or change in direction of the right of way line, 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 lines and sight distance lines; and
- all beginning and ending points of Control of Access lines.

Developer shall install monuments at changes in direction or breaks in right of way and at a distance between adjacent monuments that shall not exceed 2000 feet; in curves or tangents longer than 2000 feet, Developer shall install the intermediate monuments set at approximately equidistant spacing.

At locations where monumentation will not be disturbed during construction, Developer shall delineate points of permanent easement with 5/8 inch iron bar (#5 rebar) at least 30 inches long together with a cap, labeled NC Department of Transportation Permanent Easement Do Not Disturb. These permanent easement monuments shall be installed at all points of curvature or change in direction of the right of way line, 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 lines and sight distance lines; and
- all beginning and ending points of Control of Access lines.

Developer shall install permanent easement monuments at changes in direction or breaks in right of way and at a distance between adjacent monuments that shall not exceed 2000 feet; in

curves or tangents longer than 2000 feet, Developer shall install the intermediate monuments set at approximately equidistant spacing.

Developer shall include the station and offset distance to nearest alignment and localized coordinates (North, East) for easement 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.

Upon completion of the ROW acquisition and all construction grading Work, such that the final ROW lines will not be disturbed by construction, Developer shall replace all initial right of way monuments located on the final ROW line at all points with 5/8 inch iron bar (#5 rebar) at least 30 inches long together with a cap, labeled NC Department of Transportation Right of Way Do Not Disturb. These permanent ROW monuments shall be installed at all points of curvature or change in direction of the right of way line, 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 lines and sight distance lines; and
- all beginning and ending points of Control of Access lines.

Developer shall install permanent ROW monuments at changes in direction or breaks in right of way and at a distance between adjacent monuments shall not exceed 2000 feet. Developer shall install the intermediate monuments set 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 with the specified width within the Existing ROW as of the Proposal Due Date.

Developer shall design and construct the HOT Lanes as described in the Project scope in Section 1 of the Technical Provisions.

For the purpose of the Project, these lanes are the HOT Lanes. For avoidance of doubt, the HOT Lanes include the four-foot buffer separating the HOT Lanes from the General Purpose 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 to the Project scope description in Section 1 of the Technical Provisions.

All HOT Lanes and General Purpose Lanes shall be 12 feet wide unless otherwise specified.

Developer shall design and construct ten foot full depth paved inside Shoulders and 14 foot outside Shoulders, 12-foot of which shall be full depth paved Shoulders on Interstate routes unless otherwise specified in the Technical Provisions. At a minimum, the existing width of the outside Shoulders over the causeway in the North Section shall be maintained.

A minimum 4-foot buffer of full depth pavement shall be located between the inside General Purpose Lanes and HOT Lanes with appropriate pavement markings, unless otherwise noted in the Technical Provisions.

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.

Developer shall design and construct all roadway Elements according to NCDOT's Standards and Standard Special Provisions, including but are not limited to horizontal alignment, vertical alignment, superelevation, cross slopes, lane widths, Shoulder widths, medians, clear zones, side slopes, and cut and fill slopes. Developer shall construct the cross slope of the GP Lanes to conform to the design criteria ± 0.003.

Developer shall prepare all Interchange Modification Reports (IMR) as required by Developer's Design Documents in accordance with NCDOT and FHWA requirements. The IMR shall adhere to the policies and procedures provided in 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 alignment of the roadway and Bridge.

Developer shall adhere to all Environmental Commitments in the Environmental Approvals and conditions of required environmental permits.

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, Developer shall construct a five foot wide sidewalk on the adjacent roadway from the Bridge sidewalk to connect to the existing sidewalk, if any, or to the Project limits if there is no existing sidewalk.

10.2.2 Ingress, Egress, Weaves and Termini for HOT Lanes

Developer shall design and construct the HOT Lanes to provide the minimum number of ingress/egress and the logical termini as described in Section 1 of the Technical Provisions.

As part of the Design Documents to be submitted in accordance with the Technical Provisions and Book 3, Developer shall produce a detailed traffic simulation and capacity analysis for the entire Project scope and including roadways extending within, at a minimum, a half mile from the ROW limit and connecting to the Project using either CORSIM or VISSIM traffic simulation software, or equivalent. The analysis shall be conducted following NCDOT *Congestion Management Capacity Analysis Guidelines* and shall be submitted to NCDOT for review and comment.

The traffic simulation shall demonstrate that Developer's design of the HOT Lanes access points (including ingress, egress, and weaves) and termini, ramps, loops and interchanges or any modification thereof does not independently cause any adverse impact the operating performance of the General Purpose Lanes at such locations, including impacts on ramps, loops and interchanges to and from the GP Lanes. In the event Developer's design adversely impact the operating performance of the General Purpose Lanes at such locations, the analysis shall demonstrate, to NCDOT's satisfaction and at NCDOT's sole discretion, that Developer's design minimizes any such adverse impacts.

In addition, Developer shall submit to NCDOT for review and comment a new and updated traffic simulation following the requirements in this 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. Such analysis shall also include any impact on signalized intersections access to or from the Project. For avoidance of doubt, this requirement applies to any phased development of the Project as well as future modifications of the roadway geometry or pavement markings.

Developer's traffic simulation Submittal shall address at a minimum the following measures of effectiveness:

- total and average travel time, average travel speed, minimum travel speed, total delays (compared to the no-build alternative), and traffic volumes for HOT Lanes and the General Purpose Lanes separately and combined, for the AM Peak Period and PM Peak Period, southbound and northbound, respectively; and
- vehicle density and corresponding level of service (LOS) at representative points along the Project such as, but not limited to, HOT Lanes ingress/egress points and merges at HOT Lane termini points.

10.2.3 Roadway Geometry

The HOT Lanes shall be located to the median side of the General Purpose Lanes, with a minimum four-foot buffer separation between the HOT Lanes and the General Purpose Lanes unless otherwise specified.

In a normal crown section (tangent), NCDOT requires that the buffer and HOT Lane(s) slope at a 0.02 cross slope to the inside and the General Purpose Lanes slope at a 0.02 cross slope to the outside except when governed by other design requirements in the CA Document.

Developer shall evaluate the existing grades and cross slopes of the Existing General Purpose Lanes and the Existing HOV Lanes and revise to meet design standards specified in the CA Documents as necessary. To the extent practicable, Developer shall limit the width of the Travelways with the cross slope in the same direction to 36 feet, exclusive of tapers, auxiliary lanes, acceleration lanes and deceleration lanes. 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 and GP Lanes during a 4.0 inch per hour rain storm.

Developer shall describe in the Design Documents the roadway geometry (including but not limited to superelevation, grades and Design Speed) and how Developer shall minimize hydroplaning concerns. Developer shall follow the Hydroplaning Awareness Outline in the NCDOT Roadway Design 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:

- pave or resurface all lanes and paved Shoulders of undivided roadway to the outermost longitudinal limits of Work that impacts the pavement (installation or removal of pavement markings impact the pavement);
- on divided roadways, pave or resurface all lanes and paved Shoulders on each side of the divider, without regard to roadway on the opposite side of the divider, to the outermost limits of Work that impacts the pavement (installation or removal of pavement markings impact the pavement); 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 (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 that meet design standards.

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. As necessary, Developer shall upgrade the ramp/loop acceleration and deceleration lengths to standards.

Developer's design and construction shall not permit vegetation growth between guardrail and paved Shoulder. Developer's design shall not permit a sag vertical curve low point on any Bridge or approach slab.

Developer shall design and construct remedial Work on eastern side of causeway slope between approximate MP 30 and approximate MP 31 to stabilize the earthen embankment and to prevent erosion. Developer shall use NCDOT *Rock Plating Detail* standard or other NCDOT approved method when performing the Work.

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 50:1 taper rate unless otherwise specified in the Technical Requirements. Tapers for weave areas between the HOT and General Purpose Lanes shall use a minimum 50:1 taper rate. Taper rates for the ramps and loops shall follow the standards;
- if Developer revises the lane alignment to be parallel to the joints in underlying Portland cement concrete pavement, joints in the underlying Portland cement concrete pavement shall not be in the wheel path of the final lanes. For clarity, joints in underlying Portland cement concrete pavement shall be located at the edge of the final lanes or at the center of the final lanes;
- unless noted otherwise in these CA Documents, the Design Speed for all roadways shall be the greater of the minimum Design Speed for the facility or the anticipated/actual posted speed plus five-mph. If a speed limit is not physically posted on an existing facility, general statutes mandate the speed limit as 55 mph, resulting in a 60 mph Design Speed;
- from the southern terminus of the Project to MP 14, the minimum Design Speed shall be 60 mph for the GP and HOT Lanes on I-77 and I-277. From MP 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;
- all turn lane lengths shall meet the current NCDOT standards where vehicle storage does not govern. 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 plans; and
- at all intersections impacted by Developer's Design Documents excluding resurfacing, the following design vehicles shall be required for all turning movements:
    - WB-65 at all ramp/loop intersections with Y-lines; and
    - WB-50 at all other intersections.

10.2.4 Barriers, Walls, and Medians

Developer's Design Documents shall adhere to the following:

- 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. 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 median glare screens and, if warranted, design and construct glare protection;

- 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
- keyed-in concrete monolithic channelization islands shall be used at all at-grade intersections with restricted movements impacted by Developer's Design Documents, excluding resurfacing.

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; Central Section in accordance with the Design Noise Report for TIP Project No. I-5405 prepared by Atkins (approved October 22, 2012); North Section in accordance with the Design Noise Report for TIP Project No. I-4750 prepared by RK&K; and provided by NCDOT. Developer shall perform all geotechnical investigations necessary to design the foundations and shall be responsible for the wall envelope details. If Developer revises the horizontal and/or vertical alignments and increases noise impacts, Developer shall re-analyze and complete a revised noise report, if necessary, 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.

10.2.5 Cut and Fill Slopes

Unless noted otherwise in the CA Documents, the maximum allowable cut and fill slope shall be 2:1, with slopes in the interchange area following NCDOT requirements.

10.2.6 Fence and Survey Monuments

Developer shall be responsible for the installation or replacement of all fences impacted by construction or otherwise requiring relocation. If any areas require replacement of fence not as a direct result of construction, Developer shall notify the NCDOT prior to performing Work in proximity of such areas.

Developer shall be responsible for the installation or replacement of all ROW monuments impacted by construction or otherwise requiring relocation.

10.2.7 Toll Zone Pull Off Areas

Developer's roadway design shall provide for safe parking area at each Toll Zones 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 Construction Requirements

Construction Work shall not begin until Environmental Approvals have been acquired and a Traffic Management Plan as required by Section 22.1.1 of the Technical Provisions has been approved by NCDOT.

Developer shall provide rumble strips along the Project inside and outside paved Shoulders, including ramp and loop terminals, acceleration, deceleration and auxiliary lanes, in accordance with the NCDOT *Roadway Standard Drawings*.

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

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 PAVEMENTS

11.1 General

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

Developer shall design and construct all roadway pavements using subsurface geotechnical data collected by and engineering analyses performed by Developer as per Section 8 of the Technical Provisions. Developer shall include in the Pavement Design Report a description of how subsurface geotechnical data collected by and engineering analyses performed by Developer have been incorporated into Developer's Design and how Developer's Design Documents will achieve the operational requirements of the CA Documents.

The pavement designs shall be in accordance with the pavement design attached to Article 2 of the Agreement. For avoidance of doubt, the pavement designs shall be consistent with those deemed generally responsive by NCDOT as part of Developer's pre-proposal Submittal for pavement design as per Section 3.10 of Volume I of the RFP (Instruction to Proposers).

11.2 Design Requirements

11.2.1 Pavement Design

Developer shall evaluate the existing Shoulders and roadways regarding their suitability for carrying the design traffic where existing pavement and Shoulders are to be used or incorporated into the Work. This evaluation shall be documented in the Pavement Design Report. Developer's Design Documents shall be provided to NCDOT in accordance with Exhibit 2-09 and shall include the Pavement Design Report which documents the 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;
- lifecycle management analysis, including the periods for resurfacing, reconstruction, and other rehabilitation measures and what these activities are likely to entail and when these activities are projected to be undertaken;
- 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;
- 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 functional Highway classification(s). For roadways adjacent to and crossing the Project that are disturbed by the construction activities of the Project, Developer shall, at a minimum, match the in-place surface type and structure of the existing roadways. Developer shall design the pavement to minimize differential settlement between the existing and new surfaces.

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

- 2012 AADT = 185,400, 2035 AADT of 231,400, four percent single unit trucks, and four percent multiunit trucks;
- pavement shall be designed using the NCDOT Pavement Design Procedure; the Mechanistic-Empirical Pavement Design Guide, Darwin ME (Version 1.1 or later); or the 1993 AASHTO Guide for Design of Pavement Structures;
- pavement design using the Mechanistic-Empirical Pavement Design Guide, Darwin ME procedure adhere to "Minimum Pavement Design Criteria in Table 11.3
- pavement design shall be prepared by Pavement Designer that meets the requirements of Section 2.13.2 of the Technical Provisions
- pavement designs for the mainline and ramps shall include subgrade consistent with Section 8 of the Technical Provisions;
- concrete 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 shall meet the minimum thickness described below:
    - full depth asphalt;
        - minimum thickness: 11 in.
    - asphalt/ABC;
        - minimum thickness of ABC layer: eight in.
        - minimum thickness of asphalt over ABC: six in.
    - asphalt/CTABC;
        - CTABC thickness: eight in.
        - minimum thickness of asphalt over CTABC: seven in.
- concrete pavement shall meet the minimum thickness described below:
    - minimum thickness: nine inches; and
    - joint spacing: 15 ft.
- 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

When designing temporary pavement Developer shall prepare a separate Pavement Design Report for the temporary pavement or include the design of temporary pavement in the main Pavement Design Report. 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 expected duration for traffic on the temporary pavement and the expected traffic volume and loading.

11.2.3 Widening Pavement

Developer's design shall not provide for the uniform widening of the existing pavement by less than six feet, except that the minimum width of widening can be reduced to four feet when approved by NCDOT. Where Developer proposes uniform widening of the existing pavement by less than six feet, Developer shall submit to NCDOT for approval concurrently 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 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 with a pavement surface course that differs from the existing pavement surface course, the Pavement Design Report shall address maintenance of the interface between the existing pavement and the widened pavement, and future pavement overlays.

11.2.4 Existing Shoulders

At locations where the existing paved Shoulders are proposed to be incorporated into a permanent Travelway, Developer shall evaluate the existing paved Shoulder regarding its suitability for carrying the projected traffic volume. Developer shall detail this evaluation in the Pavement Design Report.

11.2.5 Pavement Design Report

Developer shall prepare a Pavement Design Report covering pavement design evaluation and whole life strategy and approach as detailed in this Section 11 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 on the both sides of the Project bituminous pavement throughout sag vertical curves, throughout crest vertical curves located in cut sections, and where the longitudinal grade is less than one percent. Except on the high side of superelevated roadways, Developer shall design and construct continuous Shoulder drains and outlets on the both sides of the Project concrete pavement.

Shoulder drain outlets shall be provided approximately every 300 feet. In the median, if drainage Structures are spaced at more than 300 feet, the outlet spacing may be increased to no more than 500 feet in those areas.

11.4 Construction

Developer shall:

- provide incidental milling of the end of existing bituminous pavements to provide a smooth transition to the proposed bituminous pavement. When connecting to existing pavement, the minimum required surface layer pavement thickness noted above shall not be reduced. Developer shall not perform Incidental milling more than 48 hours prior to placement of the bituminous surface layer;
- 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;
- comply with all design requirements contained in the CA Documents;
- comply with "Pavement Surface Testing" as provided in Exhibit 11-01 of the Technical Provisions;
- mill to remove the existing asphalt overlay and resurface I-277 from N. Brevard Street to approximately 400 feet east of the Hamilton Street Bridge with a minimum of 1.5" depth Asphalt Concrete Surface Course Type S9.5D;
- resurface ramps or connectors from I-77 and I-277 where resurfacing is required to other freeways to 100 feet beyond the back of the I-77 ramp gore or end of construction, whichever is greater, with a minimum of 1.5" depth Asphalt Concrete Surface Course Type S9.5D;
- resurface all ramps from I-77 and I-277 where resurfacing is required to non-freeways to within five feet of intersection with the non-freeway with a minimum of 1.5" depth Asphalt Concrete Surface Course Type S9.5D;
- resurface all General Purpose Lanes, auxiliary lanes, Shoulders, and tapers with a minimum of 1.5" depth Asphalt Concrete Surface Course Type S9.5D;
- spot mill General Purpose Lanes to a depth of 2.5" and replace with 2.5" depth Asphalt Concrete Intermediate Course Type I19.0D at locations identified by NCDOT and not to exceed percentages stated in Table 11.2; and
- not reduce vertical clearance under any existing bridge due to milling, resurfacing or overlay work.

11.5 Deliverables

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

- 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.

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 (Two lanes per direction)	0.5	0.5
Lane Distribution Factor (Three or more lanes per direction)	0.5	0.5
*Reliability	95%	95%
*Overall Standard Deviation	0.45	0.35

*1993 AASHTO Guide for Design of Pavement Structures only

Table 11.2

FROM	TO	QUANTITY
South Project Terminus	I-85	10% of Total Area
I-85	MP 20.6	5% of Total Area
MP 20.6	MP 24.4 SBL MP 22.2 NBL	100% of Total Area
MP 24.4 SBL MP 22.2 NBL	North Project Terminus	None

Table 11.3
Minimum Pavement Design Criteria for Mechanistic-Empirical Pavement Design Guide, Darwin 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*
CONCRETE 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

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.

The North Carolina Department of Environmental and Natural Resources (NCDENR) has issued a National Pollutant Discharge System (NPDES) Stormwater Permit NCS000250 to NCDOT. Developer shall comply 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. Where Developer's Design Documents utilize Elements of existing hydraulic systems Developer shall determine the status, capacity and integrity of existing hydraulic systems and document this assessment as part of the Design Document Submittal required by Section 2 of the Technical Provisions demonstrating that Developer's Design Documents have been 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 submissions required in Section 2.9 of the Technical Provisions.

Developer shall prepare and submit Bridge/Culvert Survey Reports (BSR) for each Structure to NCDOT for review and comment prior to beginning design of the Structure. Culverts with side tapered inlets shall comply with the Environmental Commitments.

Developer shall prepare a Conditional Letter of Map Revision (CLOMR) and/or Memorandum of Agreement (MOA) package for any FEMA regulated streams impacted by Developer's Design Documents. Developer shall submit the MOA package to NCDOT for submission to the reviewing agency. North Carolina Flood Plain Mapping Program (NCFMP) is the reviewing agency for the MOA package and associated model(s).

Should NCFMP not approve the MOA package, Developer shall obtain a CLOMR. For CLOMR/LOMR, Mecklenburg County and NCFMP are reviewing agency for activities within Mecklenburg County and Iredell County respectively. Developer shall not perform any Construction Work in FEMA regulated floodplains prior to the MOA and/or CLOMR being approved by the reviewing agency.

Prior to submission of the Conceptual Design Submittal required under Section 2.9 of the Technical Provisions, Developer shall organize and conduct an interagency Merger Concurrence Point 4B meeting to review the proposed hydraulic design. Developer shall incorporate the comments from the meeting in the design prior to submitting the Conceptual Design Submittal to NCDOT.

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 an interagency Merger Concurrence Point 4C meeting. Developer shall incorporate the comments from the meeting in the design prior to submitting the Final Design Submittal to NCDOT.

Developer shall record minutes of all meetings required under this Section 12.2 of the Technical Provisions and submit the minutes to NCDOT of review and comment within three days of the meeting.

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.

Developer shall prepare and submit to NCDOT a Stormwater Management Plan and all documents necessary for NCDOT to obtain a "Stormwater Management Compliance Letter" from NCDENR, including but not limited to Stormwater Management Permit Application Form (Form SW401-NCDOT Linear Roadway). NCDOT will forward the information provided by Developer to NCDENR for issuance of a "Stormwater Management Compliance Letter" Developer shall not begin construction prior to issuance of the "Stormwater Management Compliance Letter" by NCDENR.

Developer's Stormwater Management Plan shall include as 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 design stormwater controls and implement the Stormwater Management Plan using Best Management Practices per the latest NCDOT Stormwater Best Management Practices Toolbox. Developer shall design Hazardous Spill Basins in accordance with Appendix O of the North Carolina Division of Highways *Guidelines for Drainage Studies and Hydraulic Design*.

Developer shall install stormwater controls necessary for the satisfactory completion of the Project.

12.3 Construction Requirements

No construction activity shall occur in a FEMA regulated floodplain prior to approval of the MOA or CLOMR.

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;
- CLOMR or MOA package for submission to and approval by the reviewing agency prior to Construction Work in regulated floodplain;
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions;

- minutes of Merger Concurrence Point 4B and 4C meetings for review and comment within three days; and
- Stormwater Management Plan for NCDENR review and issuance of Stormwater Management Compliance Letter prior to Construction Work.

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 2.9.1 of the Technical Provisions, Developer shall convene an Erosion and Sedimentation Control Plan review meeting with NCDOT and, at the sole discretion of NCDENR, 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 days prior to the planned date of the meeting Developer shall provide to NCDOT and NCDENR a draft version of the Erosion and Sedimentation Control Plan for all Work that may result in erosion or sedimentation. Developer shall record minutes of the meeting and distribute these to NCDOT and NCDENR for review and comment within three days of the meeting. 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 the Final Clearing and Grubbing Erosion Control Plans. Developer shall submit the Erosion and Sedimentation Control Plan to NCDOT and NCDENR 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 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.

Developer shall submit the Vegetation Management Plan to NCDOT for approval not less than 40 days prior to any land disturbing activities. Developer shall submit an updated Vegetation Management Plan to NCDOT for approval not later than the 1st of each month when Developer has exposed erodible area.

Developer's Design Documents submissions required under Section 2 of the Technical Provisions shall include separate plans for erosion and sedimentation control at the various stages as follows:

- clearing and grubbing;
- grading; and
- revised or supplemental.

Developer shall comply with the requirements of Exhibit 13-01 of the Technical Provisions titled Environmental Sensitive Area set out in the exhibits attached to this Section 13 of the Technical Provisions.

13.3 Construction Requirements

Developer shall submit to NCDOT for review and comment a Vegetation Management Plan. Developer shall submit monthly update of the Vegetation Management Plan for any areas where land disturbing activities are taking place as part of the monthly Progress Report. Developer's Vegetation Management Plan shall include, but not be limited to, provisions for the early establishment of grasses/vegetation, and procedures and schedule details for fertilizer topdressing, supplemental seeding, mowing and repair seeding. The Vegetation Management Plan shall be closely aligned with Developer's proposed grading and hauling operations.

Developer shall perform all Work under this Section 13 of the Technical Provisions 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 resulting from clearing and grubbing operations.

Immediately after the clearing and grubbing erosion control measures have been installed for the entire project, or for individual sections if Developer has divided the project into construction segments, Developer's erosion and sedimentation control designer shall field verify constructed dimensions and installation of all erosion control devices. After this initial inspection(s), the aforementioned designer shall review the project conditions a minimum of every 30 days during the heavy grading operations to verify the field conditions of disturbed areas draining to erosion control devices. The erosion and sedimentation control designer shall make appropriate design revisions to the Clearing and Grubbing and/or Final Grade Erosion Control Plans resulting from or required by these field inspections for NCDOT review and comment, in accordance with Section 2.9.2 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 length of time, NCDOT may have the Work performed in accordance with Article 105-16 of NCDOT Standard Specification.

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:

- Environmental Sensitive Area — Exhibit 13-01
- 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 days of meeting;
- Final Erosion and Sedimentation Control Plan for review and comment not later than Final Clearing and Grubbing Erosion Control Plans;
- Design Documents in accordance with Exhibit 2-09 of the Technical Provisions;
- Vegetation Management Plan for review and comment at least 40 days prior to land disturbing activities;
- revised Vegetation Management Plan for approval 1st of each month when there are exposed erodible area;

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 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 and reviewed and approved by NCDOT. 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.

Developer shall design all Bridges to achieve a minimum design service life of 75 years.

With respect to plans preparation, Developer is encouraged to use NCDOT *Structural Design Manual*.

Developer's proposed Bridge geometry for new or replaced Structures shall satisfy the minimum horizontal requirements and a 17'-0" minimum vertical clearance over interstate routes. For Bridges to remain in place over interstate route, the existing vertical clearance shall be maintained unless the existing vertical clearance is greater than 17'-0". The above vertical clearance requirements apply, both during construction, and throughout the Term.

Bridges on flyovers or HOT direct connect ramps shall have the wider Shoulder on the inside of curvature per direction of travel.

Developer shall design and construct, at a minimum, five foot wide sidewalks and five foot wide bicycle lanes (measured from the face of curb) on both sides of the Bridge at the following locations:

- Bridge on Oaklawn Avenue over I-77 that replaces Bridge No. 590286;
- Bridge on LaSalle Street over I-77 that replaces Bridge No. 590153;
- Bridge on Hambright Road (SR 2117) over I-77 that replaces Bridge No. 590353; and
- Bridge on Griffith Street (SR 2158) over I-77 that replaces Bridge No. 590364.

Developer shall design and construct the Bridge on Hamilton Street over I-277 that replaces Bridge No. 590335 with, at a minimum, seven and a half foot wide sidewalks on both sides and two 13 foot lanes.

Developer shall design and construct, at a minimum, five foot wide sidewalks and five foot wide bicycle lanes on the north side of Bridge, and eight foot wide sidewalks and five foot wide bicycle lanes on the south side of Bridge on Westmoreland Road (SR 2147) over I-77 that replaces Bridge No. 590362.

If Developer's design requires removal and replacement of Bridge No 590323 (US 21) over I-77, Developer shall design and construct the replacement Bridge to accommodate, at a minimum, the existing lanes on US 21 and five foot wide sidewalks on both sides of the roadway.

Developer shall at a minimum, replace the Bridge on I-77 SB lane over I-77 NB lane at the I-85 interchange, Bridge No. 590297.

When Developer's design requires removal and replacement of Bridges over the Project, Developer shall coordinate with NCDOT and applicable municipality and/or county to determine plans to accommodate non-motorized modes of transportation. Developer shall design and construct Bridges to accommodate non-motorized modes of transportation in accordance with the NCDOT Pedestrian Policy Guidelines.

Existing Bridges that Developer proposes to widen shall be widened using a superstructure type similar to the existing superstructure type and a substructure type that is similar to the existing substructure. The relative stiffness between existing substructures/foundations and adjacent widened substructures/foundations shall be considered in the overall Bridge widening design.

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

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 all structural 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.

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 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. The LRFR method shall be used.

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 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 Highway Bridge Substructures

Developer shall not utilize fracture-critical substructure components.

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 Mechanically Stabilized Earth (MSE) walls as structural foundations for Bridges and shall not subject MSE walls to vertical loads from the Bridges.

Developer shall design and construct Bridge approach slabs and reinforced Bridge approach fills for all Bridges.

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 have railing and barrier systems tested in accordance with NCHRP Report 350 and certified by a third party acceptable to NCDOT unless the railing and barrier systems are listed in Table 14.1 and subject to NCDOT standard practice and Design Speeds.

Table 14.1

STD NAME	DESCRIPTION
BMR34	Two-Bar Metal Rail
BMR567*	Three-Bar Metal Rail with sidewalk
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

* acceptable for Design Speeds not exceeding 45 mph

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, Structure 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 toll collection system. Structures supporting tolling equipment shall be equipped with vibration control suitable for satisfactory operation of the equipment. 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 sign and tolling gantry support foundations that are plumb and that are designed to not rotate.

14.2.10 Box Culvert

Extend existing box culvert (Structure# 590288) over Irwin Creek located 0.55 miles north of I-277 (Brookshire Freeway) junction with I-77 per Developer's design to meet the scope requirements of the Project.

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.

14.4 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;

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. The Technical Provisions define opportunities for aesthetic enhancements and requirements for corridor landscaping.

15.2 Aesthetic Elements

For purposes of this Section 15 of the Technical Provisions, and evaluation criteria of Exhibit B of the Instruction to Proposers, the following items will be considered aesthetic opportunities for the Project design:

- materials, finish, color, and texture of Bridge Elements on new Structures;
- materials, finish, color, and placement of traffic barriers, railings, lighting and control access fences;
- finish, color, texture, alignment, and height of retaining and noise walls; and
- placement and materials of Signage and sign supports – overhead, attached, and ground mounted.

15.2.1 Corridor Landscaping and Aesthetics Plan

Developer shall develop a Corridor Landscaping and Aesthetics Plan that establishes an overall vision for the corridor. Developer shall consult with adjacent municipalities and, to the extent practical, incorporate their vision into the Corridor Landscaping and Aesthetics Plan. The Corridor Landscaping and Aesthetics Plan shall be developed in concert with NCDOT and finalized within 270 days after NTP2. This plan shall provide guidelines for designing, prioritizing, and implementing near term landscaping along the corridor within the allowance provided in Article 7 of the Agreement. The plan shall also include details regarding future landscaping and future aesthetic hardscape Elements that will ultimately result in a uniform, corridor-wide landscape.

