



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

February 23, 2021

Addendum No. 1

Contract No.: C204556
WBS #: 44648.3.5, 47532.3.4, 49456.3.2, 49456.3.3 & 49456.3.4
Counties: Multiple
Project Description: Installation of Broadband Fiber along I-95 (SC border-to-VA border), US 70 from I-40 to the Morehead City Port & US 74 from I-40 near Wilmington to Asheville

RE: Addendum No. 1 to Final RFP

March 26, 2021 Letting

To Whom It May Concern:

Reference is made to the Final Request for Proposals dated February 5, 2021. We have since incorporated changes, and Addendum No. 1 to the Final RFP has been posted to the web address as follows:

https://connect.ncdot.gov/letting/Pages/Design-Build-Letting-Details.aspx?let_id=Broadband I-5986C and R-5777D

Please note that all revisions have been highlighted in yellow and are as follows:

The *Table of Contents* in Appendix Part A has been revised. Please void the *Table of Contents* in Appendix Part A and replace it with the revised *Table of Contents*.

The *ITS SCOPE OF WORK* in Part D, Part F and Appendix Part A has been revised. Please void the *ITS SCOPE OF WORK* in Part D, Part F and Appendix Part A and replace it with the revised *ITS SCOPE OF WORK*. These revisions are located on pages 15, 16 and 19 of this Addendum.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
CONTRACT STANDARDS
AND DEVELOPMENT
1591 MAIL SERVICE CENTER
RALEIGH, NC 27699-1591

Telephone: (919) 707-6900
Fax: (919) 250-4119
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
1020 BIRCH RIDGE DRIVE
RALEIGH, NC 27610

Addendum No. 1 February 23, 2021

Installation of Broadband Fiber along I-95 (SC border-to-VA border), US 70 from I-40 to the Morehead City Port & US 74 from I-40 near Wilmington to Asheville

Page 2

Page No. 319 in Appendix Part A of the *Division One of Standard Specifications* has been revised. Please void Page No. 319 and replace it with the revised Page No. 319.

If you have any questions or need additional information, I can be reached by telephone at (919) 707-6930.

Sincerely,

DocuSigned by:

F81B6038A47A442...
R. E. Davenport, Jr., PE
State Contract Officer

RED:jse

Cc: Mr. Lamar Sylvester, PE
Mr. Christopher Werner, PE
Ms. Teresa Bruton, PE

Ms. Virginia Mabry
File

TABLE OF CONTENTS

COVER SHEET

PROPOSAL SHEETS

PROJECT SPECIAL PROVISIONS	<i>PAGE NO.</i>
Contract Time and Liquidated Damages	1
Intermediate Contract Time Number 1 and Liquidated Damages	1
Intermediate Contract Time Number 2 thru 7 and Liquidated Damages	1
Intermediate Contract Time Number 8 and Liquidated Damages for Failure to Repair a Damaged NCDOT ITS Fiber Optic Communications Cable and Restore Communication	2
Intermediate Contract Time Number 9 and 10 and Liquidated Damages for Failure to Reestablish ITS Fiber Optic Communications.....	2
Intermediate Contract Time Number 11 thru 13 and Liquidated Damages for Device Downtime to Switch Over a Device Replacement.....	3
Payout Schedule	3
Mobilization.....	4
Sequence and Scheduling Restrictions	4
Special Requirements for Work in National Forests.....	6
Execution of Bid, Non-Collusion Affidavit, Debarment Certification and Gift Ban Certification.....	9
Submission of Design-Build Proposal.....	10
Confidential Questions	10
Schedule of Estimated Completion Progress.....	11
Disadvantaged Business Enterprise.....	12
Special Notice to Bidders	26
Protection of Railroad Interest (NS/NCRR)	26
Protection of Railroad Interest (CSX)	49
Protection of Railroad Interest (NS)	75
Certification for Federal-Aid Contracts.....	98
Contractor's License Requirements	99
Use of Unmanned Aerial System.....	99
U. S. Department of Transportation Hotline.....	100
Cargo Preference Act	100
Subsurface Information	101
Cooperation between Contractors	101
Bid Documentation.....	107
Twelve Month Guarantee	111
Permanent Vegetation Establishment.....	111
Erosion & Sediment Control / Storm Water Certification.....	112
Clearing and Grubbing	117
Burning Restrictions.....	117
Digital CCTV Camera Assembly.....	118

CCTV Field Equipment Cabinet.....	126
CCTV Wood Pole	132
Foundation and Anchor Rod Assemblies for Metal Poles	132
High Visibility Traffic Control Devices.....	139
Sequential Flashing Warning Lights	141
Air Terminal and Lightning Protection System.....	144
Observation Period.....	146
Junction Boxes (Limited Access Facilities)	147
Ethernet Cable.....	155
HUB Cabinet.....	157
Fiber Optic Conduit System (RGC Hanging).....	168
Conduit for Jetting Fiber.....	170
Solar Power Assembly.....	179
GENERAL	181
SCOPES OF WORK	
Structures	187
Railroad Coordination	192
Transportation Management	197
Intelligent Transportation Systems (ITS)	205
Utilities Coordination	228
Erosion and Sedimentation Control	234
Environmental Permits	248
STANDARD SPECIAL PROVISIONS	
Plant and Pest Quarantines	253
On-the-Job Training	254
Availability of Funds - Termination of Contracts.....	257
NCDOT General Seed Specifications for Seed Quality	258
Errata	261
Title VI and Nondiscrimination	262
Minority and Female Employment Requirements	272
Required Contract Provisions Federal-Aid Construction Contracts	275
General Decision Wages NC20200086 01/03/2020 NC86	284
General Decision Wages NC20200087 01/03/2020 NC