15.3 Design Requirements

Developer shall design the landscaping in accordance with the guidelines and requirements set forth in the approved Corridor Landscaping and Aesthetics Plan, as well as the aesthetics and landscaping principles and design requirements of this Section 15 of the Technical Provisions.

15.3.1 Landscaping

Developer design shall incorporate native plants or plants included on the plant list available 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 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 vegetation on the corridor;
- provide a sustainable landscape plan for the corridor; and
- mowing limits compatible with Exhibit 23-01 and this Section 15 of the Technical Provisions.

15.4 Construction Requirements

Developer shall place large trees not less than forty feet from any Travelway except when protected by positive barrier. Large trees protected by barrier shall be not less than ten feet behind the barrier.

15.5 Deliverables

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

- Corridor Aesthetics and Landscaping Plan in concert with NCDOT within 270 days of NTP2;
- 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 and transit 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 and transit owner's properties or operations within or in the vicinity of the Project ROW.

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 and transit 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 or transit agency. 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 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 and transit owners including the Norfolk Southern Corporation, CSX Railroad and NCDOT in the installation of any railroad or transit crossings and any related appurtenances. Developer shall negotiate and obtain any executed agreement with the railroad or transit owner as may be required to establish the general framework for addressing coordination or potential conflicts between Developer Work and a railroad or transit owner. The two party agreement between the NCDOT and the railroad or transit owner will set forth the terms and conditions under which the Work will be performed, including Railroad Protective Liability Insurance for Bodily Injury Liability, Property Damage Liability, and Physical Damage to Property. The agreement shall also include necessary Force Account items such as preliminary engineering, construction engineering, flagging, and signal and communication lines. Developer shall comply with all terms and conditions of such agreement. Developer shall provide any railroad or transit agreements to NCDOT for review and approval 45 days prior to any Work being done within the railroad or transit right of way.

Prior to commencing any activities within a railroad right of way, Developer shall obtain insurance approval, per activity, from the appropriate railroad(s). Not 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). Developer shall not commence Work in the railroad or transit 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 or transit owner and NCDOT.

16.3 Construction Requirements

Developer shall verify any pertinent information of the railroad crossings, including but not limited to physical infrastructure type and location and operation information such as the number of trains per day and maximum speed allowed. In particular, Developer shall verify and accommodate all requirements associated with the Charlotte Railroad Improvement and Safety Program (CRISP) project. Developer shall not impede the CRISP project.

Developer shall contact the respective railroad or transit owner representative to coordinate required plan and design changes, required railroad or transit encroachment, future railroad or transit projects within or in the vicinity of the Project ROW, including rail or transit 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 or transit 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 or transit agreements for approval 45 days prior to any Work being done within the railroad or transit right of way; and
- final executed agreement documents and attachments to submittal of Final Design Document.

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, 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, 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.

17.2 Design Requirements

Developer shall design pavement markings, pavement markers and other 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 pavement marking 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 this 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 are 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 Users, 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 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.

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 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 the 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.

Developer shall 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 signs that do not meet the requirements of Section 23 of the Technical Provisions shall be replaced.

18.3.1 Overhead Sign Assemblies

Developer shall install overhead sign assemblies, including cantilever sign assemblies, for a wind speed of not 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 shall be located a minimum of 40 feet from the near edge of the Travelway to the center of the sign support. If the minimum 40-foot distance cannot be obtained due to right of way constraints, or 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 median 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 2009 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 *1)* a Toll Rate Sign one mile and one half mile in advance of a point of entry, and *2)* 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.

Developer shall include details of all Toll Rate Signs in the signing Design Submittals as required by Section 2 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 (TODS), 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

Advisory speed signs and chevrons will be added along all ramps below AASHTO or NCDOT standards to enhance safety. These safety features will be installed in accordance with current MUTCD and NCDOT guidelines. Specifically, an advisory speed sign and chevrons will be added to the I-277 NB on ramp at Graham Street.

Warning signs for reduced vertical clearance will be added along all roadways with existing overhead bridges having vertical clearances below AASHTO or NCDOT standards to enhance safety. These signs will be installed in accordance with current MUTCD and NCDOT guidelines. Locations will include along I-85 in advance of the I-77 NB Bridge over I-85 (Bridge No. 590302).

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 during Project construction (see MUTCD section 2F.02).

Developer shall leave appropriate advance guide signs and/or exit direction signs in place at all times and shall not obstruct the view of the signs by motorist. Developer shall replace any other removed signs 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 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

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 safe design for the Project corridor motorists that is economical to operate and maintain. The design shall be consistent with current NCDOT practice.

19.2.1 Signalization

As a minimum, Developer's Design Documents for all signals 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.

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 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. See Section 6.9 of the Technical Provisions for other requirements.

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

Developer shall undertake all Work necessary to provide a complete and functional system that meets the following requirements:

- is durable;
- provides uniform coverage at intersections and interchanges to create a safe and comfortable environment for the traveling public;
- 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, light trespass and glare.

Developer shall design, construct operate and maintain continuous roadway lighting along the Highway General Purpose Lanes, HOT Lanes, detours, ramps, and ramp terminal intersections with cross streets that form the Project. The existing lighting system(s) may be incorporated into Developer's lighting design provided that Developer's lighting design complies with the design requirements of this Section 20 of the Technical Provisions.

Developer shall adjust the existing crossroad lighting systems affected by the Project. Developer shall coordinate with NCDOT, municipality and/or other agencies having jurisdiction in the area.

Developer's lighting design shall consider illumination levels, uniformity, and sources for the roadways, interchanges, and intersection. Developer shall coordinate the placement of lighting Elements with Developer's landscape design. Developer's Design Documents shall provide a minimum 0.7 footcandles (fc) average maintained illuminance, with a maximum uniformity ratio of 3.5:1 (Average fc : Minimum fc) on all Travelways.

Developer shall minimize the potential hazards of lighting pole placement. For all poles located within the clear zone of the roadways, Developer's Design Documents shall incorporate AASHTO approved breakaway devices and breakaway fuse holders that are contained on the NCDOT list of approved systems. 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, ground boxes, or junction boxes.

Developer's lighting design shall include lighting layouts and supporting photometric calculations, including computer generated spacing charts, or footcandle and uniformity graphs

that demonstrate how the proposed lighting system will illuminate the proposed roadway to the required by the CA Documents.

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. See Section 6.9 of the Technical Provisions for other requirements.

Where the Work impacts existing lighting, Developer shall maintain existing lighting as temporary lighting during construction and restore or replace this with a permanent system.

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, 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 design and construct a Transportation Management Center (Developer TMC) to operate the facility. 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;
- 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 during construction.

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 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 Design in conformance with the requirements described in Section 2.9 of the Technical Provisions;
- As-Built documentation for the ITS Elements of the Project shall be developed and delivered to NCDOT within 60 days of successful completion of the System Acceptance Test and Observation Period. As-Built documents shall be in conformance 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 23.1.3.4 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 minimum, 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 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 roadway 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 Project specifications. Existing CCTV assembly upgrades may be designed by Developer to fully comply with the Project specifications.

NCDOT owns licenses for Protronix *VideoPro* (CCTV) central software that is available for Developer's use if desired.

21.2.3 DMS

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 NCDOT *Policy for the Use of Dynamic and Changeable Message Signs* on other facilities within the region. 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 number and location of the Project DMS and shall install a minimum of 16 DMS along I-77and 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 National Transportation Communications for ITS Protocol (NTCIP) supporting a minimum message of three-lines with 18" characters, 15 characters wide and 30 degree viewing angle. The DMS shall be full matrix with a color display and walk-in enclosures. 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 Project specifications. Existing DMS assembly upgrades may be designed by Developer to fully comply with the Project specifications.

21.2.4 Arterial DMS

Developer shall determine the number and location of arterial roadway DMSs at decision points in advance of major interchanges within the Project limits to provide traveler information. Developer shall install a minimum of 10 arterial DMS for 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 over ride 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. Major interchanges are defined as those associated with the approved diversion routes, provided in Exhibit 22-01 of the Technical Provisions. The arterial DMSs shall comply with NTCIP, supporting a three-line minimum of 9" character full matrix color display with front access. The arterial DMSs shall be designed with a minimum of 10 characters wide and 30 degree viewing angle.

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.

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 invest in upgrading the existing ITS communications backbone.

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. 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

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 lane Closures.

CCTV construction shall provide for maintenance personnel to have a level concrete pad in front of the equipment cabinet for safe, effective maintainability without lane Closures. 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 vehicle lane Closures. Front access arterial DMSs, when mounted on cantilevers, shall be placed to avoid lane Closures 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 to facilitate maintenance and expansion of the system.

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 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. Test plans shall be utilized to document the integration of the complete system of all field devices and the central control platform. A Final Acceptance test of the installed system shall include a 60-day observation period of the entire system 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 the 60-day test shall be rerun for another 60 days.

An observation period stoppage shall be restarted under the following rules:

- a stoppage in the first 29 days shall be corrected and the 60 day calendar begins at the point in which the stoppage occurred. For example, if the observation test is stopped on day three of the observation period, after the Defect is corrected, the observation period will resume at day three of the 60 day observation period;
- a stoppage on day 30 through 60 shall be corrected and the 60 day calendar begins at the day 30 in the 60 day observation period.
- Developer shall coordinate ITS testing with the NCDOT Engineer. Prior to any testing, Developer shall provide 30 calendar days notice to the NCDOT Engineer. Developer shall acquire the approval of NCDOT prior to conducting any testing.

Developer shall develop all ITS and Toll Infrastructure testing procedures and pass/fail requirements. These test procedures shall be submitted after NCDOT review and comment on the Final Design Submittal but not less than 30 days prior to acceptance testing of the system. The system acceptance test plan Elements are described in this Section 21 of the Technical Provisions. Testing procedures and requirements shall be submitted to NCDOT for review and comment prior to any testing at Factory and Final Testing phases. NCDOT may observe any tests and will audit test results. A system acceptance test plan includes Elements such as:

- introduction:
  - purpose;
  - reference documents;
  - traceability matrix; and
  - points of contact.
- testing process and methodology:
  - test plan objectives;
  - testing methods; and
  - assumptions:
    - source documents;
    - environmental needs;
    - training needs; and
    - testers.
  - problem identification and resolution;
  - test script;
  - issue tracking
  - disposition of signed scripts and Final Acceptance signature sheet; and
  - estimated schedule for testing and locations.
- Final Acceptance sign off block (when all scripts are accepted).

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. The log shall include 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 # and System Requirement # – 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.

Testing shall be conducted by Developer with NCDOT being given the option to observe all tests. 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 Contract. 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, Highway ITS components may be installed and made operational, and relocated at a later time. Highway ITS components shall undergo all series of tests when relocated.

Developer shall provide a schedule for all testing so that NCDOT may observe the testing. Times and locations for all tests shall be provided to NCDOT a minimum of seven calendar days in advance of any test.

21.6.1 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 be in MS Word format and 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 plan 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 equipment, Developer shall submit Project documentation and fiber optic test documentation to NCDOT, in accordance with this Section 2 of the Technical Provisions.

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 documenting the system network and, computer hardware / software Elements of the Project;
- System acceptance test plan for review and comment not less than 30 days prior to acceptance testing of the system;
- System Acceptance Test Plan execution results within 15 days of successful test;
- ITS test schedule seven calendar 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
- Final Acceptance Testing – Signed Off Test Plan for the ITS elements described in Section 21.

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, the Incident Management Plan, and the Public Information Plan related to mobility and safety in the Work zone.

Developer shall produce a TMP applicable for each phase of the Work, which impacts traffic, including Construction Work, Renewal Work, and major maintenance operations. The TMP shall include details of all planned detours, traffic control devices, striping, 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, striping 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 offsite detours, and 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 28 days for NCDOT to review the Conceptual TMP when offsite detours are proposed. In the event that NCDOT does not approve the offsite detours proposed by Developer, 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 striping;
- 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 departments and agencies;
- 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; and
- major road Closures and durations including a lane Closure analysis.

Developer shall submit the TMP for O&M Work 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 has been prepared by Developer and reviewed by NCDOT.

Developer's TMP for each phase of the Construction Period, major rehabilitation, and major maintenance operations shall include detail Traffic Control Plans. Developer shall prepare plan sheets, notes, and details as per NCDOT's Highway 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 plan has been prepared by Developer and reviewed 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 this Section 22 and Section 23 of the Technical Provisions and in the Agreement. For avoidance of doubt, these requirements apply to any roadway, including ramps, loops, and connector roads.

When a road Closure is used, Developer shall reopen the lanes at the required times to allow the traffic to pass before re-closing the roadway.

Developer shall notify NCDOT not less than 14 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 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 and durations listed in this Section 22.1.2 of the Technical Provisions. Any road Closure at any other times or for any other operations other than those specified in this Section 22.1.2 of the Technical Provisions or for durations in excess of those specified in this Section 22.1.2 shall be a breach as specified in Section 17.1.1.6 of the Agreement and shall be cause for assessment of Liquidated Damages as specified in Section 17.4.3 of the Agreement.

Except as allowed 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 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 justified in the TCP installation during the times set forth in Table 22-1. Developer shall monitor the traffic flow during operation of the crossover and should the traffic queue extend to the advance warning signs, traffic shall be returned to the existing number of lanes in each direction until the traffic queue is eliminated.

Table 22-1

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.

The maximum road Closure during times listed in Table 22-1 shall not exceed 15 minutes on I-77, I-85, I-277, I-485 and NC-16 and shall not exceed 30 minutes on all other routes and are permitted only for the following Work:

- traffic shifts to complete tie-in Work and placement of pavement markings and markers;
- installation of overhead sign structures and/or work on existing overhead sign structures over Travelways; and
- Bridge demolition and girder installation and/or removal.

22.1.3 Lane Closures, Shoulder Closures, and Lane Width Reduction

Developer shall issue a Lane Closure Notice (LCN) to NCDOT and affected Governmental Entities 14 days prior to the publication of any notices or placement of any traffic control devices associated with lane Closures, detour routing or other change in traffic control requiring lane Closures (except roadway Closures provided in Section 22 of the Technical Provisions).

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.

Developer shall coordinate with the NC State Highway Patrol (SHP) on durations and distance of HOV restrictions. When Developer initiates a Closure, HOV restrictions will not be enforced by SHP and Developer's Public Information Plan shall include procedures to inform the traveling public of such changes in the HOV restrictions.

If an Emergency condition should occur, for NCDOT controlled facilities, a LCN shall be provided to NCDOT within two days after the event. If an Emergency condition should occur, for non-NCDOT controlled facilities, Developer shall immediately notify the controlling Governmental Entity. 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 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 roadway 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 23;
- 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 23;
- 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 23;
- 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

As 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’ during the times below. 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 I-485, I-485, I-85, I-277 and Brookshire Frwy. (including ramps/loops)	Monday through Friday 5:00 a.m. to 8:00 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 I-485, 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 I-485 to North Terminus	Monday through Friday 5:00 a.m. to 11:00 p.m. Saturday and Sunday 9:00 a.m. to 11:00 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 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. As a minimum, these requirements / restrictions apply to the following schedule:

Table 22-3

HOLIDAY	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

All detours shall be designed to handle the appropriate volume and speed of traffic and shall maintain all detours in a safe and traversable condition. A pavement transition, suitable for the posted speed of the section shall be provided at all detour interfaces.

Developer shall issue a Road Closure Notice (RCN) to NCDOT and affected Governmental Entities 21 days prior to the publication of any notices or placement of any traffic control devices associated with lane Closures, detour routing or other change in traffic control.

Offsite detour routes shall be identified in Conceptual TMP and approved by NCDOT prior to Developer incorporating such detours in Developer's design. Offsite detour routes shall be included in the Design Document Submittals and shall adhere to the following requirements:

- Developer shall investigate all detour routes, including but not limited to, analyzing traffic capacity, investigating impacts to Emergency Services and schools, analyzing design characteristics to ensure the design supports the traffic volumes and investigating pavement structural adequacy, including but not limited to Bridge postings on the detour route;
- Developer shall determine and provide improvements required to accommodate detoured traffic prior to utilizing detour routes;

- Developer shall not use routes for off-site detours that have non-signalized at-grade railroad crossings;
- submit the detour route and all associated sign designs for review and acceptance prior to incorporation in plans; and
- use only State maintained roads for off-site detour routes.

22.1.6 Hauling Restrictions

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 the safe operation of roadway traffic.

When Developer moves any equipment not licensed for operation on public Highways on or across any pavement, Developer shall protect the pavement from all damage caused by such movement. Any damage caused by the operation of Developer shall be repaired by Developer.

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 roadway 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;
- maintain a minimum of two 10-foot wide lanes and one five foot sidewalk on Hamilton Street Bridge (Bridge No. 590335) during construction. 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 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 not 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.
- 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. However, a Contract has been awarded by NCDOT for Smart link to replace existing software with Statewide Advanced Transportation Management System in which the DMS and CCTV software is scheduled to be deployed in 2013. The NCDOT Smart link Contractor is required to provide, at a minimum, communication capabilities with DMS and CCTV devices are on the NCDOT Qualified Products List. Developer shall coordinate with the NCDOT Smart link Contractor 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 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;
- 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 outside useable Shoulder width is eight 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 22-5:
- 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 22-5

POSTED SPEED LIMIT (MPH)	MINIMUM 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 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 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 roadway 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 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 except for off-site detours designed for 24/7 use.

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 detour routing plan of traffic (if needed), acceptable level of service, access to abutting and corridor land uses, public safety impacts, and the 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 plan, 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 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 TMP plans and specifications.

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 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.

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) 14 days prior to the publication or implementation; and
- Road Closure Notice (RCN) 14 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 and perform the O&M Work on any Project Elements that may be installed by Developer outside the Project Right of Way beginning at the first Construction Commencement Date 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.

Developer shall be responsible for all O&M Work within the Project ROW, with the exception of the following, which shall be the responsibility of NCDOT:

- Renewal Work on NCDOT Retained Elements, subject to the conditions and limitations set forth in Section 23.1.7.1 of the Technical Provisions;
- O&M Work on all Bridges and roadways carrying non-freeway traffic over the HOT Lanes as well as I-485 (including ramps and collectors); and
- Winter Maintenance activities on both the General Purpose Lanes and HOT Lanes.

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 and I-277 within the Project ROW and all other Project Elements within the ROW.

The limit of the General Purpose Lanes shall be as specified in the definition of NCDOT Retained Elements. Developer shall establish a self-monitoring program in order to operate and maintain the Project with the main objectives of maximizing public safety, reliability, and roadway 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 and the traveling public using the Project, while minimizing traffic disruptions.

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 first responder Incident/Emergency Response and Emergency repair 24 hours per day, seven days per week. Developer shall provide the appropriate staff levels for these hours of operation and be available to assume these responsibilities from the Construction Commencement Date 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 assessment and quality assurance review 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 O&M Work records 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 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 Tables 23.1 and 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 Tables 23.1 and 23.2 and Exhibit 14 of the Agreement.

23.1.1 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.

23.1.2 Performance Measures

23.1.2.1 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 Tables 23.1 and 23.2 for O&M During Construction and O&M After Construction shall be assigned Noncompliance Points as per the Noncompliance Event Classification set forth in Table 23.3 below and as described in Article 18 of the Agreement.

Table 23.3	
Noncompliance Event Classification	Points
A	1
B	2
C	3
D	4
E	5

23.1.2.2 Construction Noncompliance Events

Construction Noncompliance Events shall result from the failure to meet the minimum requirements set forth in Table 23.1 within the Project Right of Way. 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.

23.1.2.3 O&M Noncompliance Events

O&M Noncompliance Events shall result from the failure to meet the minimum requirements set forth in Table 23.2 within the Project Right of Way. 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.

23.1.3 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 first Substantial Completion Date to address O&M After Construction, including 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 to indicate the revised operating requirements for equipment.

The O&M Plan for all 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;
- 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 the 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 Tables 23.1 and 23.2;
- method of tracking, reporting and calculating Noncompliances, including Construction Noncompliance Events and O&M Noncompliance Events, Noncompliance Points, liquidated damages, and Closures, including Permitted Closures;
- 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 and equipment/vehicle replacement, including life cycles and Renewal Work Schedule;
- 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;
- 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.

23.1.3.1 Operations Manual

Developer shall develop and submit, as part of the O&M Plan, a detailed Operations Manual based on the 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, 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.

23.1.3.2 Maintenance Manual

Developer shall develop and submit as part of the O&M Plan, a detailed Maintenance Manual based on the 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 Elements of the O&M Work and Renewal Work to be provided and the physical limits or boundaries of the 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.

23.1.3.3 Safety Plan

Developer shall perform all O&M Work 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 the O&M Work. 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.

23.1.3.4 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 at the Construction Commencement Date, how Developer will coordinate with NCDOT for all O&M Work 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 Work required on the NCDOT Retained Elements.

23.1.4 Maintenance Responsibilities during Construction

Developer shall conduct the O&M Work on the Project at all times during the Construction Period. Table 23.1 shows Project Elements that shall be maintained by Developer and the minimum Performance Requirements applicable for O&M During Construction. Further, Developer shall be required to respond to any Incident, Emergency, or event with the appropriate qualified staff, equipment and support personnel required to meet the minimum performance requirement as detailed in Table 23.1 and if needed, correct a failure to meet such minimum Performance Requirements within the applicable Cure Period or Fast Cure Period.

23.1.5 O&M Monthly Reports

From NTP2, 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 NTP2. Developer shall prepare the monthly reports in electronic format and each report shall contain as 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 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;
- summary of Closures and Permitted Closures for the past month including details describing the location and duration;
- a summary of the status of the Project for the month identifying all Closures 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 O&M Work for the year, the actual maintenance performed for the year, and confirmation that Developer performed all O&M Work in compliance with the CA Documents.

From NTP2, 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 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 Bridges Inspections, Asset Condition Assessment, and Renewal Work on NCDOT Retained Elements

23.1.7.1 Pavement and Bridges Inspections

Beginning at the first Substantial Completion Date, NCDOT shall 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.

Pavement inspections shall 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 shall be performed by Professional Engineers who

- are Registered Professional Engineers in the State of North Carolina and have at least ten years of Bridge inspection experience; and
- have successfully completed a Federal Highway Administration (FHWA) approved comprehensive Bridge inspection training course NHI 130055 "Safety Inspection of In-Service Bridges", or approved equivalent.

Bridge inspections shall be conducted in accordance with FHWA's National Bridge Inspection Program (using the National Bridge Inspection Standards).

The results of the independent inspections and corresponding recommendations for Renewal Work (including work on NCDOT Retained Elements to be performed by NCDOT) or other O&M Work to be performed by Developer, 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. 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).

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 recommendations 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 Monthly O&M 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 Renewal Work cycles on each Section, at NCDOT expense, on the General Purpose Lane pavement as it is defined under NCDOT Retained Elements in Exhibit 1 of the Agreement. The Renewal Work to be performed by NCDOT during each cycle will consist of milling and resurfacing in accordance with the requirements set forth in Section 11.4 of the Technical Provisions, or otherwise based on the recommended scope identified by the third party performing such inspection.

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, as identified in the independent inspections, Developer shall be responsible for the performance and cost of such Work.

If the inspection results show that an NCDOT Retained Element does not require Renewal Work, 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.

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 recommended Work shall be programmed into the Handback Renewal Work Plan as appropriate.

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 Elements, ITS Elements, 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 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 for review and approval 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 for approval.

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;
- the results and recommendations of 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.

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 anticipated to be performed at the end of the Element's Residual Life;
- the estimated cost in current Fiscal Year dollars of such 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 drawings, 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 Calendar Year);
- any updated inventory data as a result of the Renewal Work; and
- a list of any 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. 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

Developer shall respond to any Hazardous Material or fuel spill event that originates within the Project Right of Way 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

Developer shall ensure all persons engaged in O&M Work 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 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 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 Tables 23.1 and 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 both the General Purpose Lanes and HOT Lanes. Such activities will be provided by NCDOT, following NCDOT Snow Clearing Policy 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.

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.

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) has 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 NCC000250 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.

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 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 must 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, 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. 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 roadway system. Developer shall provide properly trained staff to perform all Routine Maintenance activities.

Developer shall complete Routine Maintenance activities, as approved by NCDOT, on the causeways to prevent erosion or slope deterioration.

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 submit a request for Closures for NCODT's approval and obtain approval from NCDOT at a minimum 14 days in advance of any Closure associated with a Planned Maintenance. If Developer has not received approval from NCDOT for a Closure associated with a Planned Maintenance at a minimum 14 days in advance of such Closure, such Closure shall not be deemed a Permitted Closure.

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.

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 roadway 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 the subject of a Permitted Closure, and a Closure that is not a Permitted Closure occurs in the lanes remaining in service, then the lanes subject to the Permitted Closure also shall be deemed to be subject to 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. Such shift in traffic shall not be claimed by Developer as a cause for a Relief Event or a Compensation Event. 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 two weeks 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
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

Closures of the GP Lanes or HOT Lanes by NDCOT shall be permitted 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.

23.2.1.4 Renewal Work

Developer shall diligently perform Renewal Work as and when necessary to maintain compliance with all Performance Requirements and performance standards. Developer shall perform 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.

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

As per Section 23 of the Technical Provisions, after Substantial Completion for each Project Section, Developer shall not be responsible for any O&M Work on all Bridges and roadways carrying non-freeway traffic over the HOT Lanes as well as I-485 (including ramps and collectors) in the Project ROW. Developer shall still be responsible for all O&M Work on all other Bridges and roadways within the Project Right of Way from the NTP2 through 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, 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 Elements 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 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 uptime 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 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 Tables 23.1 and 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 facility within ten minutes during the hours of 6:00 a.m. to 9:00 p.m., Monday through Friday, and within one hour at all other times outside these hours, 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 or roadway Closure is necessary. Developer shall determine if the repair should be initiated immediately or if the situation should be monitored through the hours of 6:00 a.m. to 9:00 p.m., Monday through Friday, and repaired outside of these hours. 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, these markers shall be similar to the existing markers and Developer shall ensure that the same markings are used to identify the cable route.

23.3 Operations Requirements

Developer shall operate the Project within the Project Right of Way with the main objectives of maximizing safety and reliability, minimizing disturbances to Users, and protecting the Environment. Developer shall provide the appropriate number of properly trained operations staff to perform the operating duties specified herein. The 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.

Throughout O&M During Construction and O&M After Construction, 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 and 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, Digital 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. 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 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 and Renewal Work.

23.3.2 Traffic Incident Management

Developer shall detect and respond to all traffic or roadway-related Incidents within the Project Right of Way as set forth in Tables 23.1 and 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.

With respect to the Incident Response requirements set forth in Table 23.1 and Table 23.2, clearing Incident shall mean removing all disabled vehicles, spill, debris or other encumbrance from the Travelway and Shoulders and restore traffic flow on the Travelway. With respect to Incident Response activities requiring clearing Incident as set forth in Table 23.1 and Table 23.2, the Cure Period or Fast Cure Period shall commence after police and/or Emergency Response officials provide notification to begin clean-up activities.

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 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.

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 Tables 23.1 and 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. Media questions pertaining to Incident investigations and rescue efforts will be forwarded to the agencies performing such activities. Any media requests for an interview shall be forwarded to NCDOT.

23.3.3 Maintenance of Traffic (MOT)

Developer shall perform the O&M Work in accordance with the requirements set forth in the CA Documents and with the Traffic Management Plan. 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 and Renewal Work.

23.3.3.1 Traffic Management Plan

The Developer shall submit a TMP as per Section 22.1.1 of the Technical Provisions. Developer shall implement the TMP for all Work performed through the Term, including during the Construction Period, during Renewal Work, and during any major maintenance activities.

23.3.4 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.

23.3.5 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, 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 the 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.

23.3.5.1 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 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 with all Laws 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.

23.3.5.2 Specific Developer Responsibilities for Governor Declared Emergencies

Governor Declared Emergencies are Incidents/events that prompt the Governor of North Carolina to declare a State of Emergency in response to the Incident/event. Governor Declared Emergencies will most commonly be winter storms, hurricanes and other natural disasters, but can include smaller natural disasters/events/storms, acts of God, and Incidents/events resulting from human interactions.

Developer shall perform the following five post-event activities. NCDOT will not provide additional compensation to Developer for the performance of these five post-event activities:

- search all roadways covered by this Contract for grievous hazards (roadway washouts/cave-ins, downed electrical lines, non-traversable Bridges, etc.). This may include clearing some debris from the roadway in order to access these hazardous 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 roadway 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 roadway Closures exceeding one hour. Notify NCDOT again upon roadway 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.

23.3.5.3 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, roadway Shoulder wash-outs, roadway 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 roadways 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 all major Incidents or events and immediately upon road Closure for all roadway Closures exceeding one hour. 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 roadway 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.

23.3.6 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 traffic investigation

outcomes, Developer shall comply with such correction or mitigation measures. 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. Cost of implementation shall be borne by Developer.

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.

23.3.6.1 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 Performance Requirements set forth in Table 23.1 of the Technical Provisions from NTP2 to the Substantial Completion Date for each Project Section, respectively. Failure to meet these Performance Requirements shall results in Construction 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 23.1 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 Final Acceptance.

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 requirement. 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 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 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 24 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 48 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 assets 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 assets. 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 life remaining 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 asset 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 asset.

Developer shall use the assets identified in Table 23.3 together with any further assets incorporated into the Project as a result of Developer's Final Design configuration and assets 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 assets 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 assets 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 assets 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 assets; and
- on the assumption that the Project assets 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 assets.

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 assets 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 assets or evaluation methodology determined following an inspection of the Project assets 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 assets 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 NTP2;
- O&M Monthly Report by the 15th day of each month beginning at NTP2;
- O&M Annual Report for review and comment no later than the 30th day of each Fiscal Year beginning at NTP2;
- 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 48 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 WITHIN THE PROJECT ROW				
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 NTP 1.	A	N/A	N/A	24 Hours	
		2	Submit the final O&M Plan to NCDOT for review and approval within 90 days after NTP 1.	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 NTP 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.	5	Beginning from NTP 2, 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 Service Commencement 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 Service Commencement 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 Service Commencement 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.	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.	B	N/A	N/A	8 Hours	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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	
		15	Meet all other technical requirements for flexible pavement set forth in the Standard Specifications.	A	60 Days	N/A	10 Days	
Rigid Pavement								
Rigid Pavement	Maintain rigid pavement acceptable condition and level of safety for traveling public.	16	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	
		17	Repair all spalls and pot holes greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	
		18	Meet all other technical requirements for rigid pavement set forth in the Standard Specifications.	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.	19	No tree and shrub growth above Traffic Lanes and Shoulders.	C	7 Days	N/A	24 Hours	
		20	Maintain mowable areas at a height between 6 and 12 inches.	C	7 Days	N/A	24 Hours	
		21	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	
		22	Meet all other technical requirements for vegetation control set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
Fencing	Maintain fence in acceptable condition and level of safety for the traveling public.	23	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	
		24	Meet all other technical requirements for fencing set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
Retaining Walls	Maintain retaining walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	25	Meet all technical requirements for retaining walls set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
	Maintain retaining walls at acceptable level of safety for the traveling public (structural damage).	26	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	
		27	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	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Causeways	Prevent erosion and maintain slope stability and ensure safety.	28	Complete all temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system. Maintain slopes no steeper than 1.5:1.	E	48 Hours	24 Hours	24 Hours	
		29	Complete all permanent repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system. Maintain slopes no steeper than 1.5:1.	E	60 Days	30 Days	5 Days	
Litter and Debris								
Debris and Encumbrances Removal	Removal of tire casings, automobile wreckage, animal carcasses, and other debris from travel lanes and Shoulder.	30	Remove debris or encumbrances, carcasses, and other roadway obstructions in the Traffic Lanes that constitute a safety hazard or eminent danger.	E	30 Minutes	15 Minutes	15 Minutes	
		31	Remove debris or encumbrances, carcasses, and other roadway obstructions on the Shoulders and other areas not on the traveled way.	C	8 Hours	4 Hours	4 Hours	
		32	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	
		33	Meet all other technical requirements for debris removal set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Litter Removal	Removal of litter within Project Right of Way.	34	Start one litter collection cycle every two weeks.	B	N/A	N/A	48 Hours	
		35	Finish each litter collection cycle within one week after starting.	B	N/A	N/A	48 Hours	
		36	Collect excessive litter within two hours of notification or discovery.	B	2 Hours	60 Minutes	2 Hours	
		37	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	
		38	Meet all other technical requirements for litter removal set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
Graffiti Removal	Continually monitor and maintain assets free of graffiti.	39	Remove graffiti from traffic devices where it is a safety concern.	E	24 Hours	8 Hours	8 Hours	
		40	Remove other graffiti that is not a safety concern.	B	48 Hours	12 Hours	12 Hours	
		41	Meet all other technical requirements for graffiti removal set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
Hazardous Materials/Fuel Spills	Clean-up and inspection of the area impacted after a fuel spill or other contamination event.	42	Respond to the scene upon notification and document situation and report to NCDOT.	D	30 Minutes	20 Minutes	15 Minutes	
		43	Begin implementation of clean-up/containment efforts in accordance with the O&M Plan.	E	60 Minutes	45 Minutes	30 Minutes	
		44	Complete initial clean-up/containment 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	
		45	Manage mitigation and clean-up efforts. Restore contaminated area to its initial condition in accordance with the O&M Plan.	D	3 Days	48 Hours	24 Hours	
		46	Conduct clean-up 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	
		47	Meet all other technical requirements for hazardous materials set forth in the Standard Specifications.	C	30 Days	N/A	5 Days	
Landscaping								
Landscaping	Continually monitor landscaped areas.	48	Meet all technical requirements for landscaping set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Sound/Noise Walls	Maintain sound/noise walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	49	Meet all technical requirements for sound/noise walls set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
	Maintain sound/noise walls at acceptable level of safety for the traveling public (structural damage).	50	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	
		51	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.	52	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	
		53	Maintain travel lanes free of standing water.	E	30 Minutes	N/A	30 Minutes	
		54	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	
		55	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	
		56	Meet all other technical requirements for drainage set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
Erosion & Sedimentation Control	Ensure that all erosion and sedimentation control measures are functioning as designed as per Section 13 of Book 2.	57	Ensure that all erosion and sedimentation control measures are functioning as designed and make repairs to any that are not.	D	At NCDOT sole discretion			

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Permits	Maintain all facilities in line with permits.	58	Comply with Governmental Approvals and permit requirements, monitoring, and reporting.	D	30 Days	N/A	5 Days	
Bridges								
Major Damage	Repair major damage.	59	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	E	24 Hours	12 Hours	4 Hours	
		60	Begin implementation of remediation Work for permanent repairs .	D	5 Days	3 Days	24 Hours	
		61	Complete permanent repairs to major damage as defined in Section 23.2.2.2 and Work identified from NBIS inspections.	D	As agreed upon by Developer and NCDOT			
		62	Meet all other technical requirements for structures set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
Minor Damage	Repair minor damage.	63	Repair minor damage as defined in Section 23.2.2.2, and perform 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.	64	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	
		65	Repair or replace all bearings or joints that no longer function properly.	C	60 Days	N/A	5 Days	
		66	No exposed reinforcing steel on bridge deck.	C	60 Days	N/A	5 Days	
		67	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	
		68	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 WITHIN THE PROJECT ROW				
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								
ITS Systems Operability	Highway advisory radio (HAR).	69	Maintain monthly HAR system performance (up time) above 98%.	C	N/A	N/A	N/A	
		70	Rectify each individual HAR defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Traffic monitoring stations.	71	Maintain monthly traffic monitoring station system performance (up time) above 95%.	C	N/A	N/A	N/A	
		72	Rectify each individual traffic monitoring station defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Message sign system (excluding toll rate signs).	73	Maintain monthly message sign system performance (up time) above 95%.	C	N/A	N/A	N/A	
		74	Rectify each individual message sign defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Incident detection system.	75	Maintain monthly incident detection system performance (up time) above 98%.	C	N/A	N/A	N/A	
		76	Rectify each individual CCTV camera/incident detection system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Developer TMC Security system.	77	Maintain monthly Developer TMC security system performance (up time) above 99%.	C	N/A	N/A	N/A	
		78	Rectify each individual security camera/system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Roadway weather information station system (RWIS).	79	Maintain monthly RWIS performance (up time) above 95%.	C	N/A	N/A	N/A	
		80	Rectify each individual RWIS defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Two-way radio system.	81	Maintain monthly two-way radio system performance (up time) above 99%.	C	N/A	N/A	N/A	
		82	Rectify each individual two-way radio system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Call boxes.	83	Maintain monthly call box system performance (up time) above 95%.	C	N/A	N/A	N/A	
		84	Rectify each individual call box defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	All other ITS systems.	85	Maintain monthly system performance (up time) above 95% for all other ITS systems.	C	N/A	N/A	N/A	
		86	Rectify each individual other ITS system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Emergency maintenance repair.	87	Implement emergency maintenance repairs in accordance with Section 23.2.4.4.	E	N/A	N/A	10 Minutes	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
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ITS Maintenance	Inspection, testing, maintenance, etc. of all ITS system components.	88	Conduct routine inspections, testing, and maintenance in accordance with all Laws and equipment manufacturer's recommendations.	D	N/A	N/A	5 Days	
Existing Communication Links	Maintaining existing communication links within the Project Right of Way.	89	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	4 Hours	
		90	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	
Electrical								
Highway Lighting	Maintain functionality of highway lighting system.	91	Maintain full functionality of all luminaires.	A	5 Days	48 Hours	24 Hours	
Sign Lighting	Maintain functionality of highway sign lighting.	92	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.	93	Meet all technical requirements for pavement markings and delineators set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
Signage	Maintain signs at acceptable level of safety for the traveling public.	94	Repair all damaged overhead signs and sign structures that pose imminent risk to the public.	E	2 Hours	30 Minutes	30 Minutes	
		95	Repair/replace all damaged but functional and clearly legible overhead signs and sign structures.	C	60 Days	7 Days	5 Days	
		96	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	
		97	Repair/replace all other signs, including posts that are damaged or missing.	B	5 Days	48 Hours	24 Hours	
		98	Meet all other technical requirements for signage set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
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Element Category	**Required Task**	**ID**	**Minimum Performance Requirements**	**Construction Noncompliance Event Classification**	**Cure Period**	**Fast Cure Period**	**Interval of Recurrence**	**Liquidated Damages per Day**
Guardrail	Maintain guardrail at acceptable level of safety for the traveling public (non-structural damage or deterioration).	99	Meet all technical requirements for guardrail set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
	Maintain guardrail at acceptable level of safety for the traveling public (structural damage).	100	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	
		101	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).	102	Meet other technical requirements for barrier walls set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
	Maintain barrier walls at acceptable level of safety for the traveling public (structural damage).	103	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	
		104	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	

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Attenuators	Maintain attenuators at acceptable level of safety for the traveling public (non-structural damage or deterioration).	105	Meet all technical requirements for attenuators set forth in the Standard Specifications.	A	30 Days	N/A	5 Days	
	Maintain attenuators at acceptable level of safety for the traveling public (structural damage).	106	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	
		107	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.	108	Place regulatory and warning devices, delineation signs, etc. on the facility at conclusion of event.	D	24 Hours	N/A	60 Minutes	
		109	Begin planning/implementation of remediation Work.	C	24 Hours	N/A	24 Hours	
		110	Meet all other technical requirements for storm damage set forth in Standard Specifications.	A	30 Days	N/A	5 Days	
Lane Closures								
Lane Closures	Closure of Traffic Lanes during the Term.	111	Comply with the time restrictions for Permitted Closures set forth in Section 23.2.1.2. Request approval 24 hours prior.	E	N/A	N/A	15 Minutes	

TABLE 23.1 - O&M DURING CONSTRUCTION WORK REQUIREMENTS								
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Incident Response								
Incident Response	Response to sites of incidents, emergencies, accidents, and other events that that result in a	112	Respond to scene within 30 minutes after detection or notification on Shoulders.	N/A	N/A	N/A	N/A	Refer to Exhibit 14 of the Agreement
		113	Respond to scene within 30 minutes after detection or notification in Travelway.	N/A	N/A	N/A	N/A	
	Clearing of incidents and reopening of closed travel lanes after police/emergency response officials provide notification to begin clean-up.	114	Clear incidents that involve a breakdown, minor accident (passenger vehicles only, no overturned vehicles), non-hazardous material spill or debris and result in one closed travel lane within 30 minutes.	N/A	N/A	N/A	N/A	
		115	Clear incidents that involve a multiple vehicle accident (passenger vehicles/light trucks, one overturned vehicle), but no fire and result in up to all travel lanes closed in one direction within 60 minutes.	N/A	N/A	N/A	N/A	
		116	Clear incidents that involve a multiple vehicle accident (passenger vehicles /light trucks, two or more overturned vehicles) with or without fire and result in up to all travel lanes closed in one direction within two hours.	N/A	N/A	N/A	N/A	
		117	Clear incidents that involve a heavy transport vehicles or lost cargo loads, with or without fire and result 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 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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.	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.	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	

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				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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 85 or higher for HOT Lane pavement.	C	90 Days	N/A	5 Days	
		11	For any continuous one mile segment, maintain a Pavement Condition Survey Manual rating of 85 or higher for General Purpose Lane pavement.	C	Developer action as determined by the Independent Inspections detailed in Section 23.1.7.1.			
		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 0.5 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 85 or higher for HOT Lane pavement.	C	90 Days	N/A	5 Days	
		17	For any continuous one mile segment, maintain a Pavement Condition Survey Manual rating of 85 or higher for General Purpose Lane pavement.	C	Developer action as determined by the Independent Inspections detailed in Section 23.1.7.1.			
		18	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	
		19	Repair all spalls and pot holes greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	$3,200
		20	Seal all cracks.	C	30 Days	N/A	10 Days	
		21	Repair or replace all slabs where movement is evident, regardless of the number of pieces the slab is broken into.	C	60 Days	N/A	10 Days	$3,900
		22	Meet all other technical requirements for rigid pavement set forth in the Maintenance Operations Manual.	A	60 Days	N/A	10 Days	

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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.	23	No tree and shrub growth above Traffic Lanes and Shoulders.	C	7 Days	N/A	24 Hours	
		24	Maintain mowable areas at a height between 6 and 12 inches.	C	7 Days	N/A	24 Hours	
		25	No trees or woody growth greater than 1.0 inches in diameter within the established cleared area.	B	7 Days	N/A	24 Hours	
		26	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	
		27	Maintain all walls, barriers, and other roadway features free of undesirable vegetative growth.	C	7 Days	N/A	24 Hours	
		28	Turf - no continuous brown-out areas greater than 50 square feet.	C	60 Days	N/A	5 Days	
		29	No bare or erodible areas.	D	15 Days	5 Days	5 Days	
		30	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
		31	No slope failures.	E	24 Hours	12 Hours	60 Minutes	$1,200
		32	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	
		33	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	
		34	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.	35	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	
		36	Fences shall be functional, visible and accessible. Fences and fence posts shall be plumb and tops rails shall have no sags or deflections greater than 1/3 of the height of the fence.	B	30 Days	N/A	5 Days	
		37	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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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**
Retaining Walls	Maintain retaining walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	38	Keep weep holes in walls open. No wash-outs or separation at top of wall.	C	30 Days	N/A	5 Days	
		39	Prevent erosion at base on walls.	C	30 Days	N/A	5 Days	
		40	Seal cracks or joints greater than 0.5 inches wide.	C	30 Days	N/A	5 Days	
		41	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	
		42	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).	43	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
		44	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.	45	Complete all temporary repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system. Maintain slopes no steeper than 1.5:1.	E	48 Hours	24 Hours	24 Hours	
		46	Complete all permanent repairs of damage to the structural integrity that creates a public safety hazard, traffic safety hazard or compromises the system. Maintain slopes no steeper than 1.5:1.	E	60 Days	30 Days	5 Days	
Litter and Debris								
Debris and Encumbrances Removal	Removal of tire casings, automobile wreckage, animal carcasses, and other debris from travel lanes and Shoulder.	47	Remove debris or encumbrances, carcasses, and other roadway obstructions in the Traffic Lanes that constitute a safety hazard or eminent danger.	E	30 Minutes	15 Minutes	15 Minutes	$6,700
		48	Remove debris or encumbrances, carcasses, and other roadway obstructions on the Shoulders and other areas not on the traveled way.	C	8 Hours	4 Hours	4 Hours	
		49	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	
		50	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.	51	Start one litter collection cycle every two weeks.	B	N/A	N/A	48 Hours	
		52	Finish each litter collection cycle within one week after starting.	B	N/A	N/A	48 Hours	
		53	Collect excessive litter within two hours of notification or discovery.	B	2 Hours	60 Minutes	2 Hours	
		54	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	
		55	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.	56	Remove graffiti from traffic devices where it is a safety concern.	E	24 Hours	8 Hours	8 Hours	
		57	Remove other graffiti that is not a safety concern.	B	48 Hours	12 Hours	12 Hours	
		58	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	Clean-up and inspection of the area impacted after a fuel spill or other contamination event.	59	Respond to the scene upon notification and document situation and report to NCDOT.	D	30 Minutes	20 Minutes	15 Minutes	
		60	Begin implementation of clean-up/containment efforts in accordance with the O&M Plan.	E	60 Minutes	45 Minutes	30 Minutes	
		61	Complete initial clean-up/containment 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	
		62	Manage mitigation and clean-up efforts. Restore contaminated area to its initial condition in accordance with the O&M Plan.	D	3 Days	48 Hours	24 Hours	
		63	Conduct clean-up 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	
		64	Meet all other technical requirements for hazardous materials set forth in the Maintenance Operations Manual.	C	30 Days	N/A	5 Days	
Landscaping								
Landscaping	Continually monitor landscaped areas.	65	Landscaped areas and plantings are to be maintained in healthy conditions (and free of disease and pests) in accordance with Developer's landscaping plan.	B	30 Days	N/A	24 Hours	
		66	Meet all other technical requirements for landscaping set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	

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Sound/Noise Walls	Maintain sound/noise walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	67	Prevent erosion at base on walls.	C	30 Days	N/A	5 Days	
		68	Seal cracks or joints greater than 0.5 inches wide.	C	30 Days	N/A	5 Days	
		69	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	
		70	Meet all other technical requirements for sound/noise walls set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
	Maintain sound/noise walls at acceptable level of safety for the traveling public (structural damage).	71	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	
		72	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.	73	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	
		74	Maintain travel lanes free of standing water.	E	30 Minutes	N/A	30 Minutes	$8,000
		75	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	
		76	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	
		77	Meet all other technical requirements for drainage set forth in the Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Erosion & Sedimentation Control	Ensure that all erosion and sedimentation control measures are functioning as designed as per Section 13 of Book 2.	78	Ensure that all erosion and sedimentation control measures are functioning as designed and make repairs to any that are not.	D	At NCDOT sole discretion			
Permits	Maintain all facilities in line with permits.	79	Comply with Governmental Approvals and permit requirements, monitoring, and reporting.	D	30 Days	N/A	5 Days	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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**
Bridges								
Major Damage	Repair major damage.	80	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	E	24 Hours	12 Hours	4 Hours	$2,200
		81	Begin implementation of remediation Work for permanent repairs .	D	5 Days	3 Days	24 Hours	
		82	Complete permanent repairs to major damage as defined in Section 23.2.2.2 and Work identified from NBIS inspections.	D	As agreed upon by Developer and NCDOT			
		83	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.	84	Repair minor damage as defined in Section 23.2.2.2, 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.	85	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	
		86	Repair or replace all bearings or joints that no longer function properly.	C	60 Days	N/A	5 Days	
		87	No exposed reinforcing steel on bridge deck.	C	60 Days	N/A	5 Days	
		88	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	
		89	Repair all spalls and pot holes greater than 2.0 inches deep.	E	4 Hours	N/A	2 Hours	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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**
ITS & Communications Systems								
ITS Systems Operability	Highway advisory radio (HAR).	90	Maintain monthly HAR system performance (up time) above 98%.	C	N/A	N/A	N/A	
		91	Rectify each individual HAR defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Traffic monitoring stations.	92	Maintain monthly traffic monitoring station system performance (up time) above 95%.	C	N/A	N/A	N/A	
		93	Rectify each individual traffic monitoring station defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Message sign system (excluding toll rate signs).	94	Maintain monthly message sign system performance (up time) above 95%.	C	N/A	N/A	N/A	
		95	Rectify each individual message sign defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Incident detection system.	96	Maintain monthly incident detection system performance (up time) above 98%.	C	N/A	N/A	N/A	
		97	Rectify each individual CCTV camera/incident detection system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Developer TMC Security system.	98	Maintain monthly Developer TMC security system performance (up time) above 99%.	C	N/A	N/A	N/A	
		99	Rectify each individual security camera/system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Roadway weather information station system (RWIS).	100	Maintain monthly RWIS performance (up time) above 95%.	C	N/A	N/A	N/A	
		101	Rectify each individual RWIS defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Two-way radio system.	102	Maintain monthly two-way radio system performance (up time) above 99%.	C	N/A	N/A	N/A	
		103	Rectify each individual two-way radio system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Call boxes.	104	Maintain monthly call box system performance (up time) above 95%.	C	N/A	N/A	N/A	
		105	Rectify each individual call box defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	All other ITS systems.	106	Maintain monthly system performance (up time) above 95% for all other ITS systems.	C	N/A	N/A	N/A	
		107	Rectify each individual other ITS system defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	Emergency maintenance repair.	108	Implement emergency maintenance repairs in accordance with Section 23.2.4.4.	E	N/A	N/A	10 Minutes	
ITS Maintenance	Inspection, testing, maintenance, etc. of all ITS system components.	109	Conduct routine inspections, testing, and maintenance in accordance with all Laws and equipment manufacturer's recommendations.	D	N/A	N/A	5 Days	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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**
Existing Communication Links	Maintaining existing communication links within the Project Right of Way.	110	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	4 Hours	
		111	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.	112	Maintain daily Traffic Measurement Station performance uptime 99.8%, per calendar month.	E	N/A	N/A	N/A	
	Operating Speed Performance Standard.	113	Maintain compliance with Operating Speed Performance Standard greater than 90%, reported as per part VII E (7) of Exhibit 4 to the Agreement, calculated over the last 180 days.	A	N/A	N/A	N/A	
	Federal Minimum Average Speed Standard.	114	Maintain compliance with Federal Minimum Average Speed Standard greater than 90%, reported as per part VII E (7) of Exhibit 4 to the Agreement, calculated over the last 180 days.	A	N/A	N/A	N/A	
	Performance Reporting.	115	Provide monthly reports on HOT Lanes performance as per Part G of Exhibit 4 to the Agreement	C	N/A	N/A	72 Hours	
	Degraded Facility.	116	If the monthly report identifies a Degradation, Developer shall submit a rectification plan to the NCDOT for approval.	E	N/A	N/A	72 Hours	
	Publicity of Toll Rates.	117	Publicize, make available or otherwise provide the current or prevailing toll rate in accordance with Exhibit 4 of the Agreement.	D	N/A	N/A	24 Hours	
	Toll rate sign system.	118	Maintain monthly toll rate sign system performance (up time) above 95%.	C	N/A	N/A	N/A	
		119	Rectify each individual toll rate sign defect to restore full functionality.	D	24 Hours	N/A	24 Hours	
	ETCS availability.	120	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 .	121	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	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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**
ETCS Performance	Transponder read success rate .	122	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.	123	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.	124	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 .	125	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	
	Transmittal of transponder transactions.	126	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	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
				ALL PROJECT ELEMENTS WITHIN THE PROJECT ROW				
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	Transmittal of video transactions.	127	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.	128	Developer shall maintain a record of User Tranasactions for a minimum of 365 days, reported monthly.	B	N/A	N/A	30 days	
	Transmission of User Transaction Information to Customer Service Center.	129	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.	130	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.	131	Developer shall address call issues within one day, reported monthly.	E	N/A	N/A	24 Hours	
	Customer Service Level 2 Call Efficiency.	132	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.	133	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.	134	Maintain full functionality of all luminaires.	A	5 Days	48 Hours	24 Hours	
Sign Lighting	Maintain functionality of highway sign lighting.	135	Maintain full functionality of all sign luminaires.	C	48 Hours	24 Hours	24 Hours	

TABLE 23.2 - O&M AFTER CONSTRUCTION WORK REQUIREMENTS								
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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**
Traffic Guidance								
Pavement Markings / Delineators	Repair and replacement of line striping and pavement reflectors.	136	Pavement markings, snowplowable 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	
		137	Pavement markings, snowplowable 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	
		138	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	
		139	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.	140	Repair all damaged overhead signs and sign structures that pose imminent risk to the public.	E	2 Hours	30 Minutes	30 Minutes	$3,300
		141	Repair/replace all damaged but functional and clearly legible overhead signs and sign structures.	C	60 Days	7 Days	5 Days	
		142	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
		143	Repair/replace all other signs, including posts that are damaged or missing.	B	5 Days	48 Hours	24 Hours	
		144	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).	145	Guardrail is maintained to meet the current design criteria and safety standards.	D	5 Days	N/A	24 Hours	
		146	Guardrail shall be free of excessive wear, unsightly rust and vegetation.	B	30 Days	N/A	5 Days	
		147	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).	148	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
		149	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								
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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**
Barrier Wall	Maintain barrier walls at acceptable level of safety for the traveling public (non-structural damage or deterioration).	150	Barrier is maintained to meet the current design criteria and safety standards.	D	5 Days	N/A	24 Hours	
		151	Barrier shall be free of wear and vegetation.	B	30 Days	N/A	5 Days	
		152	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).	153	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
		154	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 (non-structural damage or deterioration).	155	Attenuators are maintained to meet the current design criteria and safety standards.	D	5 Days	N/A	24 Hours	
		156	Attenuators shall be free of wear and vegetation.	B	30 Days	N/A	5 Days	
		157	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).	158	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
		159	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.	160	Place regulatory and warning devices, delineation signs, etc. on the facility at conclusion of event.	D	24 Hours	N/A	60 Minutes	
		161	Begin planning/implementation of remediation Work.	C	24 Hours	N/A	24 Hours	
		162	Meet all other technical requirements for storm damage set forth in Maintenance Operations Manual.	A	30 Days	N/A	5 Days	
Lane Closures								
Lane Closures	Closure of Traffic Lanes during the Term.	163	Comply with the time restrictions for Permitted Closures set forth in Section 23.2.1.2. 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								
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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	164	Respond to scene within 30 minutes after detection or notification on Shoulders.	N/A	N/A	N/A	N/A	Refer to Exhibit 14 of the Agreement
		165	Respond to scene within 30 minutes after detection or notification in Travelway.	N/A	N/A	N/A	N/A	
	Clearing of incidents and reopening of closed travel lanes after police/emergency response officials provide notification to begin clean-up.	166	Clear incidents that involve a breakdown, minor accident (passenger vehicles only, no overturned vehicles), non-hazardous material spill or debris and result in one closed travel lane within 30 minutes.	N/A	N/A	N/A	N/A	
		167	Clear incidents that involve a multiple vehicle accident (passenger vehicles/light trucks, one overturned vehicle), but no fire and result in up to all travel lanes closed in one direction within 60 minutes .	N/A	N/A	N/A	N/A	
		168	Clear incidents that involve a multiple vehicle accident (passenger vehicles /light trucks, two or more overturned vehicles) with or without fire and result in up to all travel lanes closed in one direction within two hours.	N/A	N/A	N/A	N/A	
		169	Clear incidents that involve a heavy transport vehicles or lost cargo loads, with or without fire and result 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 85 or higher for HOT Lane and General Purpose Lane pavement (Renewal Work to be performed by NCDOT); 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 85 or higher for HOT Lane and General Purpose Lane pavement (Renewal Work to be performed by NCDOT); 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, roadside ditches, 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

Table 23.3 - HANDBACK REQUIREMENTS				
Asset Description	**Asset Sub System Description**	**Handback Evaluation Tasks**	**Handback Evaluation Criteria**	**Residual Life at Handback (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 18.2. 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

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 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 the toll 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 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 Transactions, both by Toll Segment and by Trip, and billing and invoicing of tolls and Incidental Charges to Users.

24.1 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.

24.2 ETCS Operational Requirements

24.2.1 ETCS Systems Requirements

Developer shall determine the components of the ETCS needed to satisfy the ETCS functional requirements set forth in Section 24.2.2 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.

24.2.2 ETCS Functional Requirements

24.2.2.1 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 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 Transaction 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 and Incidental Charges for the use of the HOT Lanes; with 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 index 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 as per the CA Documents.

ETCS functional and Performance Requirements are further defined in this Section 24 of the Technical Provisions.

24.2.2.2 Vehicle Detection, Identification, and Classification

The ETCS shall detect and classify according to the User Classification in Exhibit 4 of the Technical Requirements 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 HOV 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 themselves as HOV Users. The use of Transponders with self declaration capabilities is acceptable.

24.2.2.3 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 the Toll Segment.

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.

24.2.2.4 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.

24.2.2.5 Interoperability

The ETCS shall meet NCTA Interoperability and compatibility standards, requirements and protocols. At a minimum, the ETCS shall support IAG (E-ZPass®) Interoperability protocols as outlined in Exhibit 18 of the Agreement.

Developer shall provide any and all reports required by third parties for Interoperability.

24.2.2.6 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 automobiles 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.

24.2.2.7 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 of all ETCS data and records, directly produced by the ETCS, for Developer audits and NCDOT audits.

The ETCS shall, at a minimum:

- track Incidents from occurrence to resolution;
- monitor Work from request to completion; and
- track system performance.

24.2.2.8 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 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.

24.2.2.9 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.

24.2.2.10 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. Primary Customer service shall include Customer account and balance management, payment processing, voids and adjustments, 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 24.2.2.3 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.

The Level Two Customer Service support will be co-located at the NCTA's Customer Service Center in the Charlotte area. NCDOT will provide space and equipment for up to four Developer staff persons for the purpose of Level Two Customer Service. Developer staff shall be available, at a minimum, by phone and in Person to provide Level Two Customer Service during the same hours as the NCTA's CSC is open.

24.3 ETCS Performance Requirements

24.3.1 Roadside Performance Requirements

The ETCS Performance Requirements set forth in Table 23-2 -1 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.

24.3.2 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.

24.4 ETCS Performance Monitoring, Auditing, and Reporting

24.4.1.1 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;
- 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, real time Toll Rates in every Toll Segment; and
- supply to NCDOT with appropriate tools, subject to NCDOT review and comments, for generating excerpts, analyses, and synthesis reports for the ETCS performance.

24.4.1.2 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 one month 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.

24.5 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 and Exhibit 4 of the Technical Provisions. 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 and Exhibit 4 of the Technical Provisions 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 24.2.2 of the Technical Provisions.

24.5.1 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 documentation;
- to demonstrate that the equipment, systems, and sub-systems meet the performance, and reliability requirements set out in the design documentation, Table 23-2, in this Section 24 and Exhibit 4 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. CCH, CSC, 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 wider 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.

24.5.2 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 as per Section 24 of the Technical Provisions and Exhibit 4 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 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; and
- 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 that Project Section shall not be before the end of the Demonstration Period for the first Project Section; if the subsequent ETCS Demonstration Periods 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 each period respectively.

24.6 ETCS Design Documents

In addition to the ETCS plans, Developer's Design Document Submittals identified in Section 2 of the Technical Provisions Shall include the document provided in this Section 24.6

24.6.1 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 value display 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.

24.6.2 Intermediate Design Document Submittal

- Intermediate Design Documents shall include at a minimum the following Elements: lane configurations;
- Toll Zones configuration;
- gantry 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.

24.6.3 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 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 Final Acceptance signature sheet; and
  - estimated schedule for testing and locations.
  - Final Acceptance sign off block (when all scripts are accepted).

24.6.4 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.

24.6.5 Substantial Completion

Developer shall submit documentation demonstrating successful completion of on-site system acceptance testing as a condition for achieving Substantial Completion.

Following Substantial Completion, additional submittals shall include:

- Operations and Maintenance Manuals as per Section 21.3.1 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 not less than 60 days prior to the first Substantial Completion date and updated within 30 days of each Substantial Completion date for each Project Section.

24.7 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 not less than 30 days prior to Substantial Completion on any portion of the Project. Developer shall submit each report required in this Section 24.7 for each calendar month to NCDOT not later than the 7th of the following month.

24.7.1 ETCS Activity Monthly Report

From the first Substantial Completion Date, for the current month, the ETCS Activity Monthly Report shall be submitted to NCDOT concurrently to the monthly O&M Report 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 23.1 and 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 the Developer and the CCH 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 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.

24.7.2 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 concurrently to the monthly O&M Report 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 E-1 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 E-1 template. 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 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.

24.7.3 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 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 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).

24.8 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;
- 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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25 List of Exhibits

Exhibit 2-01 226
Exhibit 2-02 228
Exhibit 2-06 230
Exhibit 2-07 233
Exhibit 2-09 236
Exhibit 2-10 273
Exhibit 6-01 280
Exhibit 6-02 285
Exhibit 6-04 291
Exhibit 7-01 293
Exhibit 11-01 294
Exhibit 13-01 297
Exhibit 13-02 299
Exhibit 13-03 305
Exhibit 22-01 314
Exhibit 23-01 343

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 2-06

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
Mobilization						
Mobilization						
Design						
Survey						
Engineering Design						
Specialist Design Services (insert below)						
Certification						
Checking						
Design Review by NCDOT						
Geotechnical Investigation						
Developer Submittals						
Management						
Supervision and Oversight						
Project Schedule						
Developer Management Plan						
Quality Management						
Insurance						
Public Information and Communication						
Bonds						
Condition Survey						
Mitigation and Protection Measures						
Notice to Proceed						
Meeting (Stakeholder, Third Party, etc.)						
Third Party Agreements						
Environmental						
Water Quality						
Erosion, Sedimentation and Vegetation Control						
Stream Restoration/Relocation						
Contamination Inspection and Testing						
Environmental Protection Measures						
Permit Application Preparation						
Permit Application Submittal and Approval						
Roadway						
Clearing and Grubbing						
Earthworks (bulk excavation/bulk fill/backfill)						
Concrete Base and Pavement, Mainline						
Asphalt Base and Pavement, Mainline						
Base and Pavement, Ramps						

Cost item	Total	Month 1	Month 2	Month 3	…	Month X
Base and Pavement, Cross Streets						
Drainage						
Signs, Markings, and Signalization						
ITS						
Traffic Control						
Landscaping						
Lighting						
Concrete Median and Barrier						
Concrete Curb and Gutter						
Guardrail						
Minor Items (including Fencing)						
Structures						
Remove Structures						
Bridges						
Retaining Walls						
Foundations						
Railing and Barriers						
Concrete Box Culverts						
Noise Walls						
Gantries and overhead signs supports						
Tolling						
In-lane ETCS equipment						
Back office equipment						
Power supply						
Buildings						
Other						
Financing						
Site facilities						
Operations and Maintenance Center						
Punch List						
As-Built Record Plans						
Material Quality Tracking						
Material Testing						
Utilities						
Utility Coordination						
Utility Agreement Preparation						
Utility Agreement Approval						
Utility Adjustment						
Right of Way						
Acquisition						
Relocation Assistance						
Title and Escrow Fees						
Land Costs						
Maintenance & Operation of HOT Lanes						
Roads						

Cost item	Total	Month 1	Month 2	Month 3	…	Month X
Drainage						
Structures						
Building & Enclosed Facilities						
Traffic Management & Monitoring						
Fleet & Equipment						
O&M Plan						
Ramp-up and Training						
Toll Operations						
Toll Operations						
Level Two Customer Service						
Incident Management						
Lane Availability Management						

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 from NTP2 until Final Acceptance of the last Project Section.

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 Contract. 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 plans, specifications, and 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 and the Minimum Sampling Guide. 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 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 as required by Section 6.3.7.2 of the Agreement 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

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, 4 Half-size, 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 entitled "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 noise 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 "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. 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. 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 Merger Concurrence Point 4B Meeting (see Section 404 –NEPA Merger Process Information) as applicable for review.

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

Merger Concurrence Point 4B Meeting Submittal

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 4B 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 Merger Concurrence Point 4C Meeting (see Section 404 –NEPA Merger Process Information) as applicable for review.

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

Merger Concurrence Point 4C, Permit Application or Permit Modification Review Submittal

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 or 4C meeting (see Section 404 –NEPA Merger Process Information), as applicable.

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 Merger Concurrence Point 4C 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

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.

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 Staging 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:
- N/A

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

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 as 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 as 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 Design Manual's 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. John Pilipchuk, L. G., P. E.	Mr. John Pilipchuk, L. G., 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:

John Pilipchuk

(704) 455 – 8902

(704) 455 – 8912 facsimile

jpilipchuk@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 Materials & 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

*** * * *** * * \

performed under this agreement not in compliance with FAPG shall constitute unauthorized 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.

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. 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 Bridge Design 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 11-01

Pavement Surface Testing

Test the finished pavement surface of the Project or major segments of construction 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 GE 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, or portion thereof, shall have a Mean Roughness Index (MRI) of 60 inches per mile or less. Each 0.10-mile section of the HOT Lanes, or portion thereof, shall have a Mean Roughness Index (MRI) of 50.0 inches per mile or less.

When corrections to the pavement surface are required, NCDOT shall approve Developer's method of correction. 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 13-01

Environmentally Sensitive Areas

Description

Developer shall identify high quality waters within the Project. This designation requires special procedures to be used for clearing and grubbing, temporary stream crossings, and grading operations within the Environmentally Sensitive Areas. The Environmentally Sensitive Areas shall be identified on the plans as Environmentally Sensitive Areas. This also requires special procedures to be used for seeding and mulching and staged seeding.

The Environmentally Sensitive Area shall be defined as a 50 foot buffer zone on both sides of the stream measured from top of stream bank.

Construction Methods

Clearing and Grubbing:

In areas identified as High Quality Water Zones/Environmentally Sensitive Areas, Developer may perform clearing operations, but not grubbing operations until immediately prior to beginning grading operations as described in Article 200-1 of the *Standard Specifications*. Only clearing operations (not grubbing) shall be allowed in this buffer zone until immediately prior to beginning grading operations. Erosion control devices shall be installed immediately following the clearing operation.

Grading:

Once grading operations begin in identified High Quality Water Zones/ Environmentally Sensitive Areas, Work shall progress in a continuous manner until complete. All construction within these areas shall progress in a continuous manner such that each phase is complete and areas are permanently stabilized prior to beginning of next phase. Failure on the part of Developer to complete any phase of construction in a continuous manner in High Quality Water Zones/ Environmentally Sensitive Areas will be just cause for the Engineer of Record to direct the suspension of Work in accordance with Article 108-7 of the Standard Specifications.

Temporary Stream Crossings:

Any crossing of streams within the limits of the Project shall be accomplished in accordance with the requirements of Subarticle 107-13(B) of the Standard Specifications.

Seeding and Mulching:

Seeding and mulching shall be performed in accordance with Section 1660 of the Standard Specifications and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment. No appreciable time shall lapse into the contract time without stabilization of slopes, ditches and other areas within the High Quality Water Zones/Environmentally Sensitive Areas.

Stage Seeding:

The Work covered by this exhibit shall consist of the establishment of a vegetative cover on cut and fill slopes as grading progresses. Seeding and mulching shall be done in stages on

cut and fill slopes that are greater than 20 feet in height measured along the slope, or greater than two acres in area. Each stage shall not exceed the limits stated above.

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 program. The Certified Supervisor shall be on the Project within 24 hours notice from initial exposure of an erodible surface to the Project's Final Acceptance. 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 the Engineer;
    - 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 the Contractor 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 the Contractor'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 Program – maintain a quality control program to control erosion, prevent sedimentation and follow provisions/conditions of permits. The quality control program shall:
    - follow permit requirements related to the Contractor and subcontractors' construction activities;
    - ensure that all operators and subcontractors on site have the proper erosion and sediment control/stormwater certification;
    - notify the Engineer 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 as agreed upon by the Engineer; and
    - the Contractor's quality control and inspection procedures shall be subject to review by the Engineer. Maintain NPDES inspection records and make records available at all times for verification by the Engineer.
- *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.

The Contractor may request to use the same Person as the Level II Supervisor and Level II Foreman. This Person shall be onsite whenever construction activities as described above are taking place. This request shall be approved by the Engineer prior to Work beginning.

The Contractor may request to name a single Level II Foreman to oversee multiple construction activities on small Bridge or culvert replacement projects. This request shall be approved by the Engineer 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;
    - sodding;
    - 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, the Contractor may substitute a Level II Foreman for a Level I Installer, provided the Level II Foreman is not tasked to another crew requiring Level II Foreman oversight.

- *Certified Designer* – include the certification number of the Level III-B Certified Designer on the erosion and sediment control/stormwater component of all reclamation plans and if applicable, the certification number of the Level III-A Certified Designer on the design of the Project erosion and sediment control/stormwater plan.

Preconstruction Meeting

Furnish the names of the *Certified Erosion and Sediment Control/Stormwater Supervisor, Certified Foremen, Certified Installers* and *Certified Designer* and notify the Engineer 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 *Cease 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
- 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.

- Infiltration 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). Infiltration Basin shall be designed to dewater in three days or less. An Infiltration Basin Designer Spreadsheet will be provided by the NCDOT (REU) upon request.

- 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.

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 5 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 3 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
- Infiltration 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). Infiltration Basin shall be designed to dewater in three days or less. An Infiltration Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit (REU) upon request.

- 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.
- 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 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 the Engineer 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 NCTA and NCDOT REU 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 the Engineer 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: 0 – 14 Days

- At a minimum, Developer shall stabilize erodible areas that will not be disturbed for 14 days or less utilizing non-vegetative cover, including straw mulch, hydraulic applied erosion control products or rolled erosion control products.

8.2.2 Mid-Term Stabilization: 14 – 90 Days

- Developer shall stabilize erodible areas that will not be disturbed for more than 14 days and less than 90 days utilizing the following stabilization protocol:

March 1 - August 31	September 1 - February 28
50# German or Browntop Millet	50# Rye Grain or Wheat
400# Fertilizer	400# Fertilizer

8.2.3 Long Term Stabilization: 90+ Days

- Erodible areas that will not be disturbed for more than 90 days shall be stabilized utilizing the following stabilization protocol:

All Roadway Areas

March 1 - August 31	**September 1 - February 28**
50# Tall Fescue Cultivars *	50# Tall Fescue Cultivars *
10# Centipede	10# Centipede
25# Bermudagrass (hulled)	35# Bermudagrass (hulled)
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

Waste and Borrow Locations

March 1 – August 31	**September 1 - February 28**
75# Tall Fescue Cultivars*	75# Tall Fescue Cultivars*
25# Bermudagrass (hulled)	35# Bermudagrass (hulled)
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

- Centipede shall be applied at a rate of five pounds per acre and Sericea Lespedeza shall be applied at a rate of 20 pounds per acre 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.

* 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	

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

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.

8.3.4 Mowing

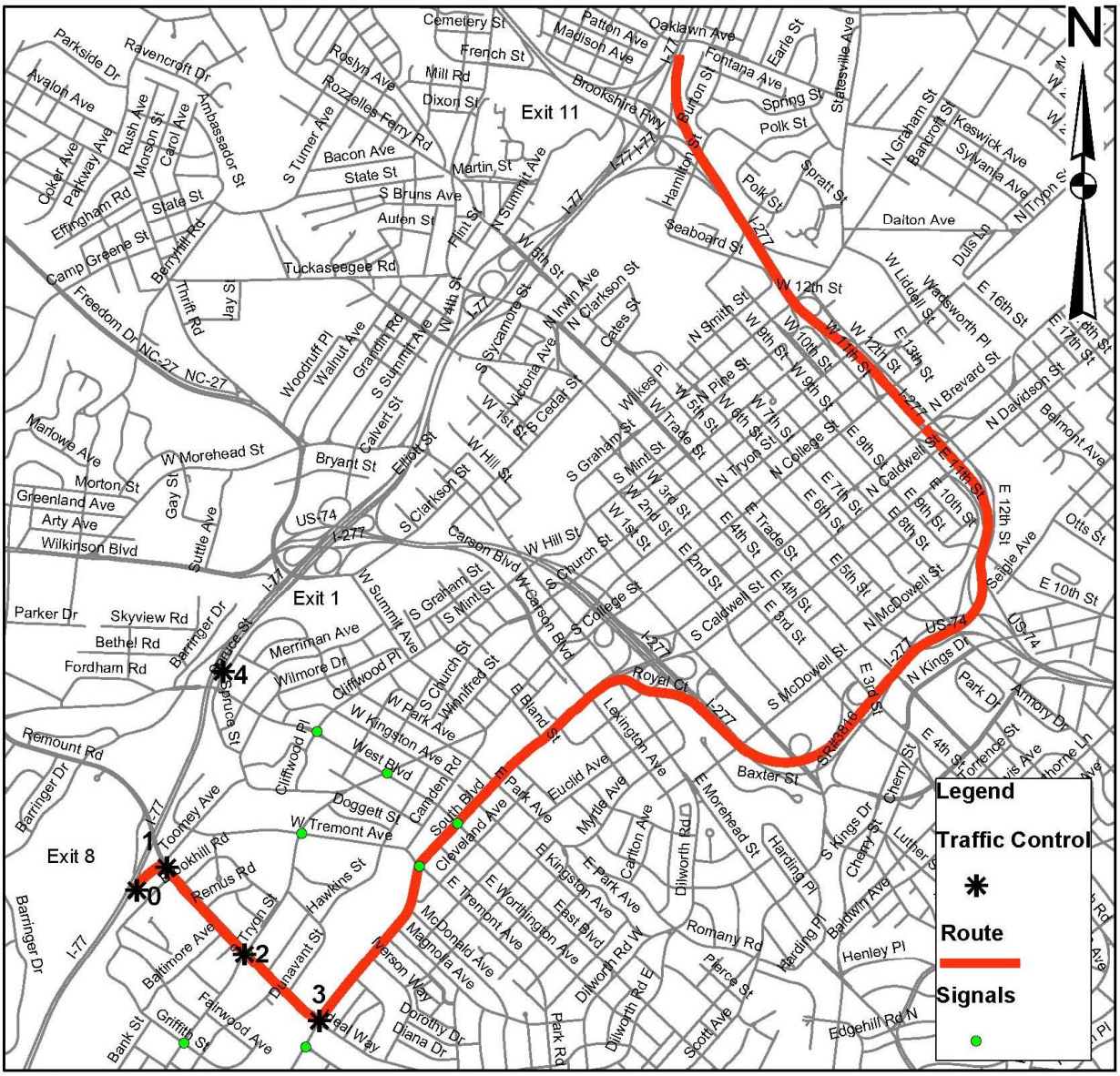
- The minimum mowing height shall be four inches.

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)

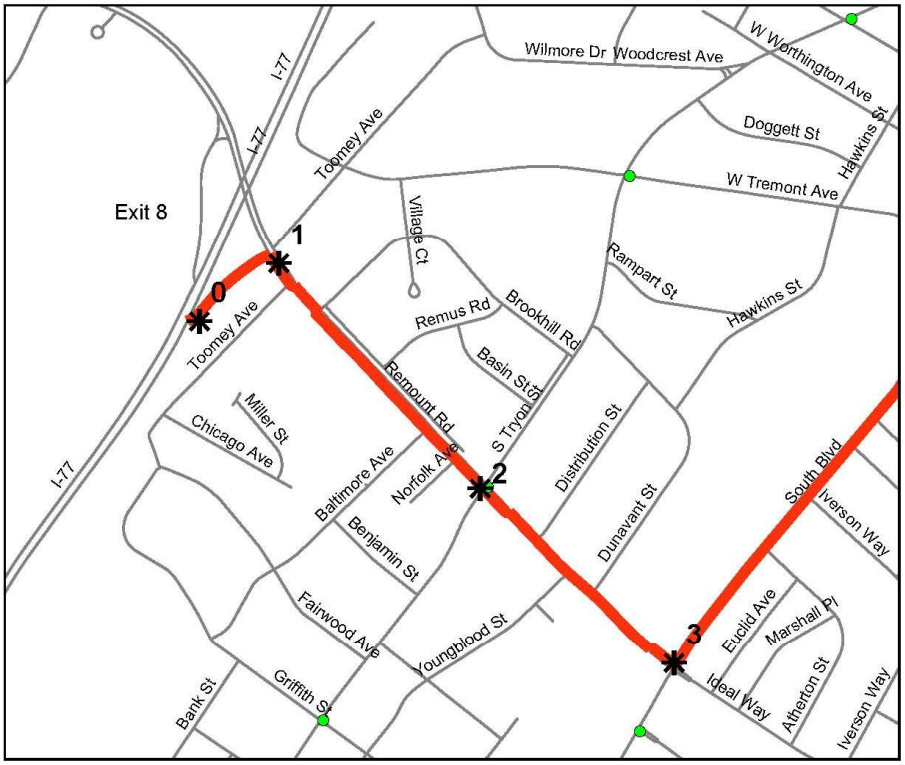


Detour Route
Remount Rd East to South Blvd North to I-277 NB (John Belk Frwy) to I-77 NB

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)



Legend

Traffic Control ✱

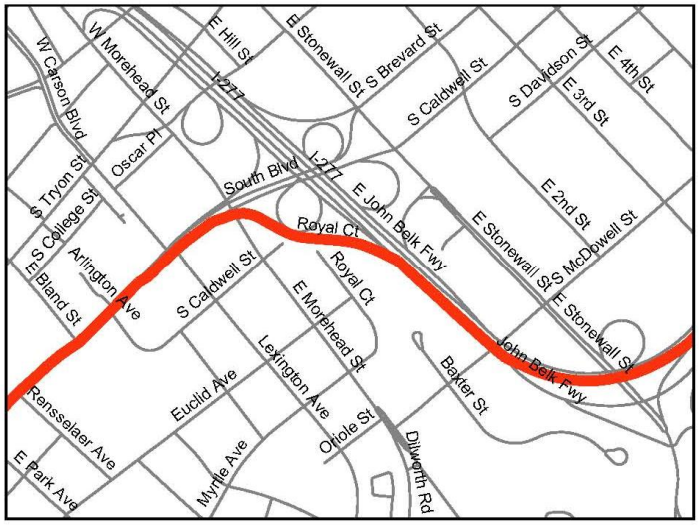
Route

Signals

Interchange Details - Exits 8
Traffic Control Points 0, 1, 2, & 3

Message Signs To Use
CMS0-0I0077N0000.21
CMS0-0I0077N0005.54

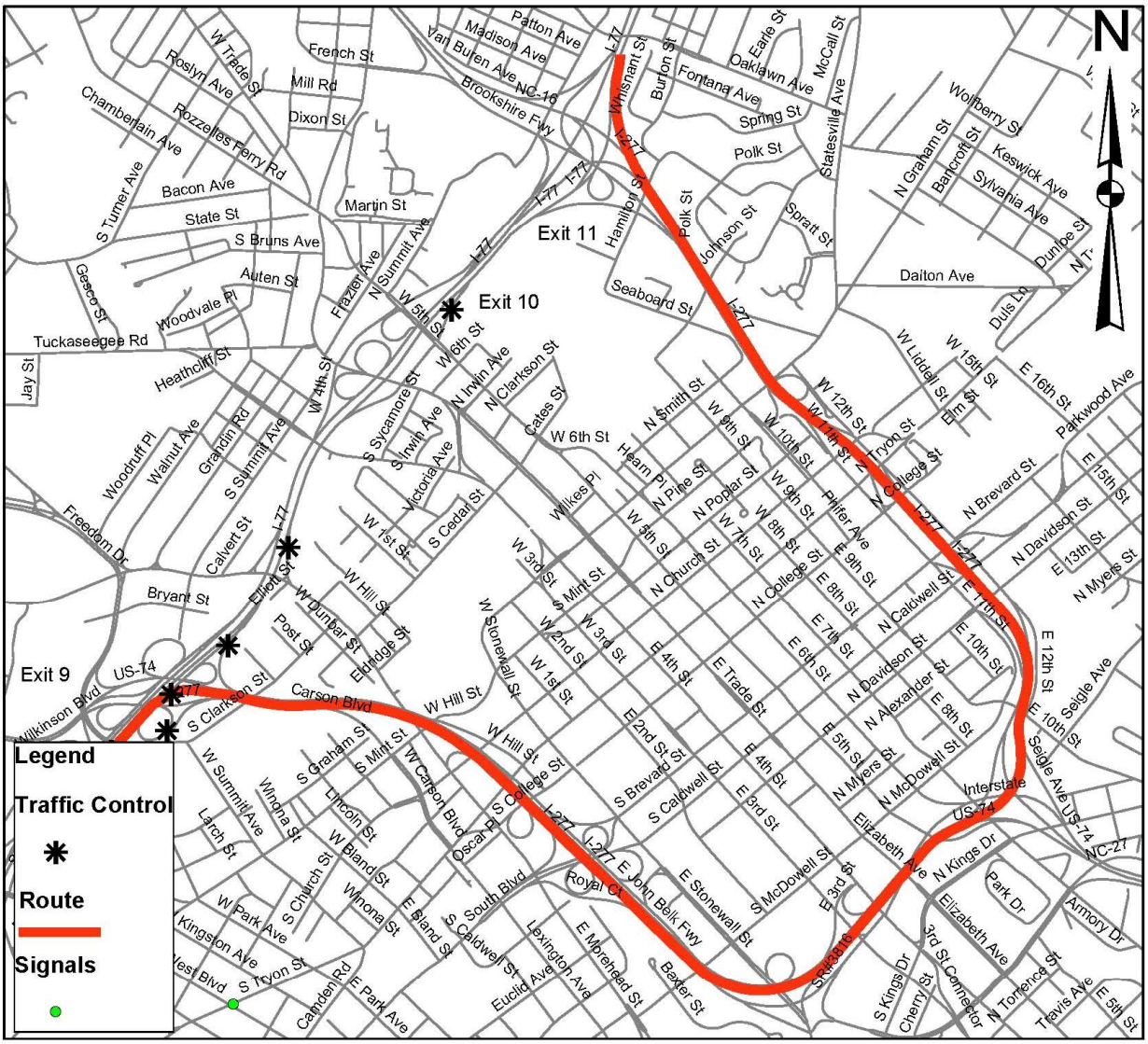
Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
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)

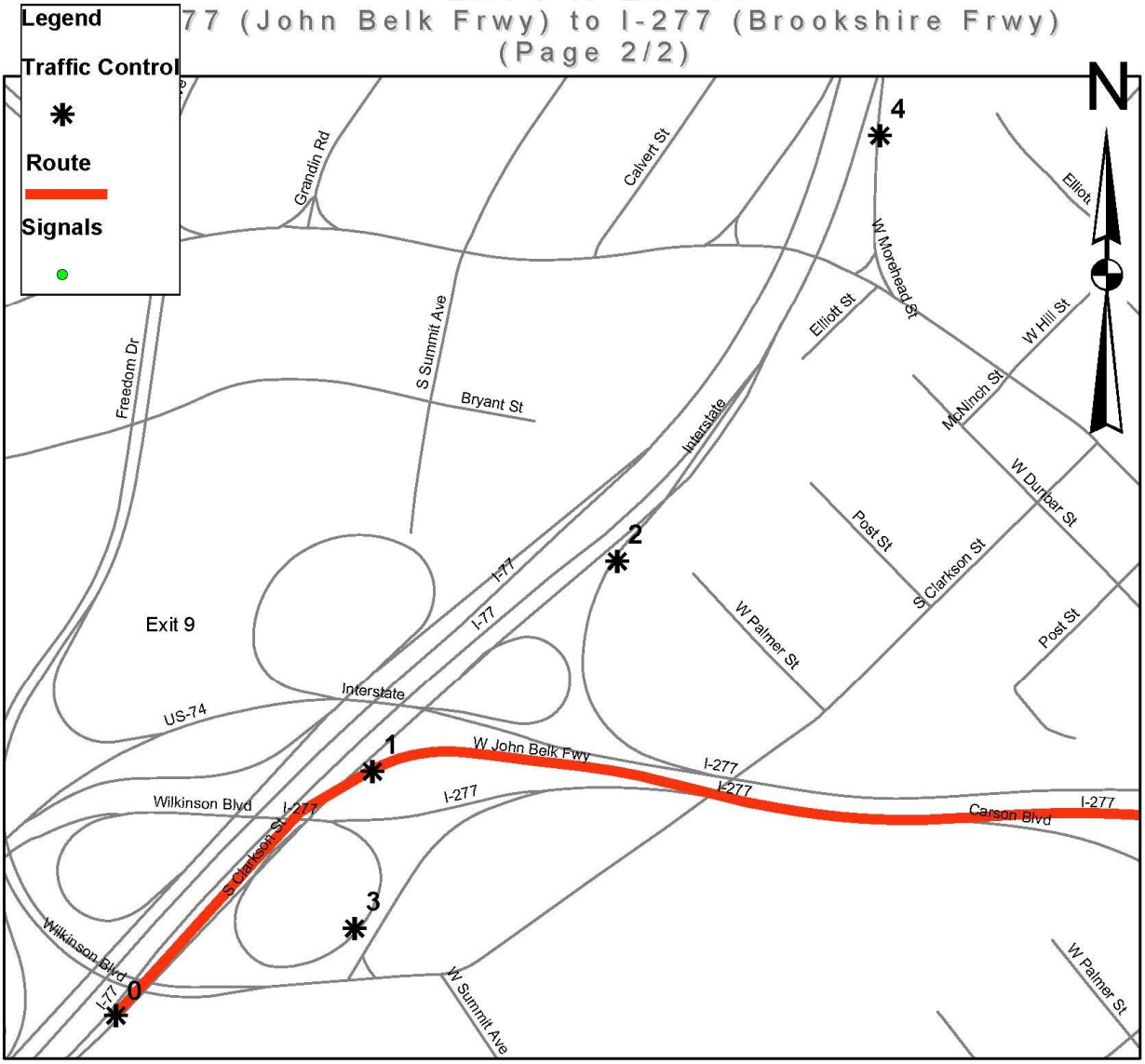


Detour Route
I-77 NB Collector to I-277 NB (John Belk Frwy) to I-77 NB

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)



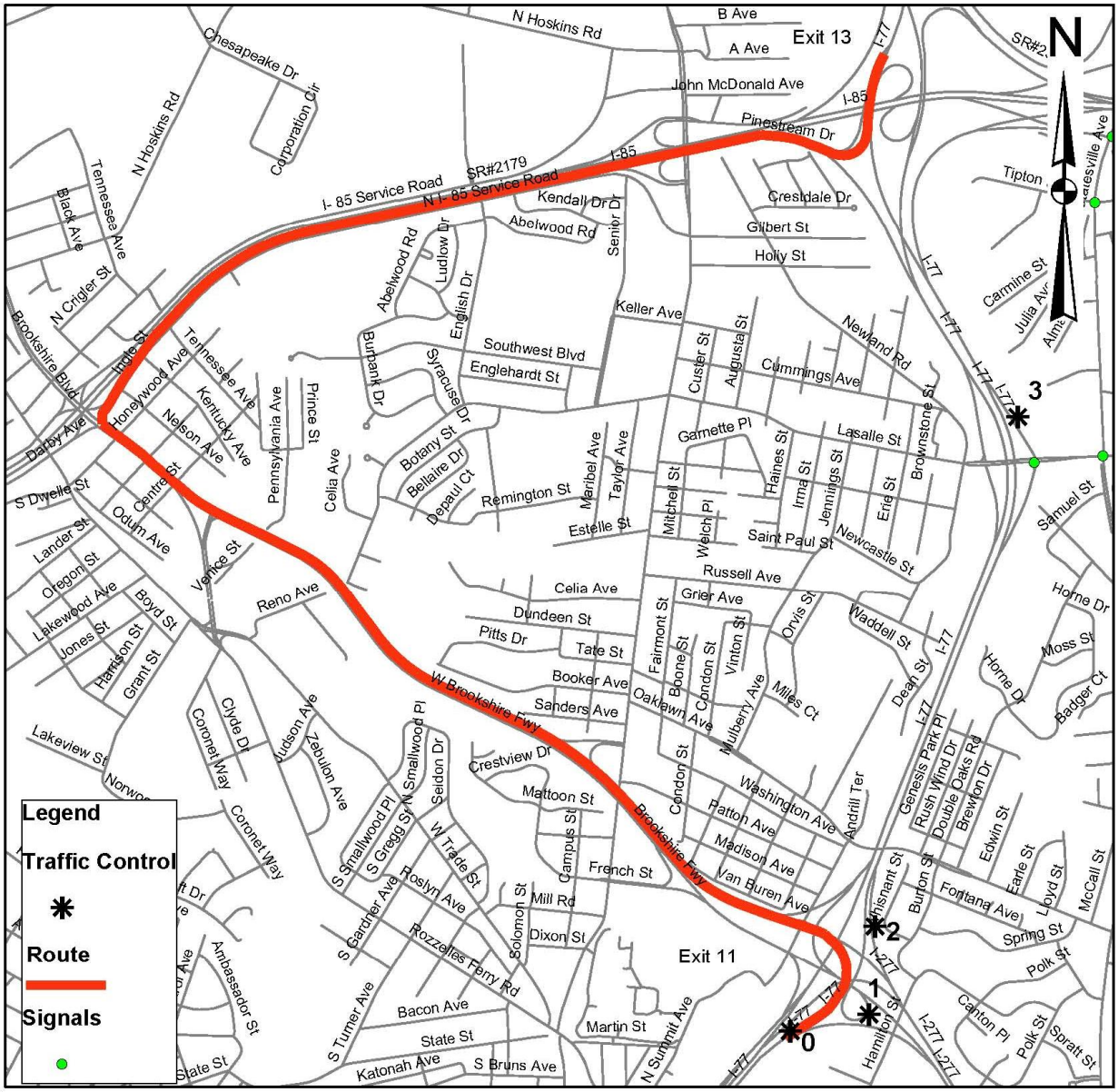
Interchange Details - Exits 9
Traffic Control Points 0, 1, 2, 3, & 4

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)

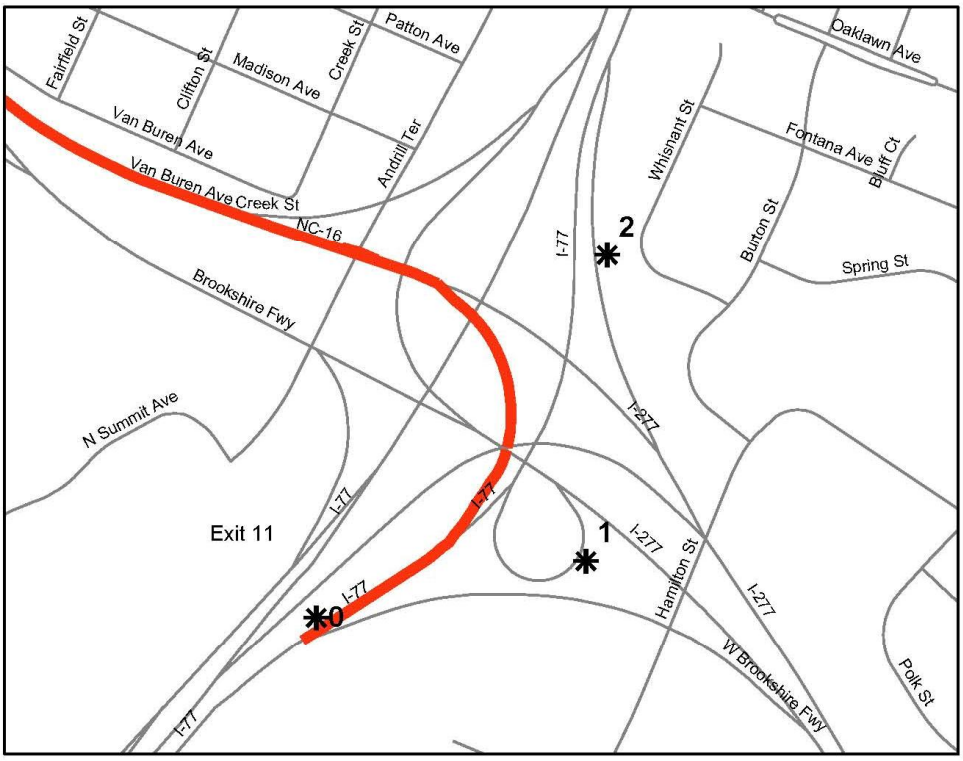


Detour Route
NC 16 NB (Brookshire Frwy) to I-85 NB to I-77 NB

ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic onto NC 16 (Brookshire Frw y)	2
1	Close I-77 NB On Ramp from NC 16 (Brookshire Frw y)	1
2	Close I-77 NB On Ramp from I-277 NB (Brookshire Frw y)	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

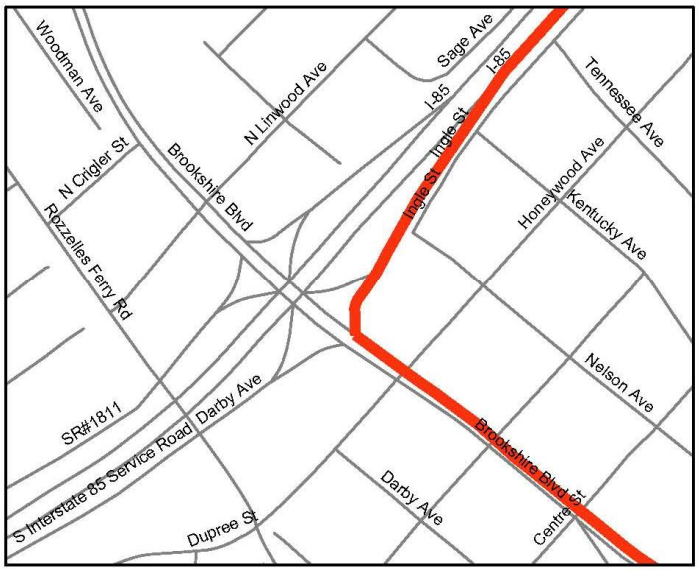
Route

Signals

Interchange Details - Exits 11
Traffic Control Points 0, 1, & 2

Message Signs To Use
CMS0-0I0077N0000.21
CMS0-0I0077N0005.54

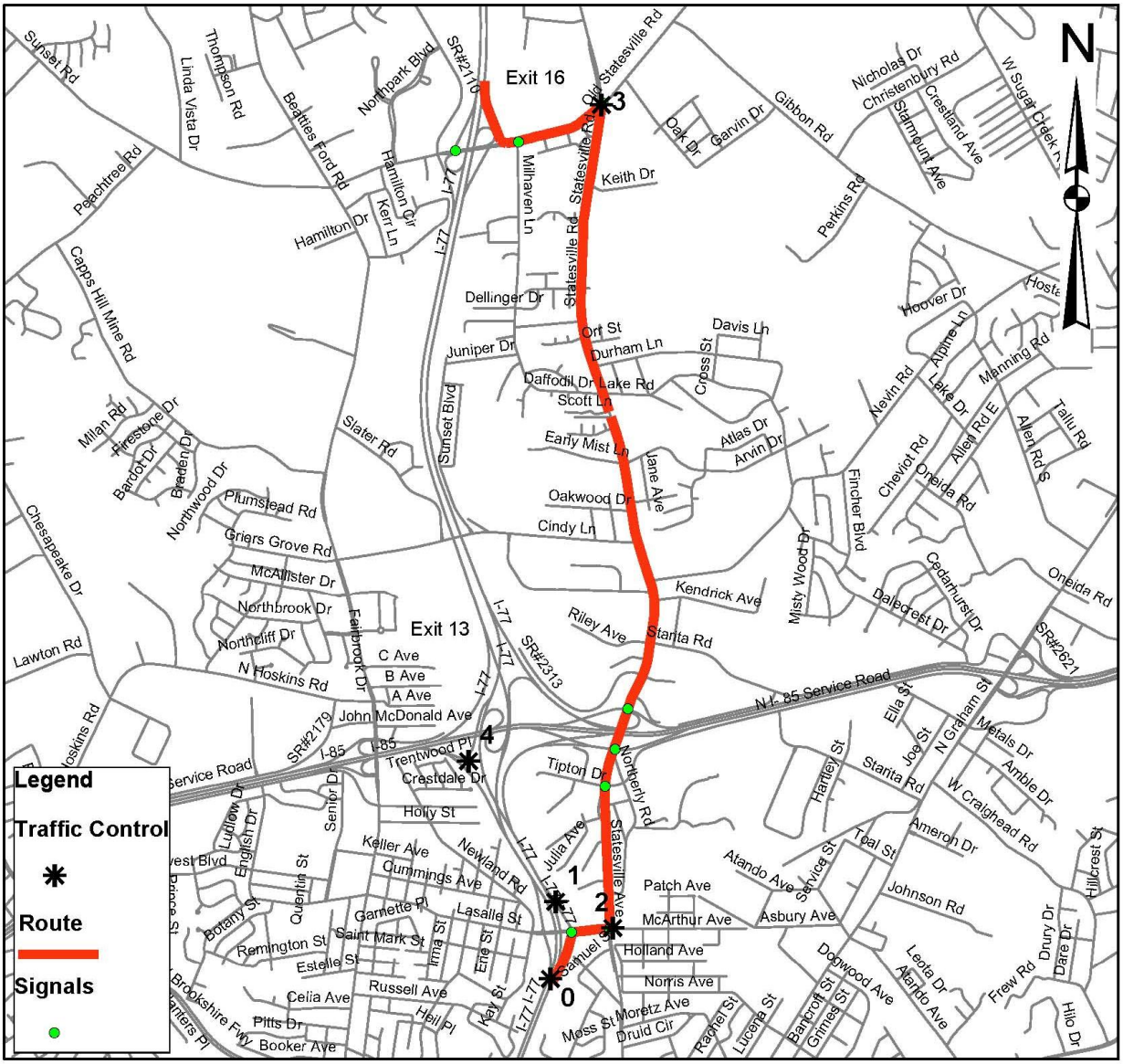
Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141



Interchange Details
Brookshire Blvd and I-85

Exhibit Book 2 # 22-01

I-77 NB
Exit 13
I-85 Interchange
(Page 1/2)

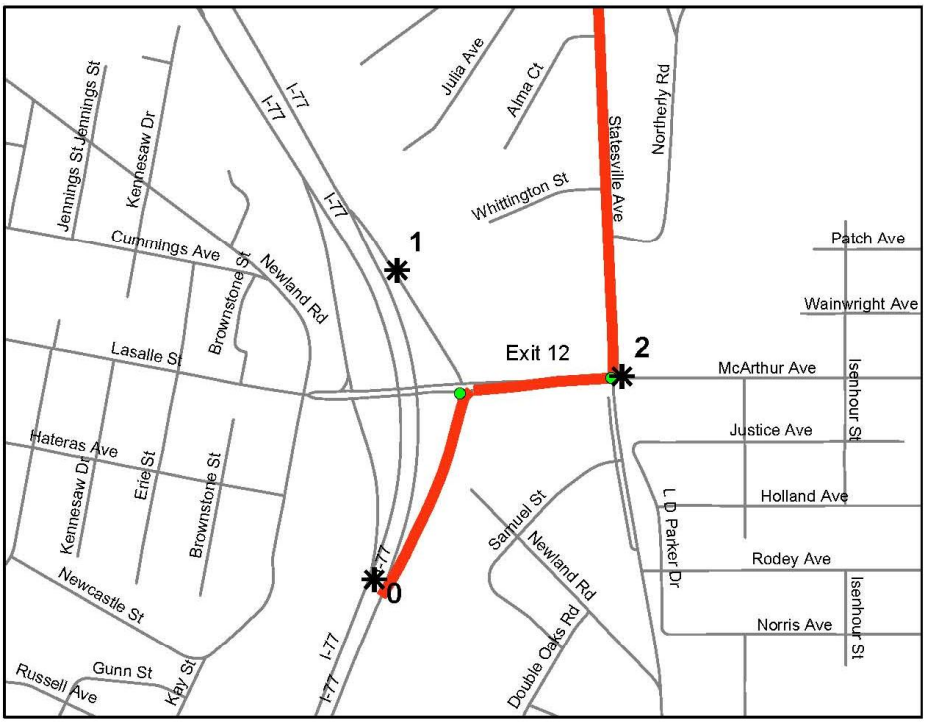


Detour Route
LaSalle St East to Statesville Ave North to Sunset Rd West to I-77 NB

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)



Legend

Traffic Control ✱

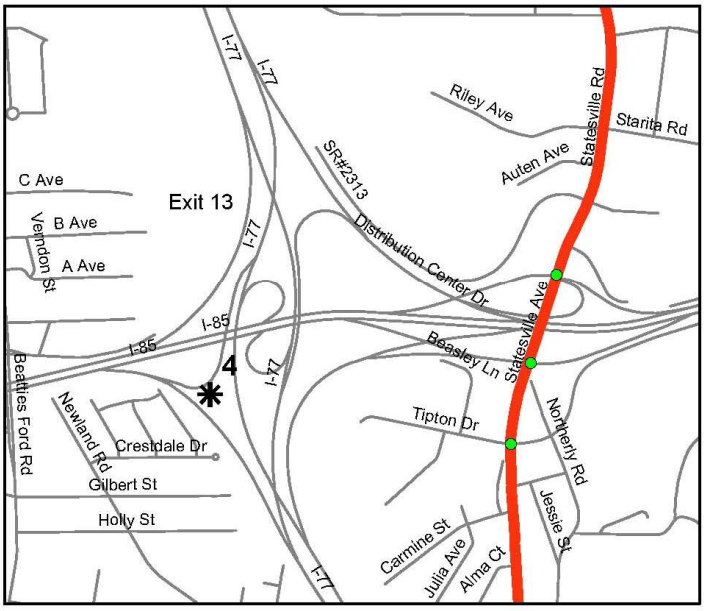
Route

Signals

Interchange Details - Exits 12
Traffic Control Points 0, 1, & 2

Message Signs To Use
CMS0-0I0077N0005.54
CMS0-0I0077N0011.97

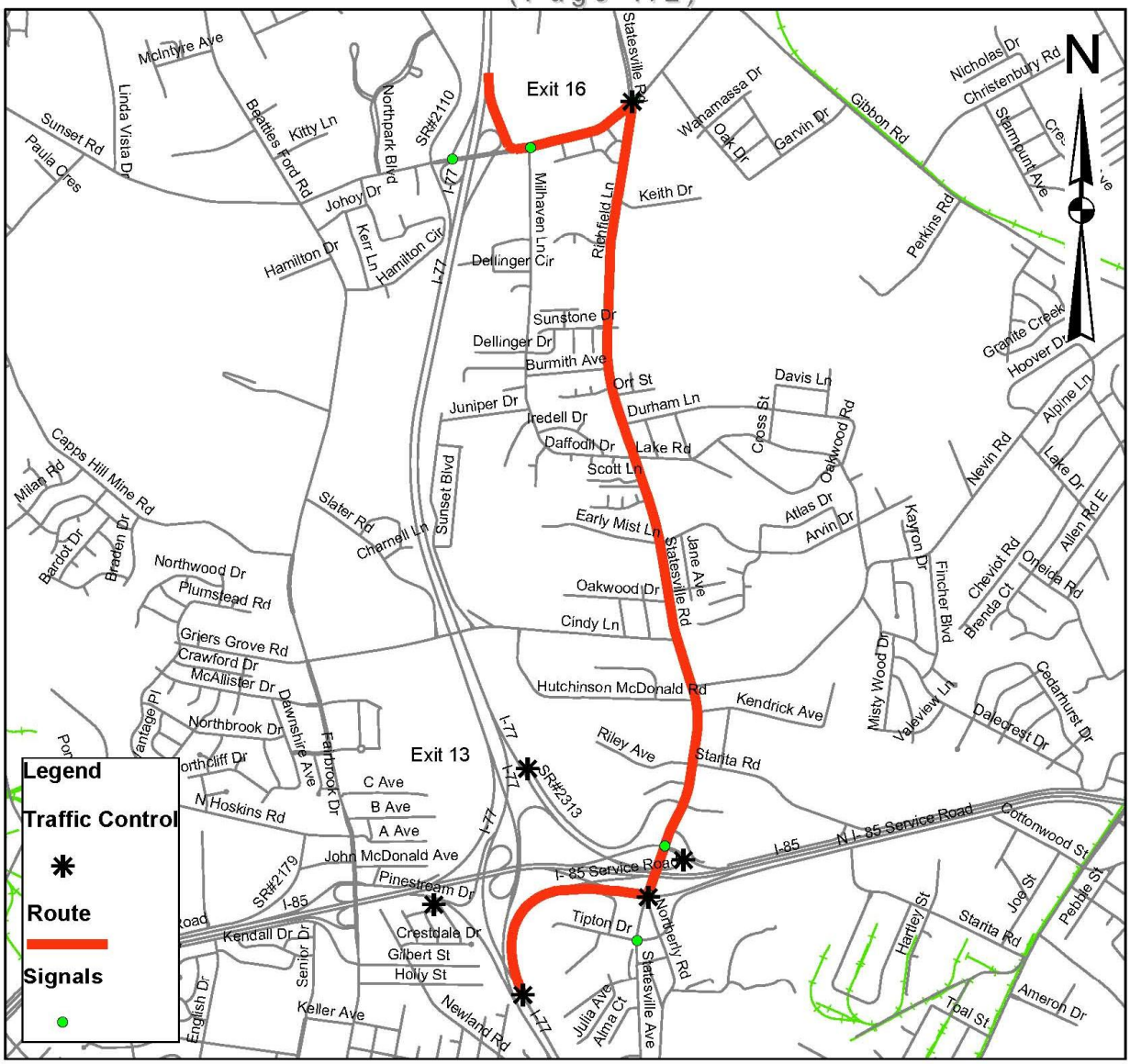
Char/Meck Emergency Contacts	
NCDOT Maint	980-722-8510
Pager (After Hours)	704-346-9808
NCDOT Incident Mgmt	704-342-6814
NCSHP	1-800-572-8765
NC Emer Mgmt St Warning Pt	1-919-733-3942
Charlotte Fire	704-336-2441
CMPD-Suburban Com Dtr	704-336-3237
Duty Officer	704-336-2141
CMPD-Urban Com Ctr	704-336-3333
Duty Officer	704-336-2141
Char/Meck Emerg Mgmt	704-336-2141



Interchange Details - Exits 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)

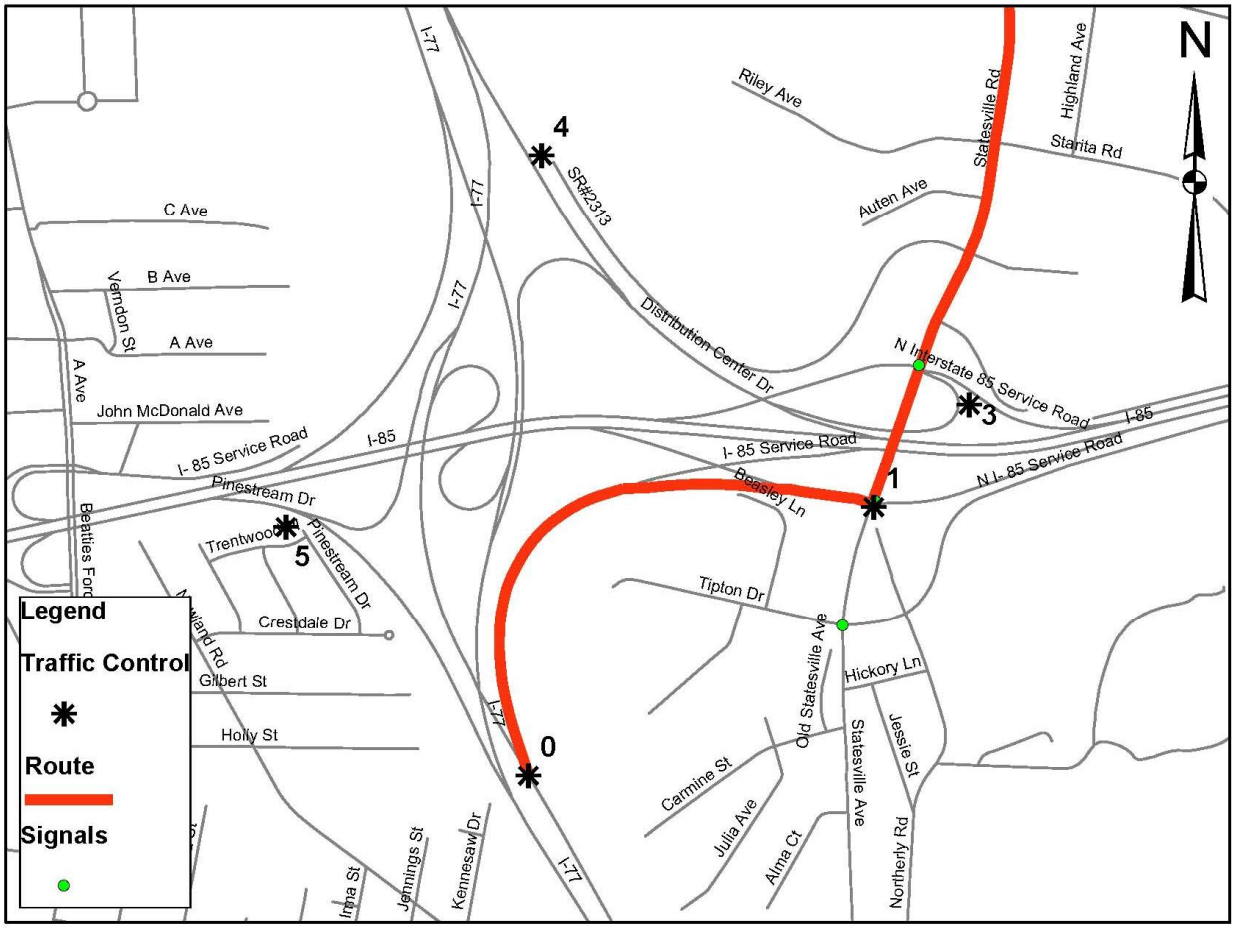


Detour Route
I-85 NB to Statesville Ave North to Sunset Rd West to I-77 NB

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)



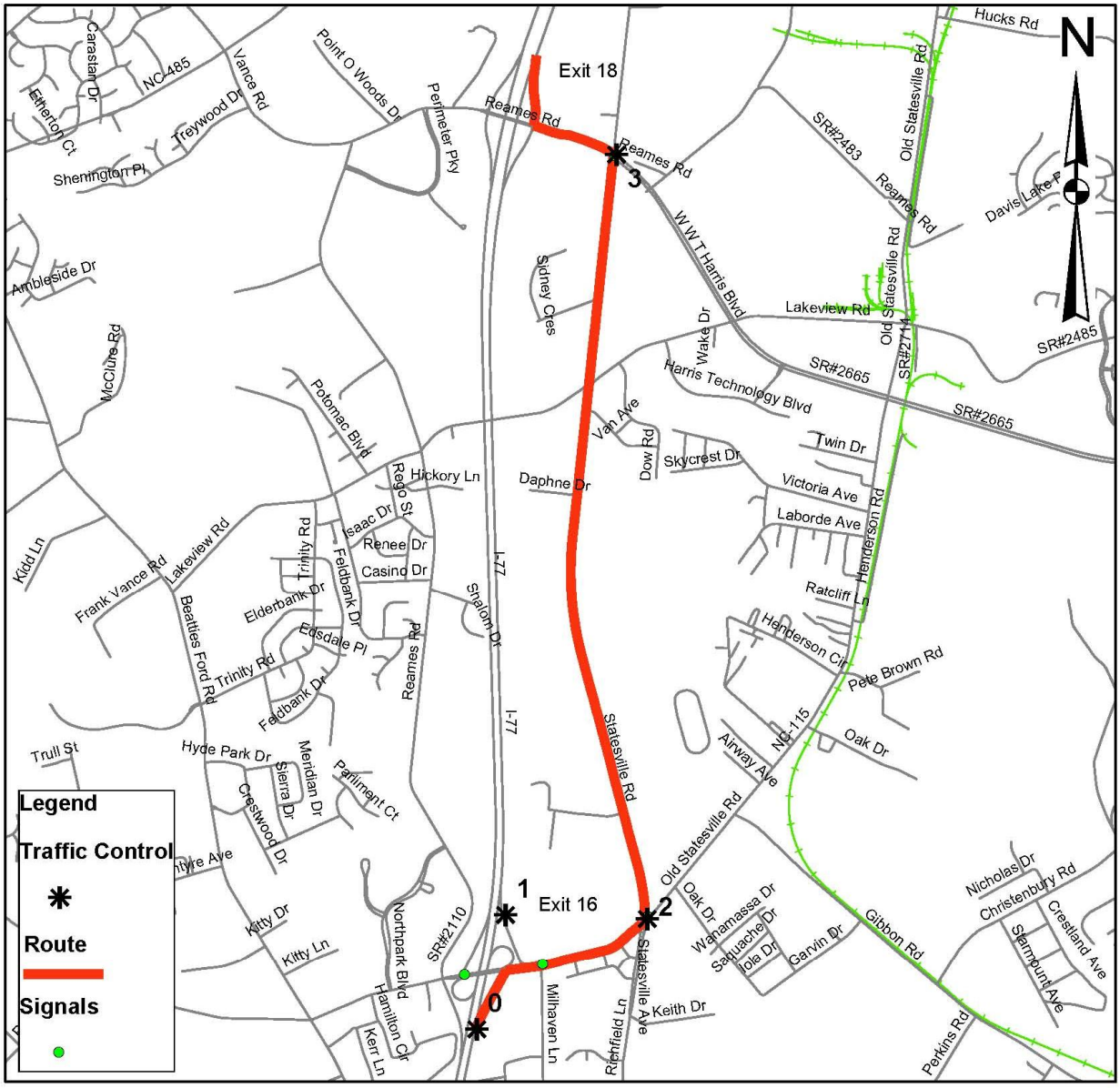
Interchange Details - Exits 13
Traffic Control Points 0, 1, 3, 4, & 5

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)

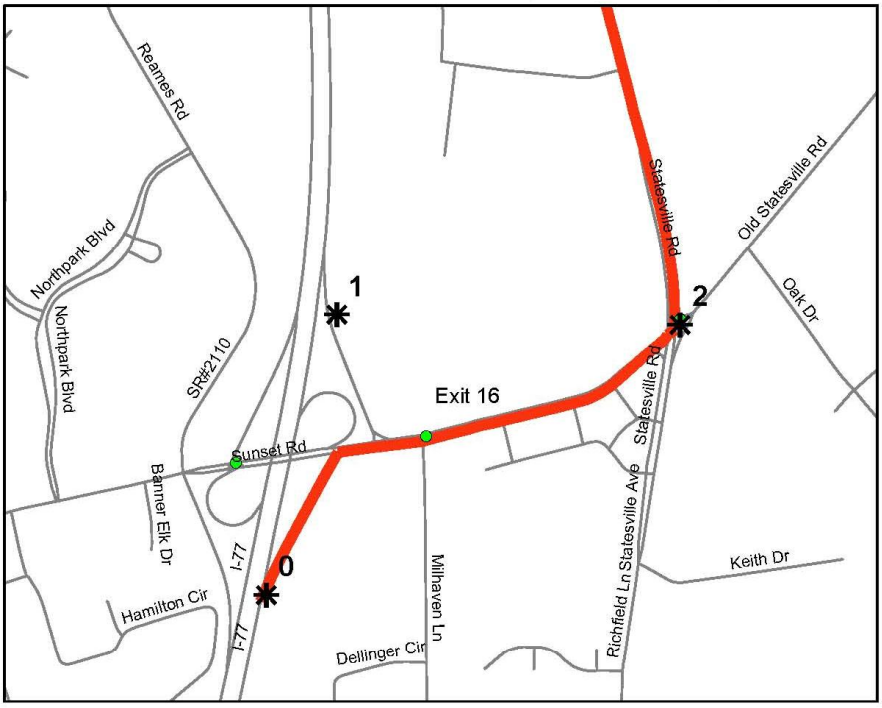


Detour Route
Sunset Rd East to US 21 (Statesville Rd) North to NC 24 (Harris Blvd) West to I-77 NB

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)



N

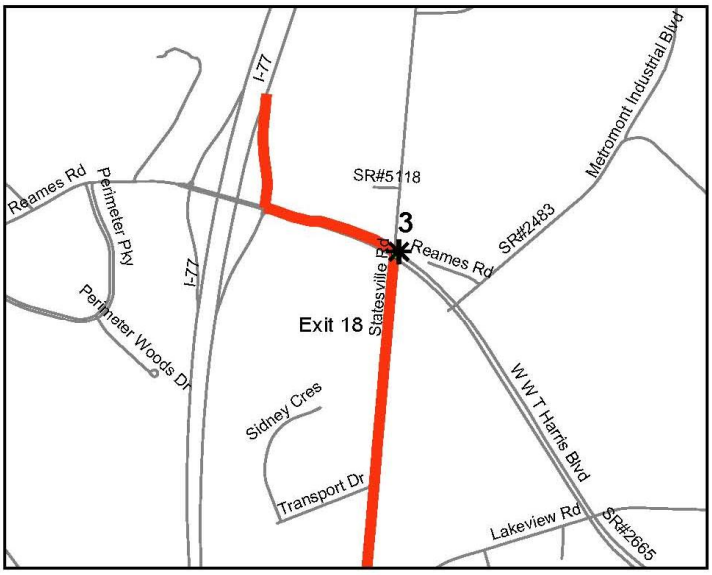
Legend

Traffic Control ✱

Route

Signals

Interchange Details - Exits 16
Traffic Control Points 0, 1, & 3



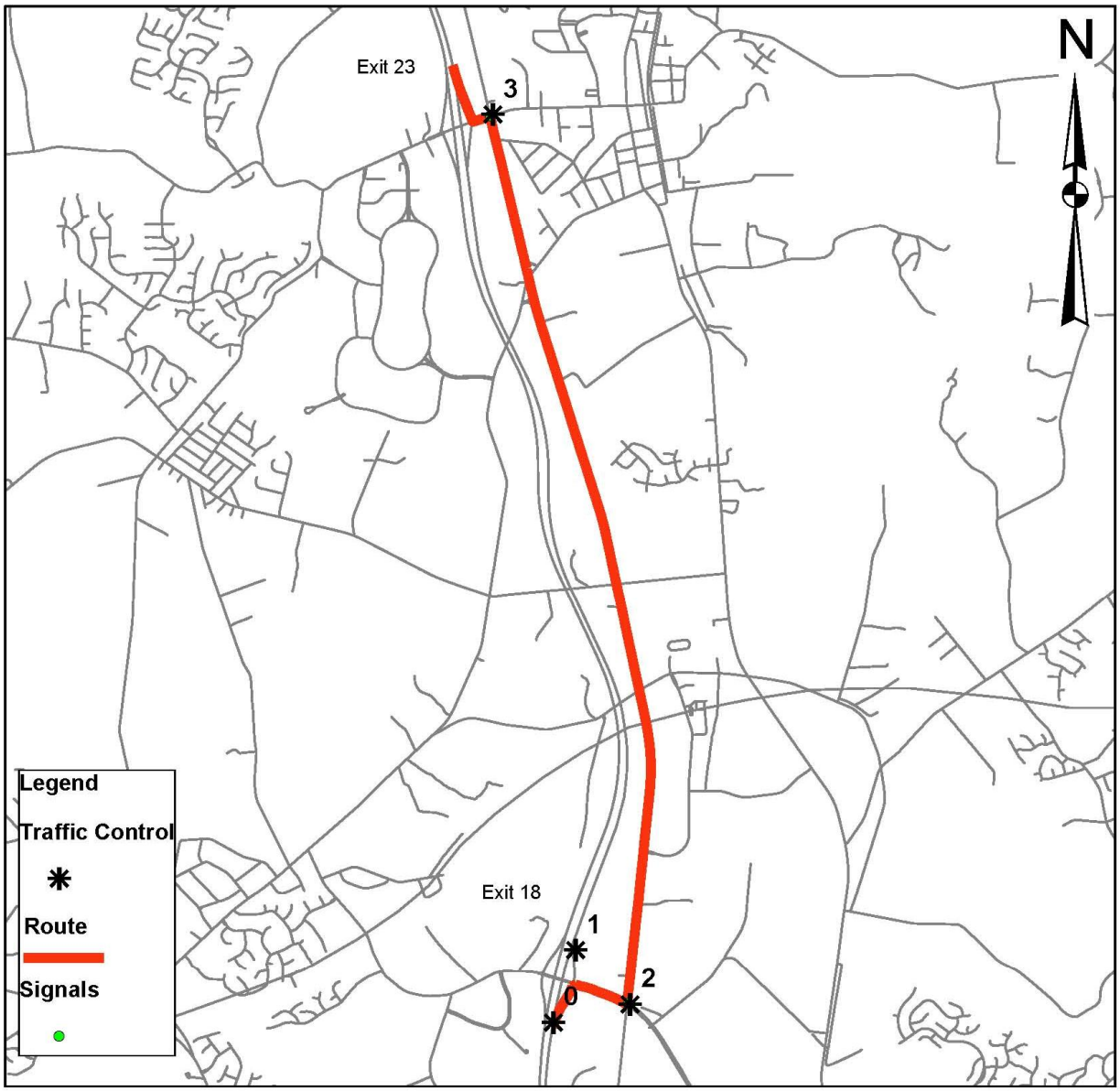
Interchange Details - Exits 18
Traffic Control Points 3

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

Exhibit Book 2 # 22-01

I-77 NB
Exit 18 to Exit 23
NC 24 (Harris Blvd) to Gilead Rd
(Page 1/2)

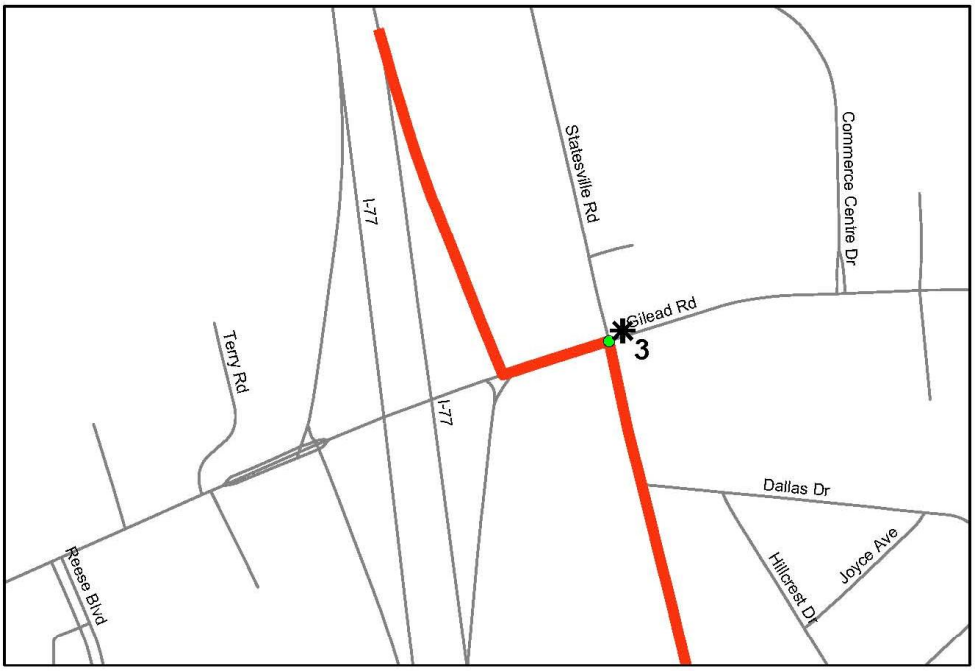


Detour Route
NC 24 (Harris Blvd) East to US 21 (Statesville Rd) North to Gilead Rd West to I-77 NB

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)



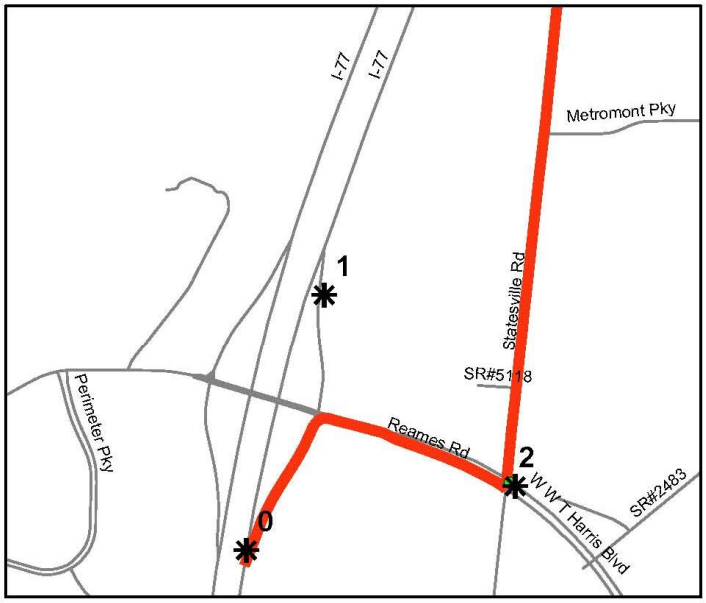
Legend

Traffic Control ✱

Route

Signals

Interchange Details - Exits 23
Traffic Control Points 3



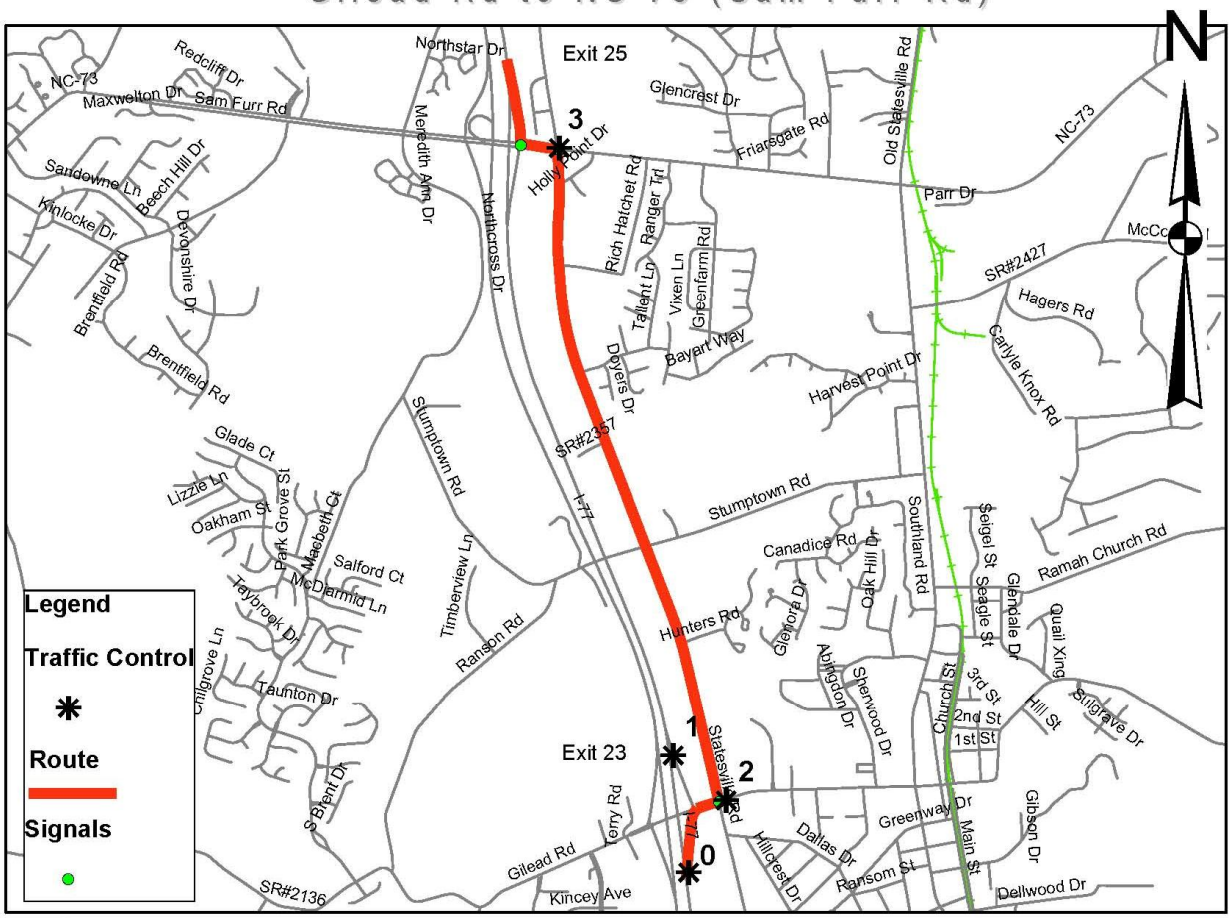
Interchange Details - Exits 18
Traffic Control Points 0, 1, & 2

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

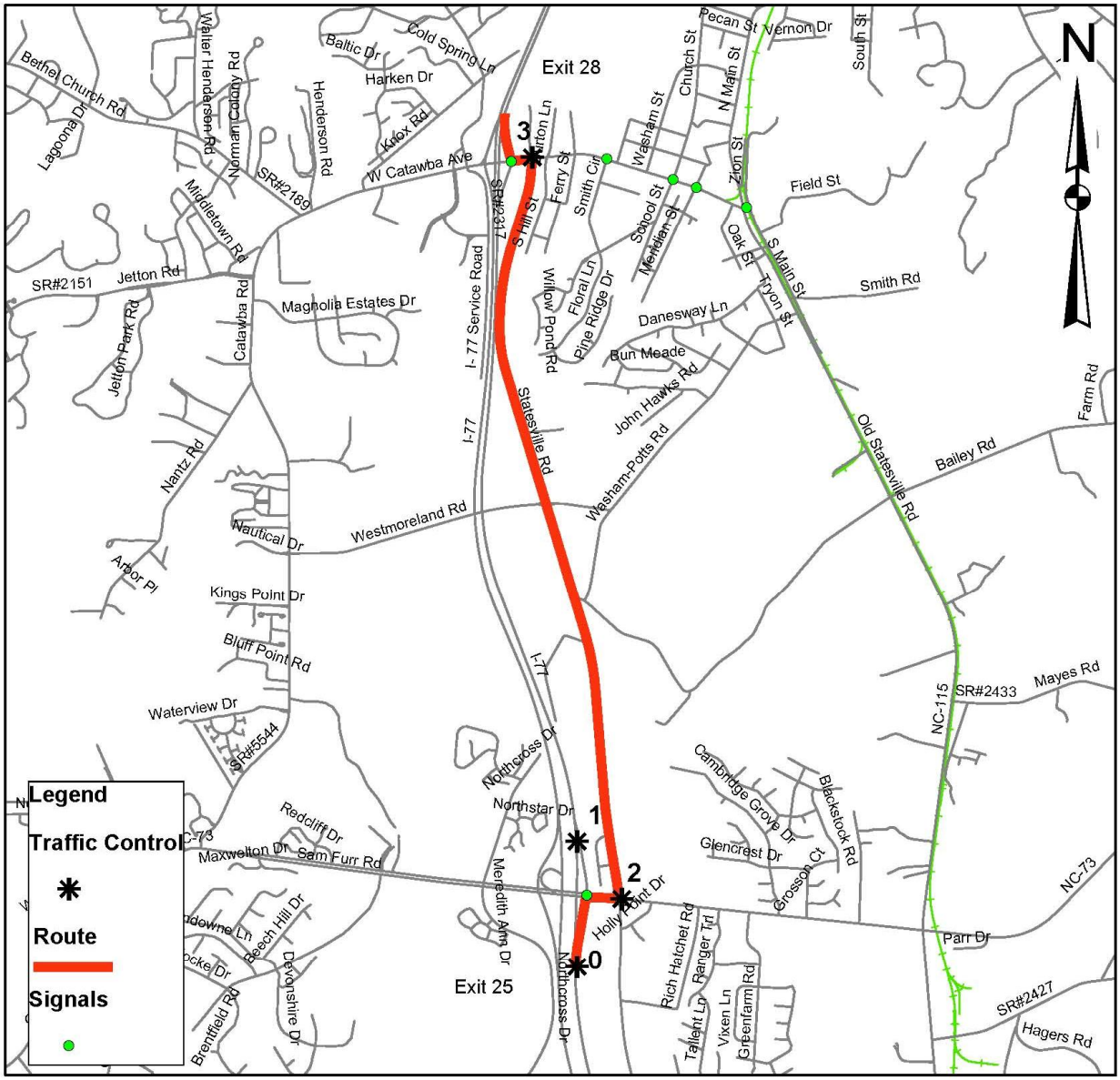
ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic onto Gilead Rd	2
1	Close I-77 NB On Ramp from Gilead	1
2	Direct Traffic at Gilead Rd and US 21 (Statesville Rd)	1
3	Direct Traffic at US 21 (Statesville Rd) and NC 73 (Sam Furr Rd)	1

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 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 25 to Exit 28
Sam Furr Rd to Catawba Ave
(Page 1/2)

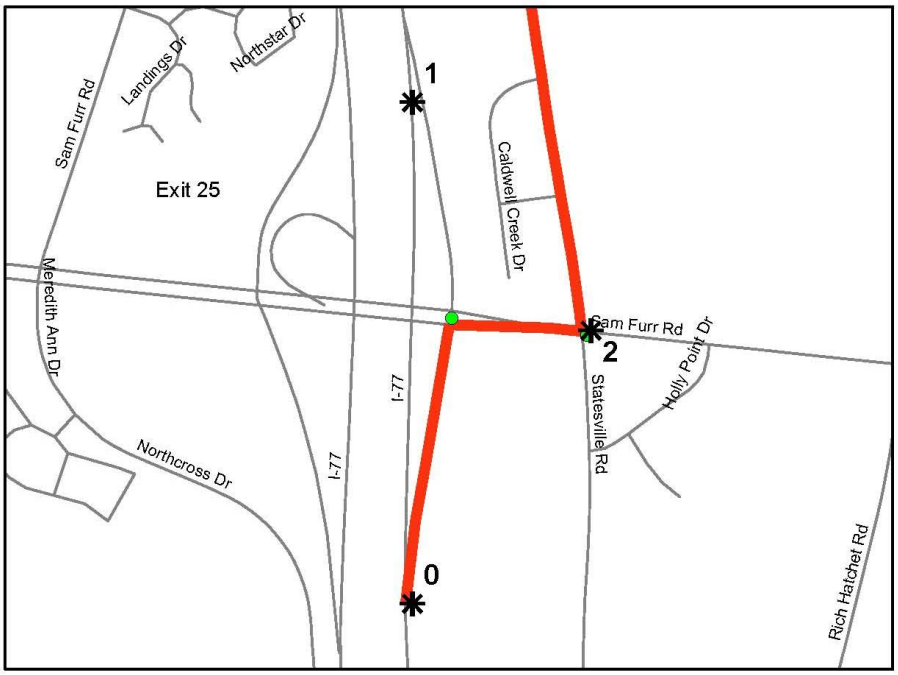


Detour Route
Catawba Ave East to NC 115 (Old Statesville Rd) North to Griffith St West to I-77 NB

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)



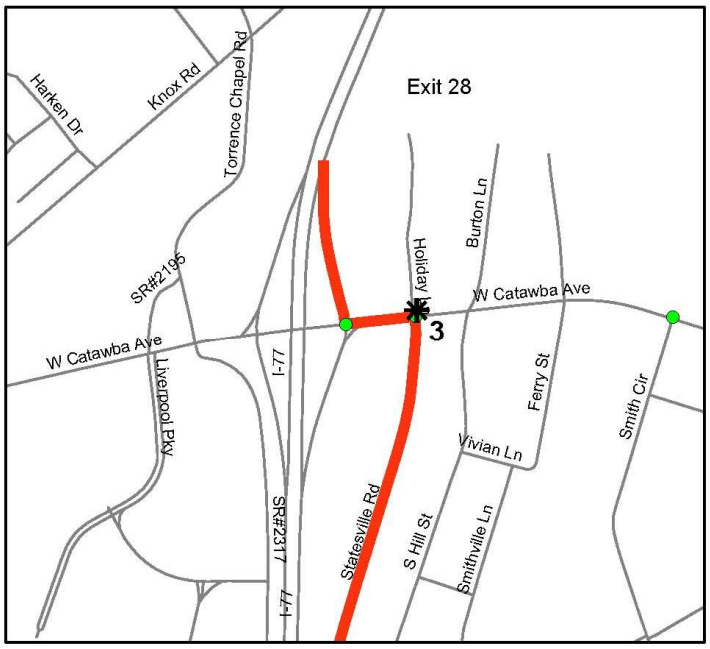
Legend

Traffic Control ✱

Route

Signals

Interchange Details - Exits 25
Traffic Control Points 0, 1, & 2



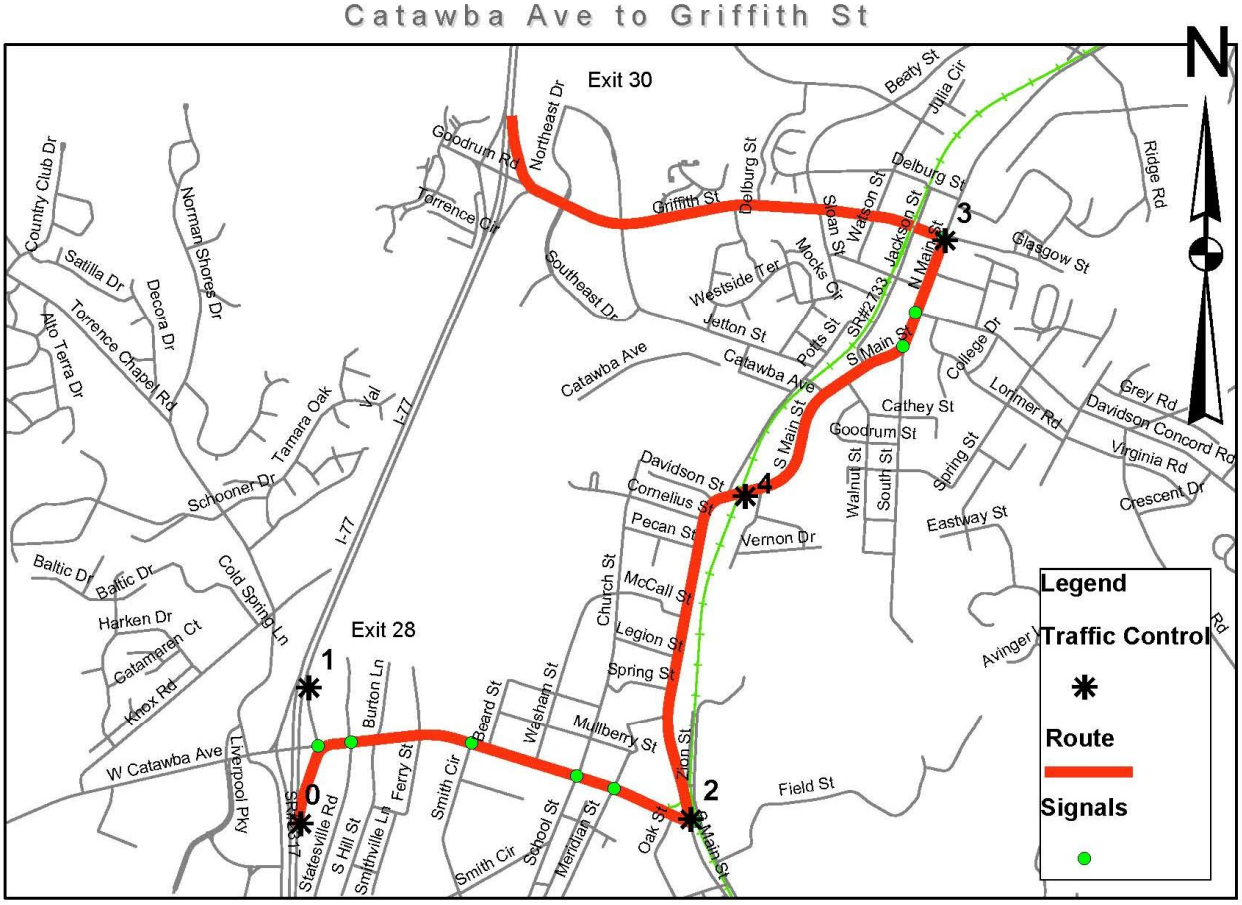
Message Signs To Use
CMS0-0I0077N0011.97
CMS0-0I0077N0016.87

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

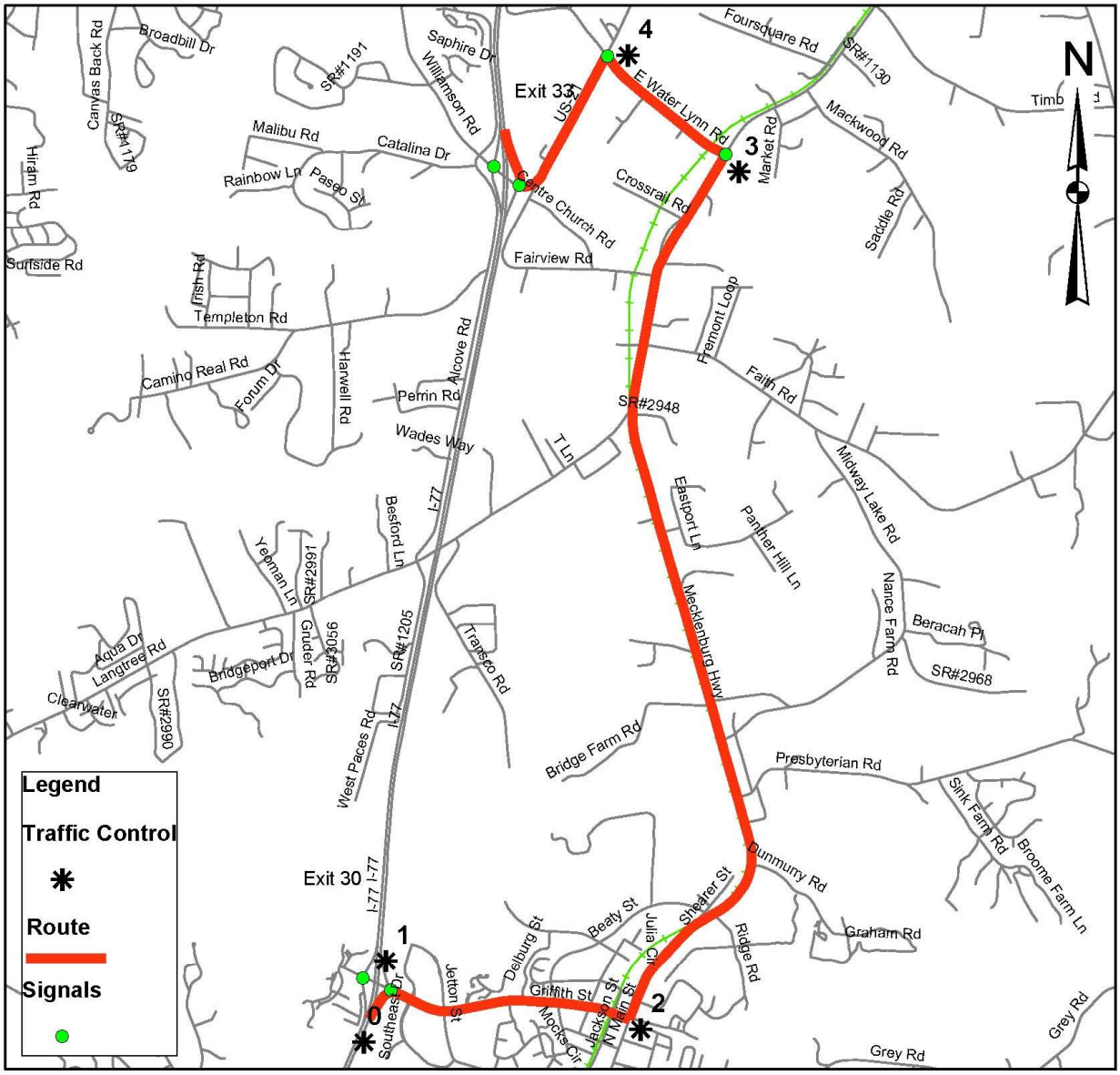
ID#	Traffic Control Point	Personnel
0	Close I-77 NB, Direct Traffic onto Cataw ba Ave	2
1	Close I-77 NB On Ramp from Cataw ba Ave	1
2	Direct Traffic at Cataw ba and NC 115 (Old Statesville Rd)	1
3	Direct Traffic at NC 115 (Old Statesville Rd) and Griffith St	1
4	Monitor Railroad Underpass on NC 115 for 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)

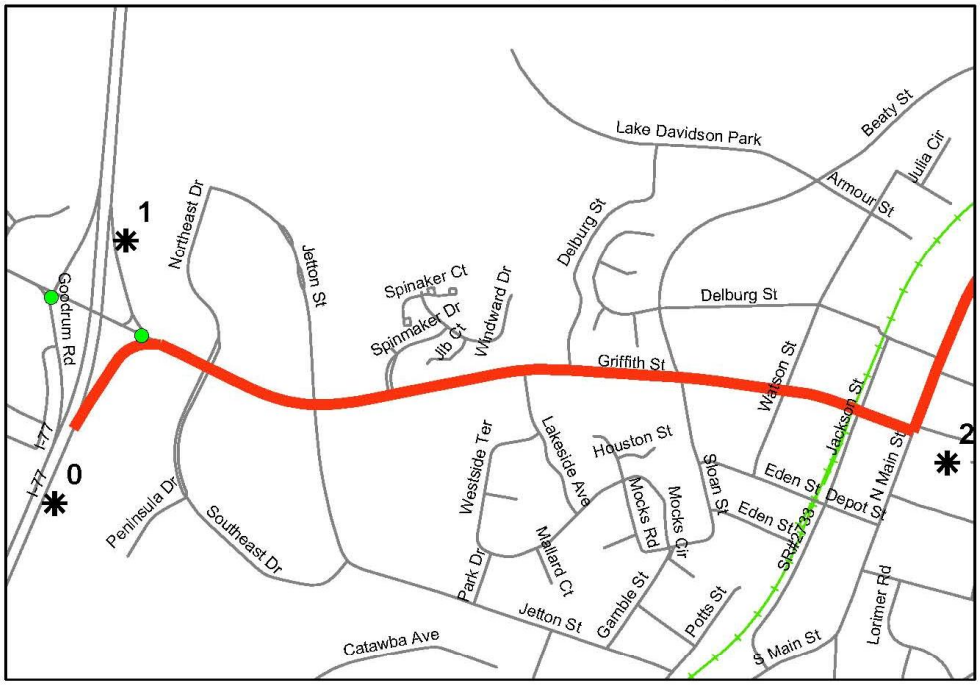


Detour Route
Griffith St East to NC 115 (Old Statesville Rd) North to Waterlynn Rd West to US 21 South to I-77 NB

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)



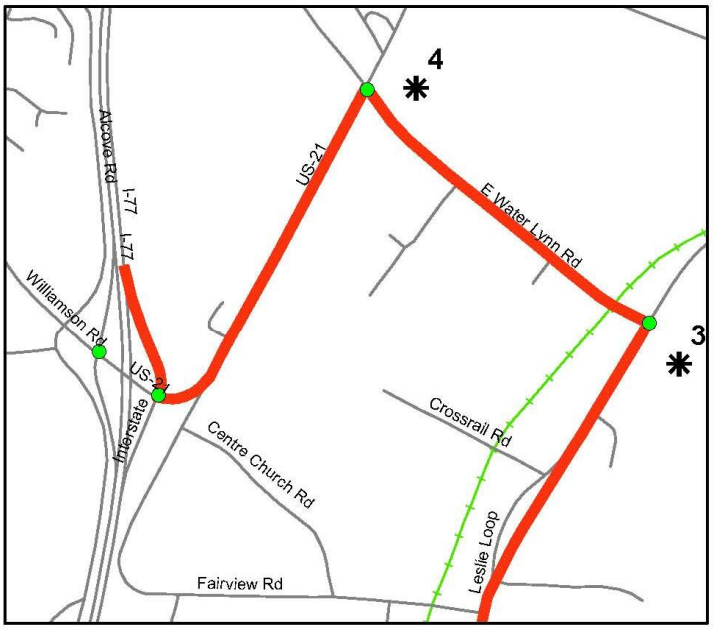
Legend

Traffic Control ✱

Route

Iredell Signals

Interchange Details - Exits 30
Traffic Control Points 0, 1, & 2



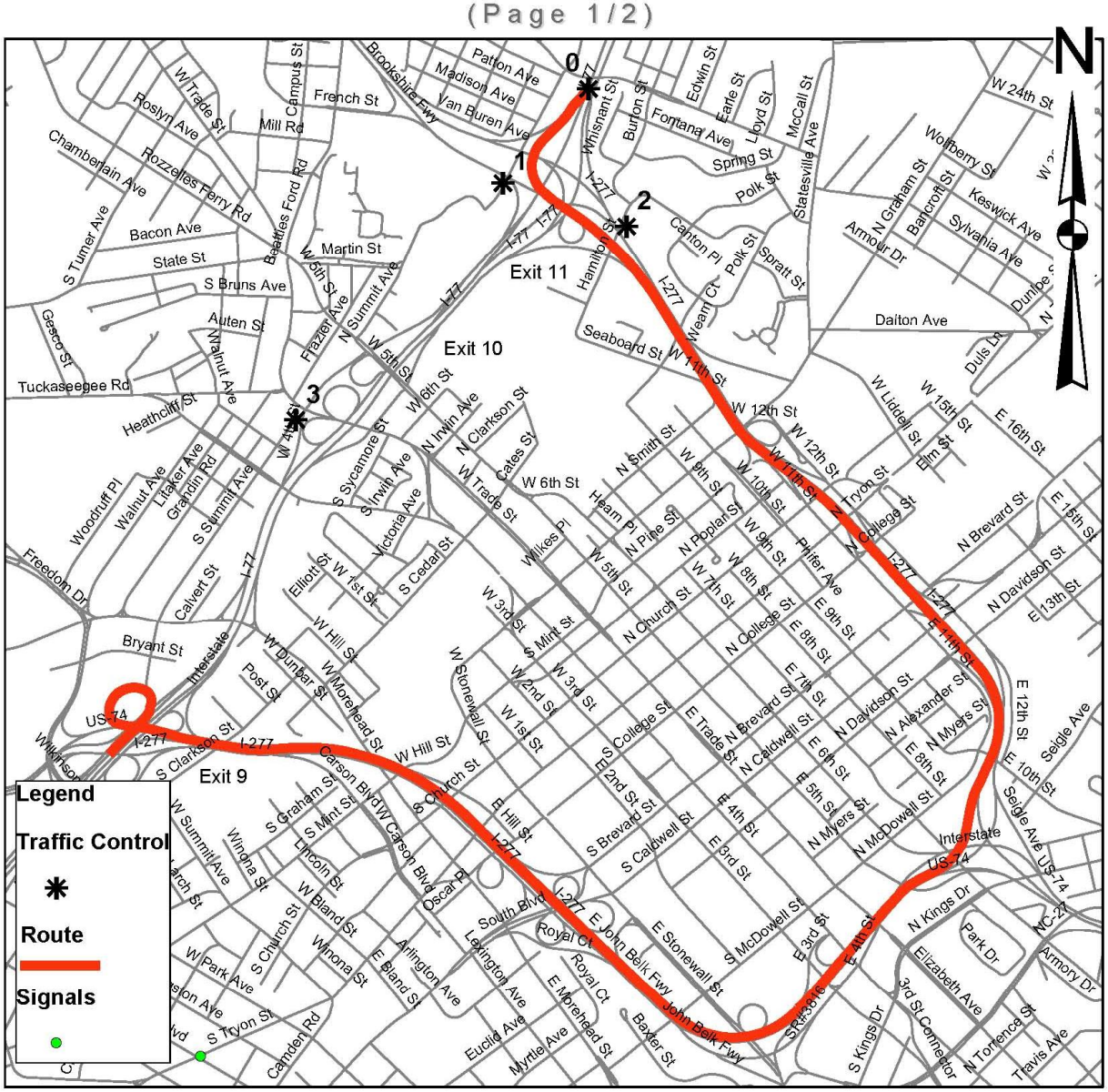
Interchange Details - Exits 33
Traffic Control Points 3 & 4

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)

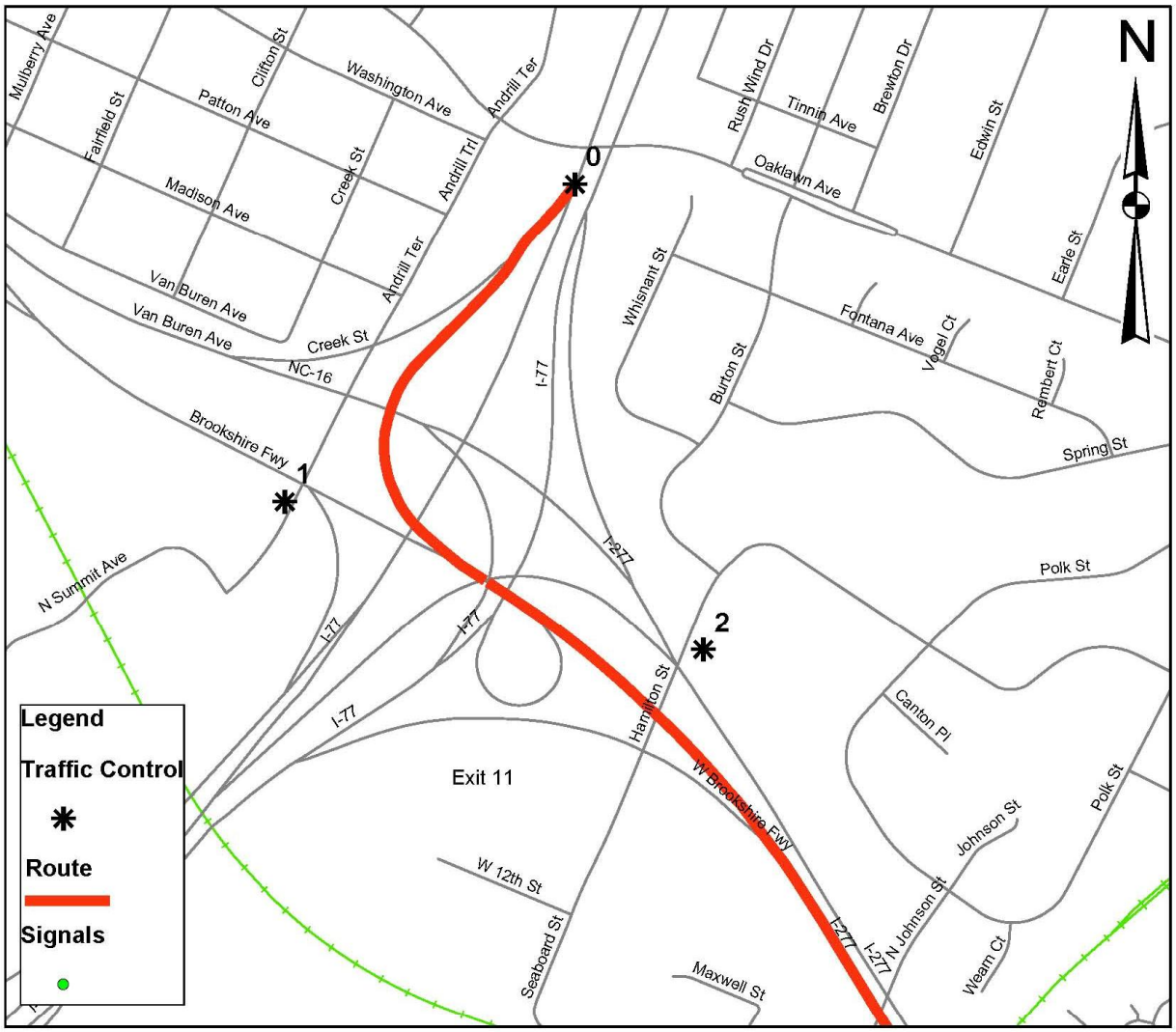


Detour Route
I-277 SB (Brookshire Frwy/John Belk Frwy) to I-77 SB Colector to I-77 SB

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)



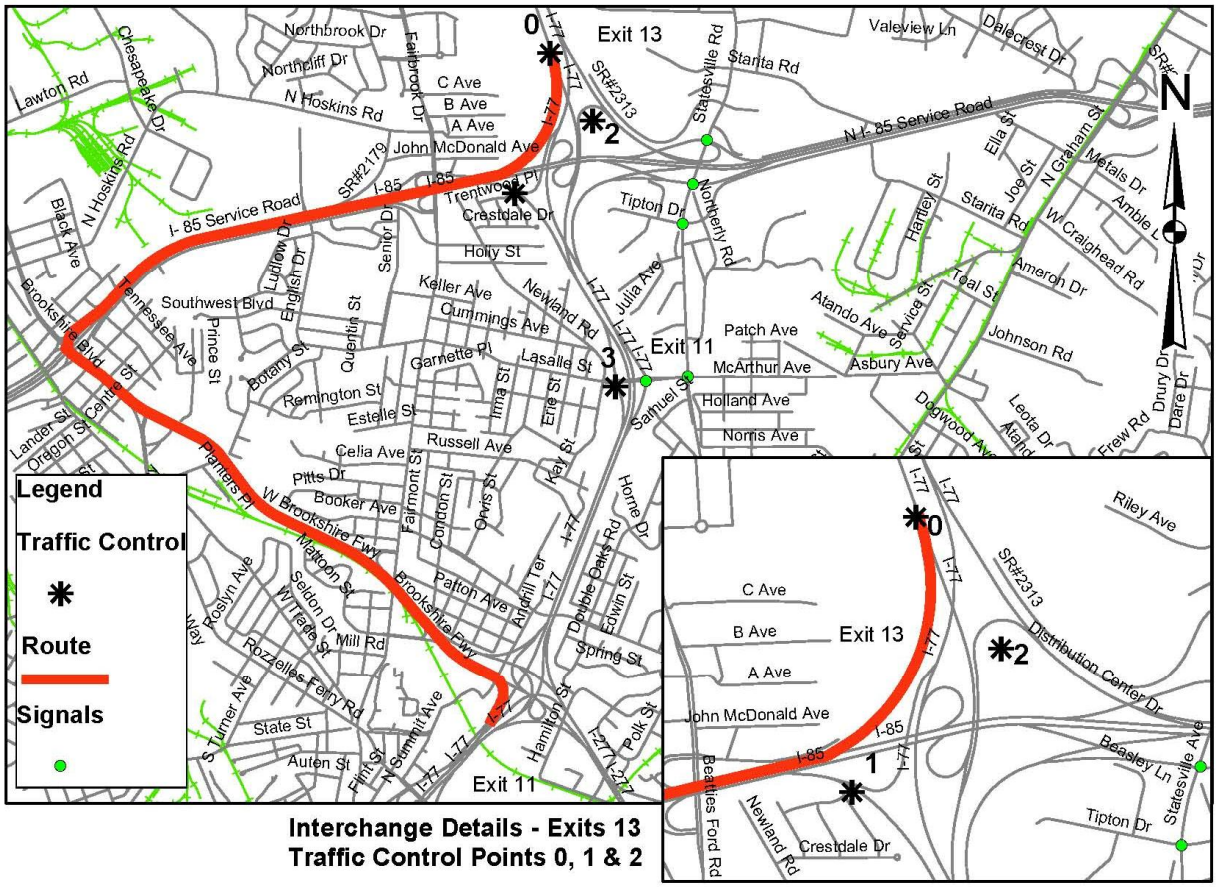
Interchange Details - Exits 11
Traffic Control Points 0, 1, 2

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)



Interchange Details - Exits 13
Traffic Control Points 0, 1 & 2

Detour Route
I-85 SB to NC 16 SB (Brookshire Frwy) to I-77 SB

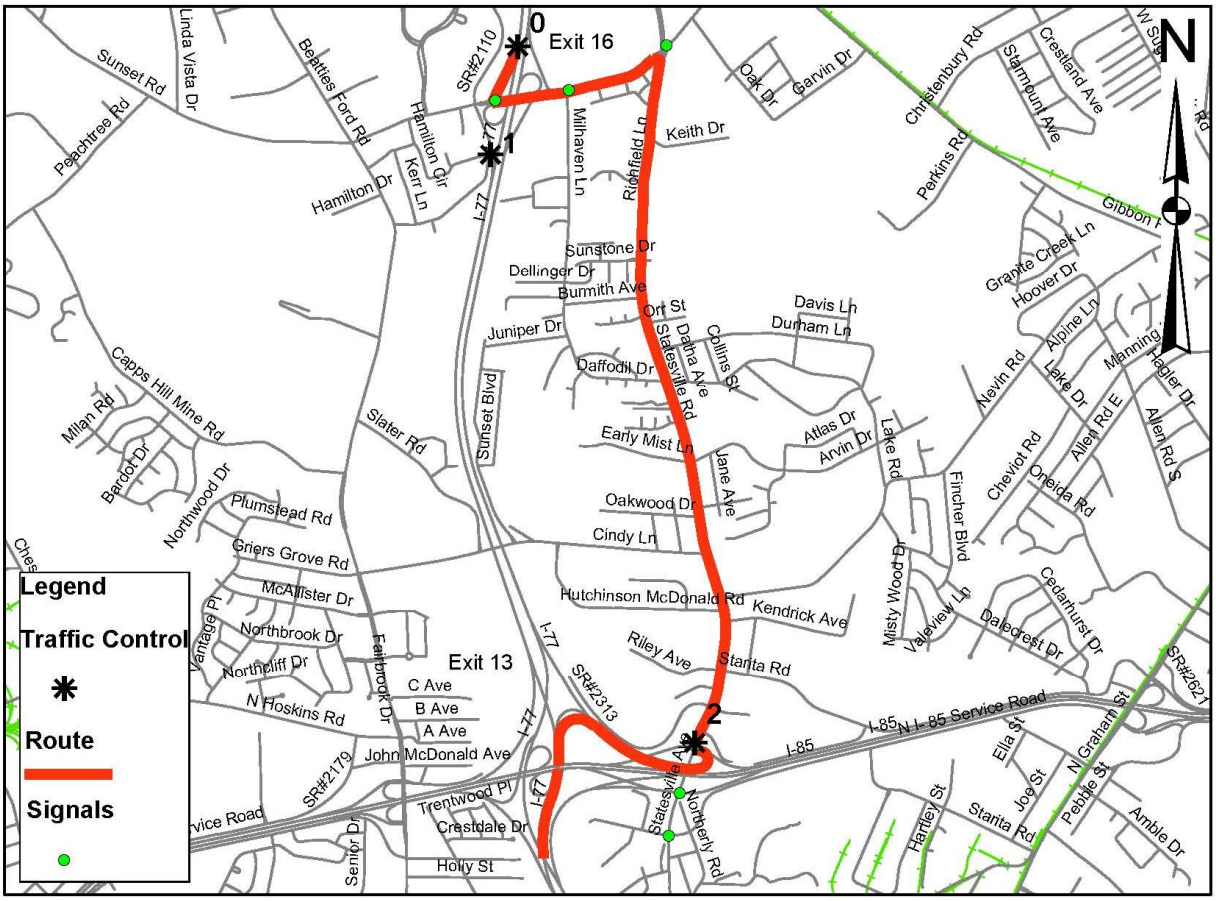
ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto I-85 SB	2
1	Close I-77 SB On Ramp from I-85 NB	1
2	Close I-77 SB On Ramp from I-85 SB	2
3	Close I-77 SB On Ramp from LaSalle St	1

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

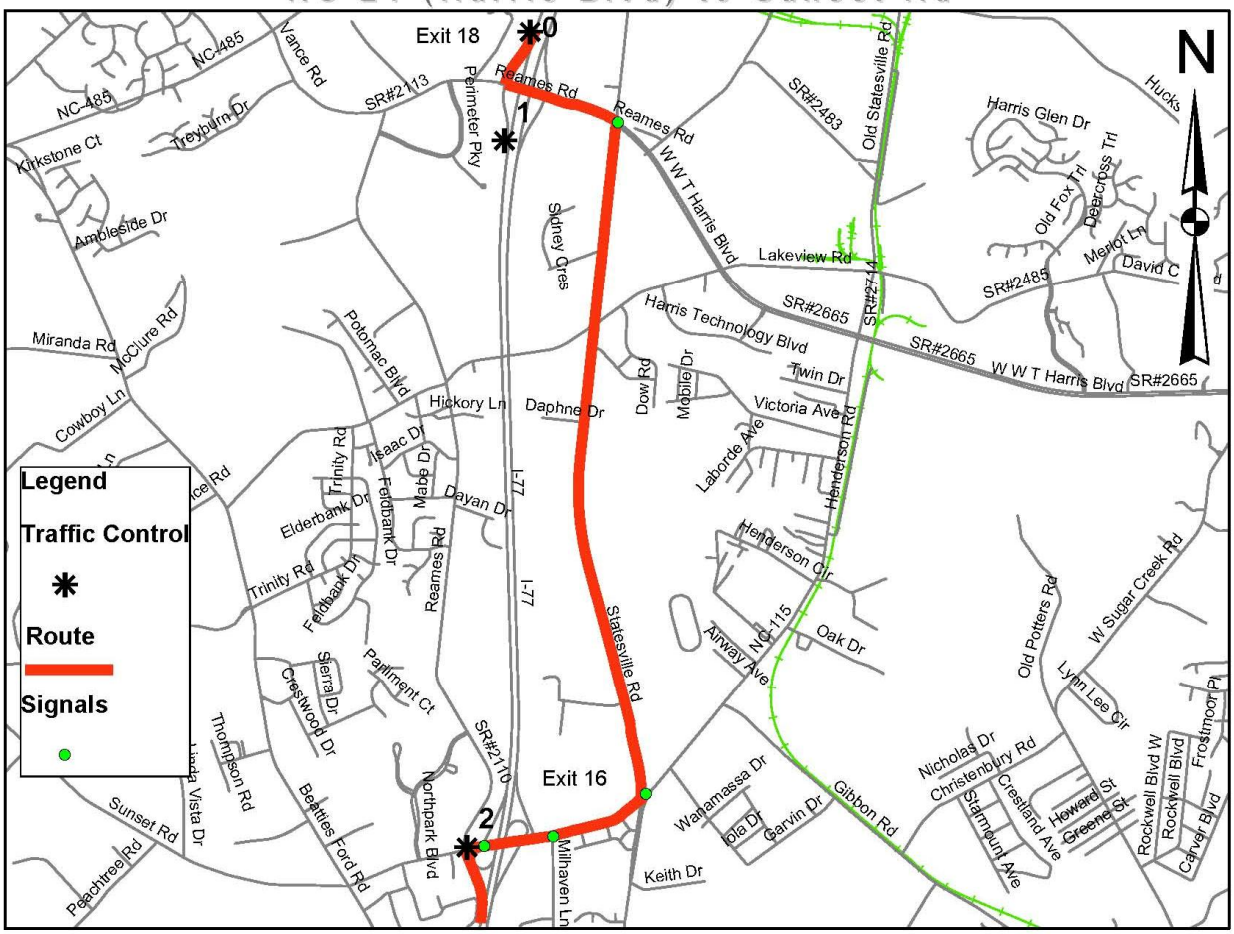
ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto Susnet Rd East	2
1	Close I-77 SB On Ramp from Sunset Rd	1
2	Direct Traffic at Statesville Ave and I-77 SB Access Ramp	2

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

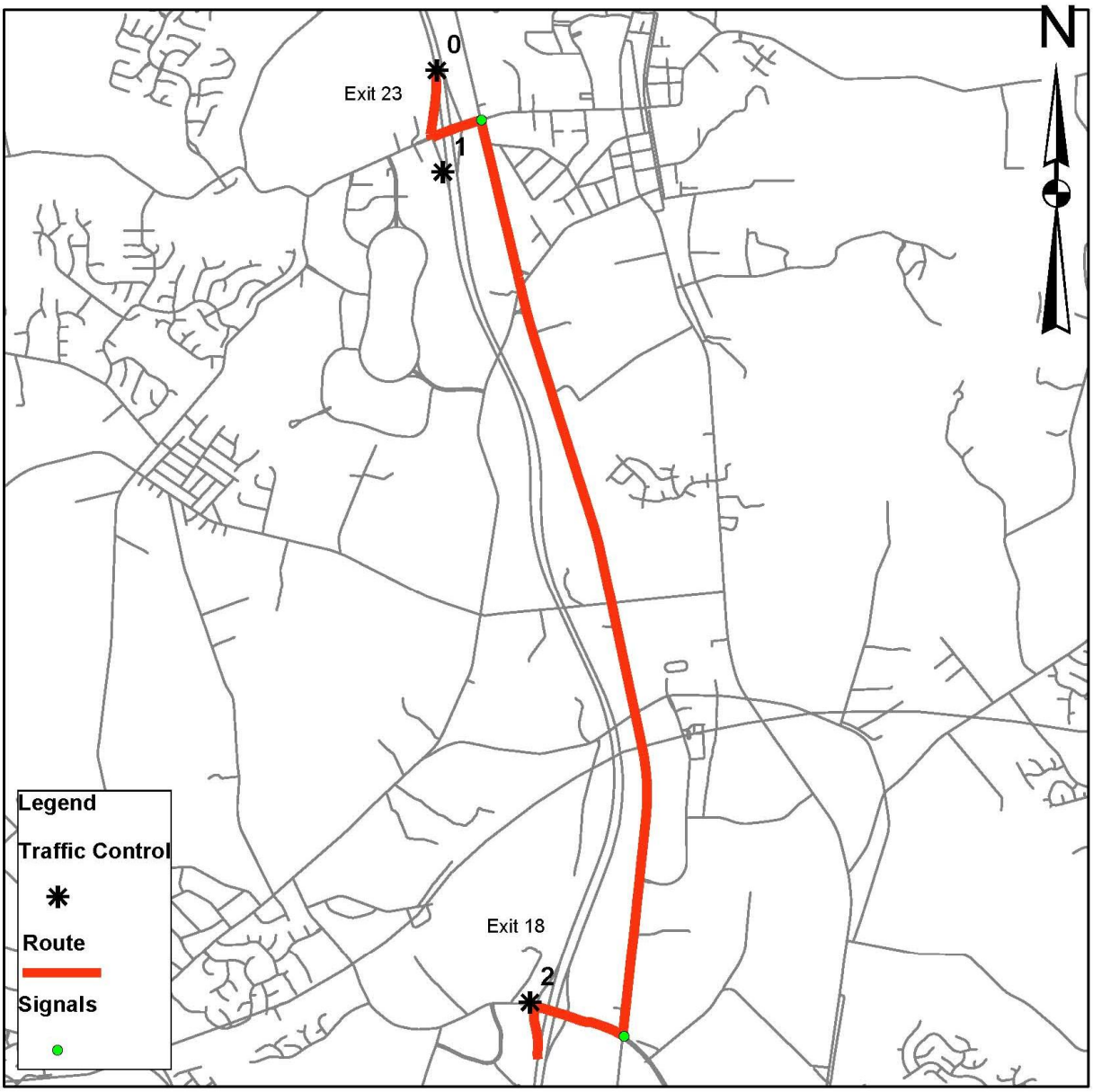
ID#	Traffic Control Point	Personnel
0	Close I-77 SB, Direct Traffic onto NC 24 (Harris Blvd)	2
1	Close I-77 SB On Ramp from NC 24 (Harris Blvd), Direct Traffic at Ramp and NC 24	1
2	Direct Traffic at Sunset Rd and I-77 SB On Ramp	1

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 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 23 to 18
Gilead Rd to NC 24 (Harris Blvd)
(Page 1/2)

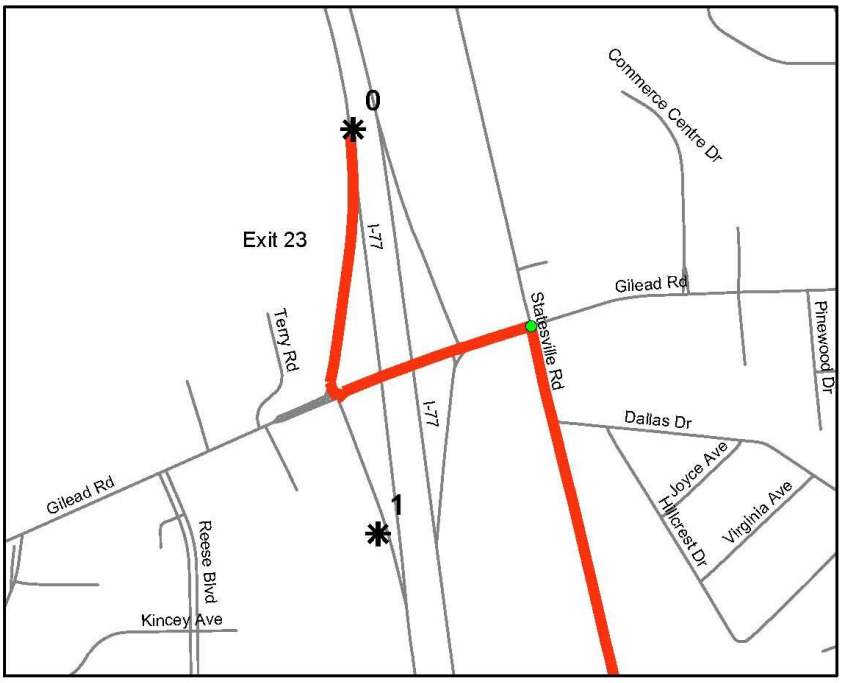


Detour Route
Gilead Rd East to US 21 (Statesville Rd) South to NC 24 (Harris Blvd) West to I-77 SB

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)



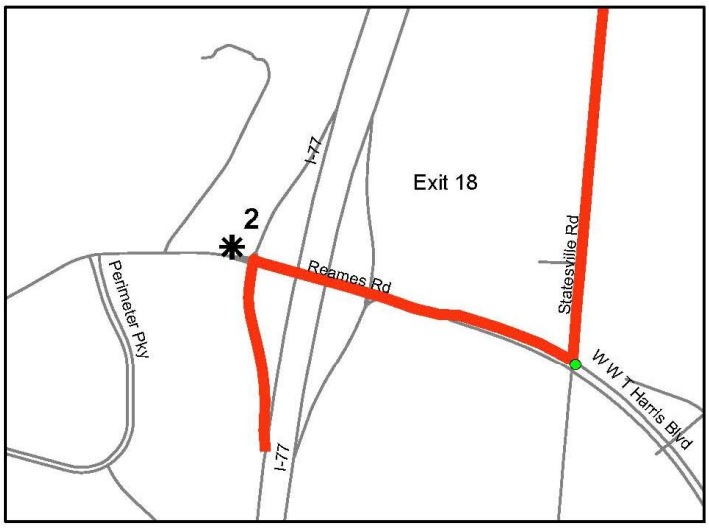
Legend

Traffic Control ✱

Route

Signals

Interchange Details - Exits 23
Traffic Control Points 0 & 1



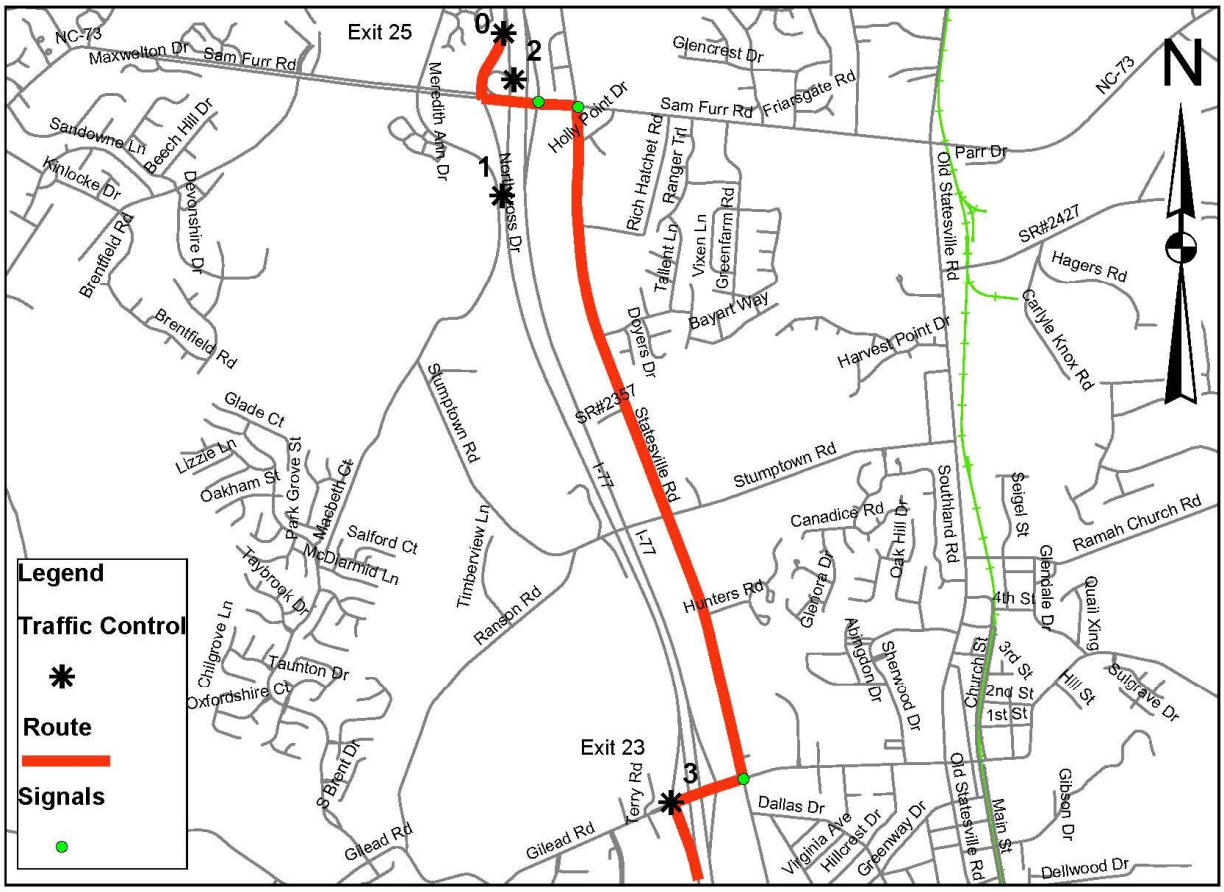
Interchange Details - Exits 18
Traffic Control Points 2

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. Along minor paved and unpaved secondary routes, grass height may exceed eighteen (18) inches for varying periods of time; however, safe sight distances will be maintained.

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 for each highway system 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.

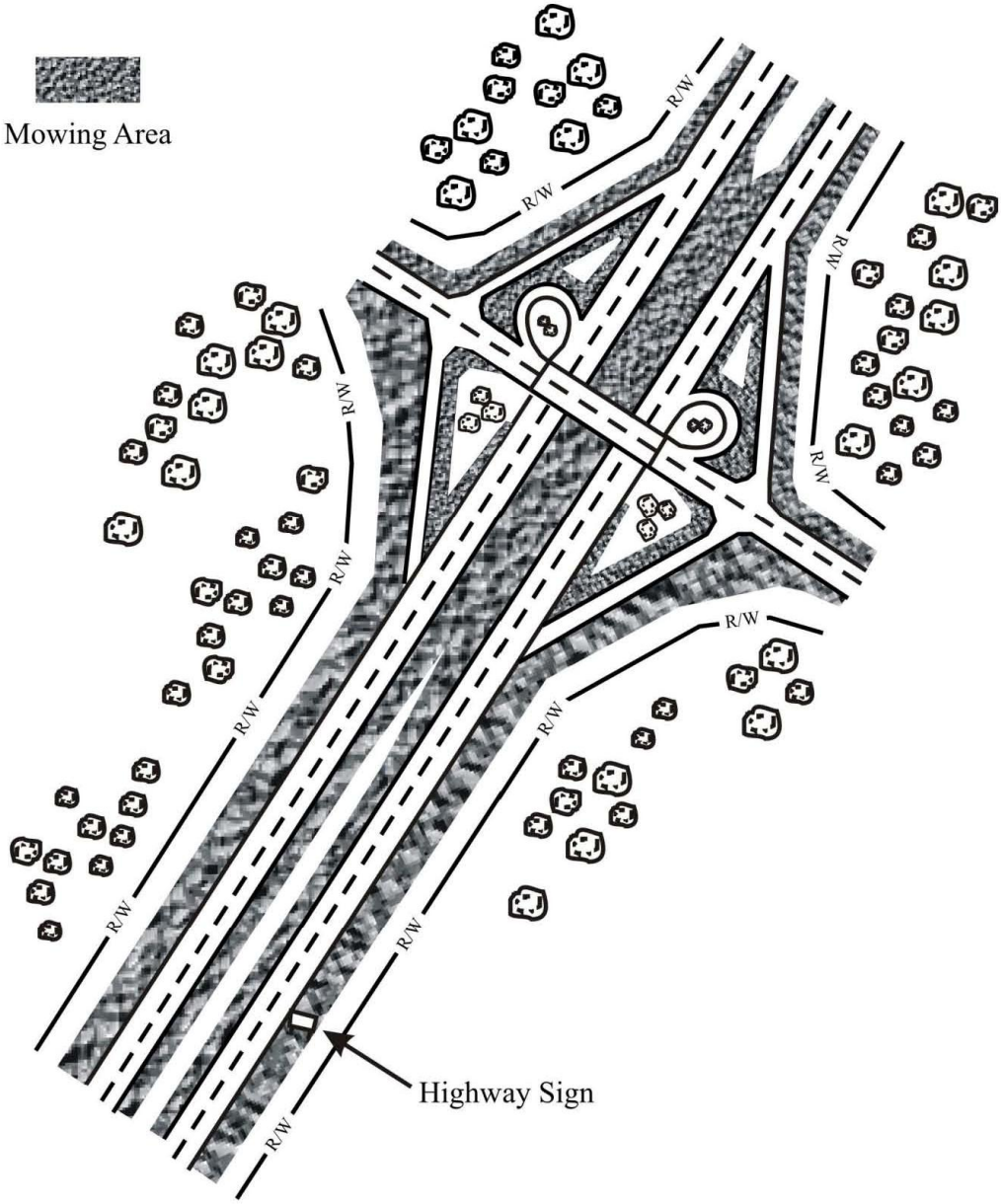
Herbicide treatment can be an effective tool to relieve mowing pressure on interstate and primary routes in early season and allow more attention for mowing secondary routes which can present sight distance problems quickly in the spring and early summer. General areas of use for treatments are as follows:

- 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

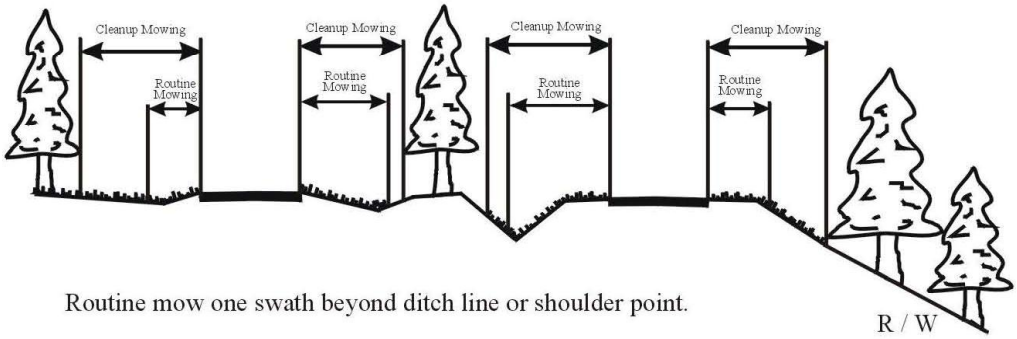
TYPICAL MULTI-LANE HIGHWAY



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

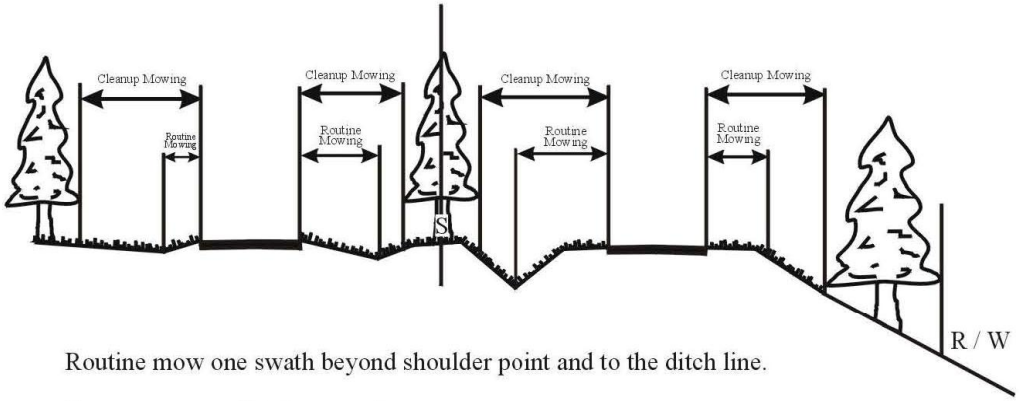
For Swath Contracts:



Routine mow one swath beyond ditch line or shoulder point.

Cleanup mow to R/W or mowing pattern.

For Ditch Contracts:

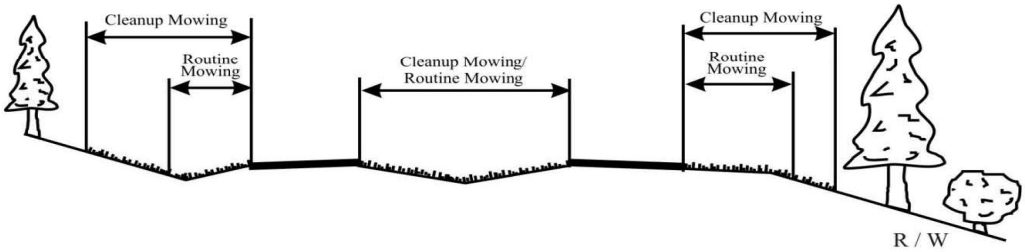


Routine mow one swath beyond shoulder point and to the ditch line.

Cleanup mow to R/W or mowing pattern.

TYPICAL FOUR LANE HIGHWAY SECTION NARROW MEDIAN

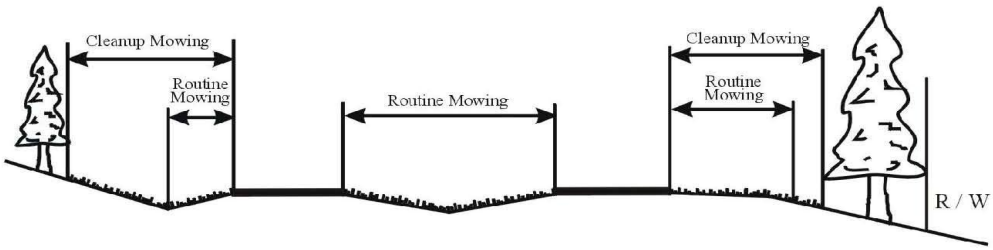
For Swath Contracts:



Routine mow one swath beyond ditch line or shoulder point.

Cleanup mow to R/W or mowing pattern.

For Ditch Contracts:

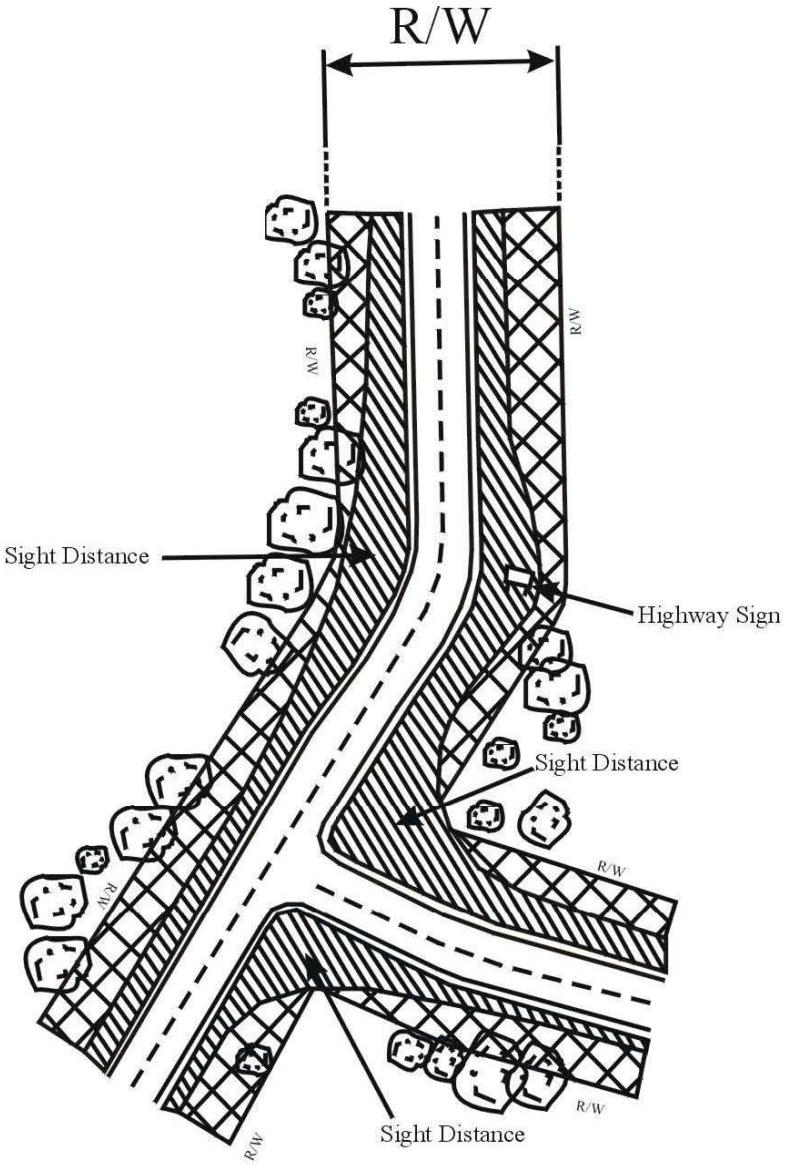


Routine mow one swath beyond shoulder point and to the ditch line.

Cleanup mow to R/W or mowing pattern.

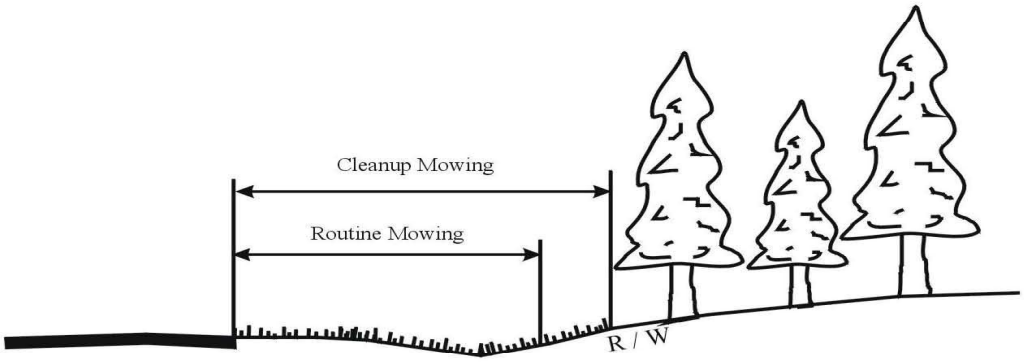
3

TYPICAL TWO LANE HIGHWAY



TYPICAL CUT SECTION WITH SLOPE FLATTER THAN 2:1

For Swath Contracts:

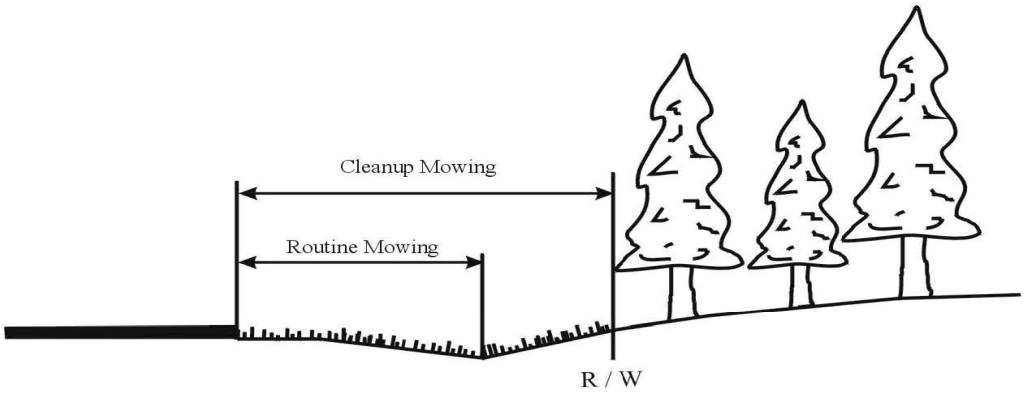


TYPICAL CUT SECTION WITH SLOPE FLATTER THAN 2:1

Routine mowing to one swath beyond ditch line.

Cleanup mow to established mowing pattern line or R/W.

For Ditch Contracts:



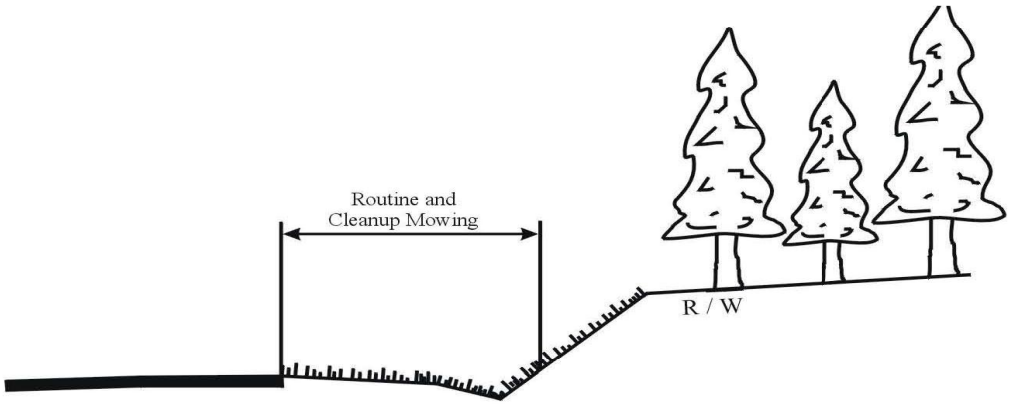
TYPICAL CUT SECTION WITH SLOPE FLATTER THAN 2:1

Routine mowing to ditch line.

Cleanup mow to established mowing pattern line or R/W.

TYPICAL CUT SECTION WITH SLOPE 2:1 AND STEEPER

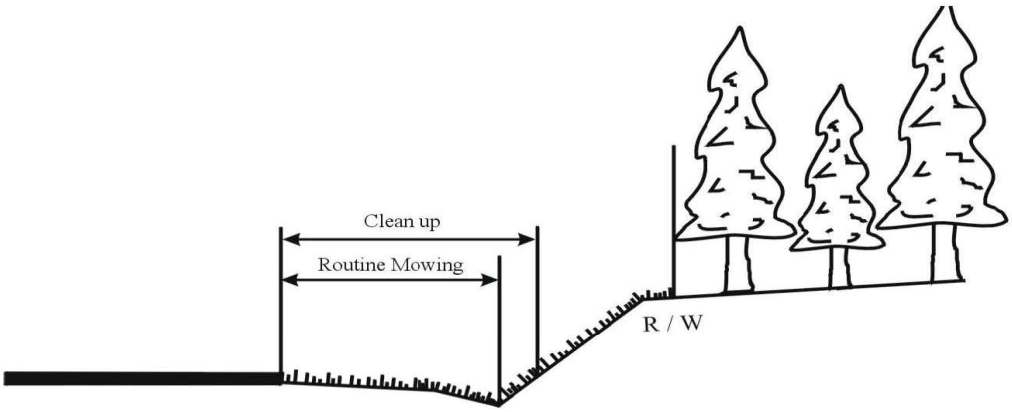
For Swath Contracts:



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:

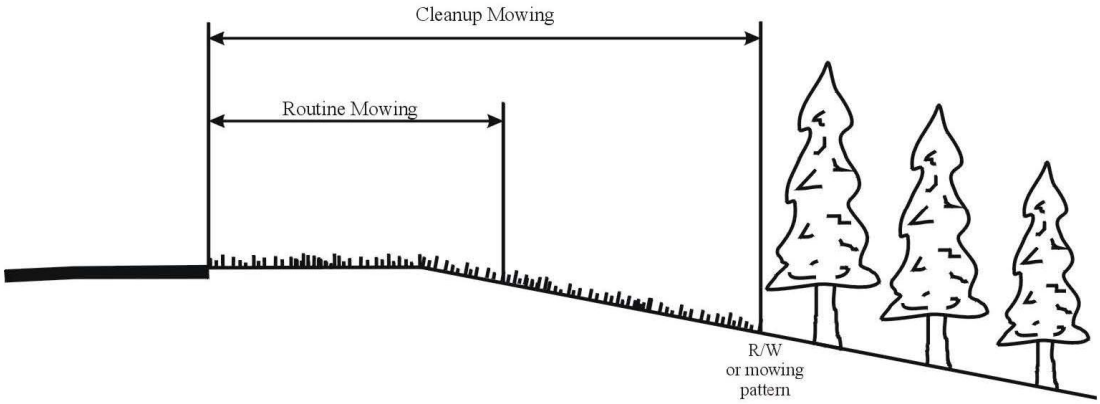


TYPICAL CUT SECTION WITH SLOPE 2:1 AND STEEPER.

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:

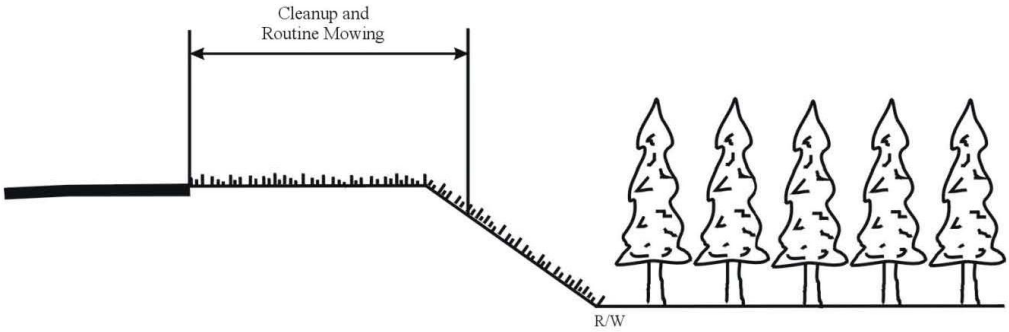


TYPICAL FILL SECTION WITH SLOPE FLATTER THAN 2:1.

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:

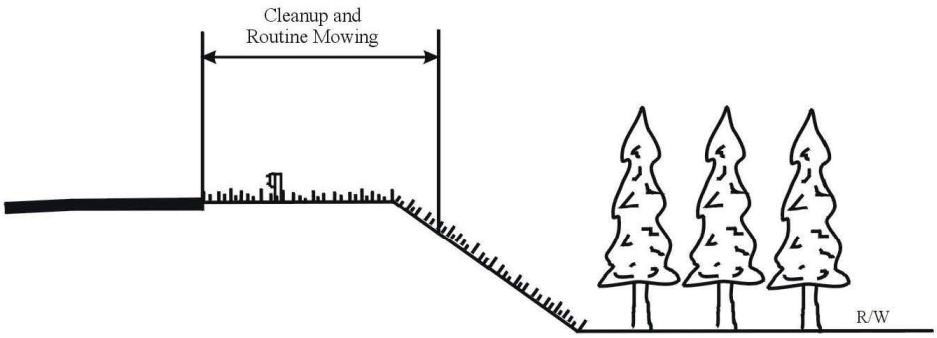


TYPICAL FILL SECTION WITH SLOPE 2:1 AND STEEPER.

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:

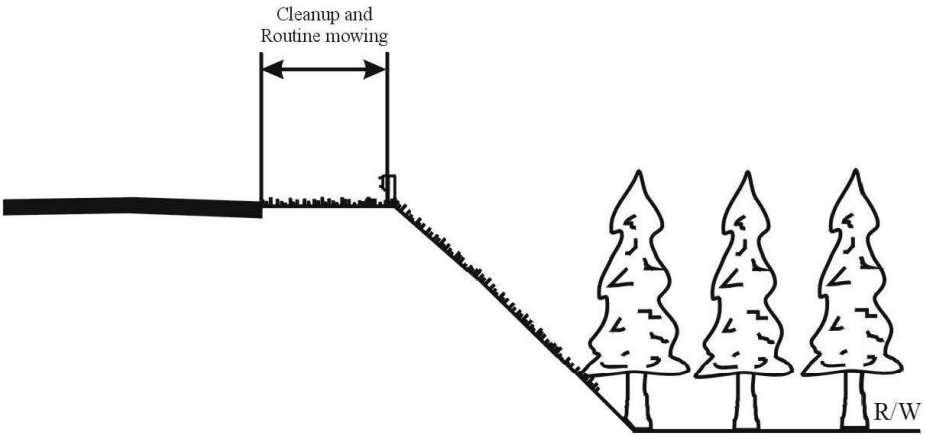


TYPICAL FILL SECTION WITH ROOM BEHIND GUARDRAIL FOR MOWER.

Routine and cleanup mow one swath behind guardrail and one swath down fill slope.

TYPICAL FILL SECTION WITH GUARDRAIL NEAR SHOULDER POINT

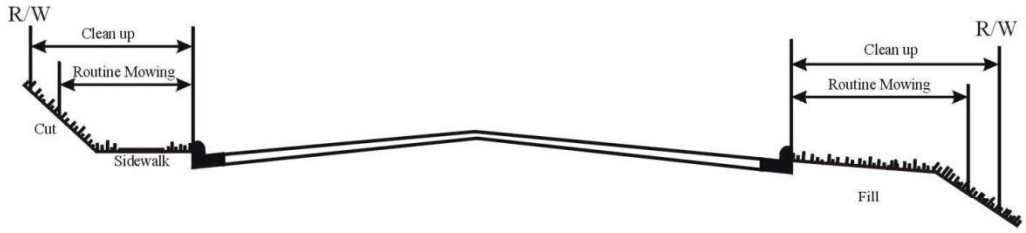
For Swath and Ditch Contracts:



TYPICAL FILL SECTION WITH GUARDRAIL NEAR SHOULDER POINT.

Routine and cleanup mow to guardrail.

Appendix A

TYPICAL CURB AND GUTTER SECTION

For Swath and Ditch Contracts: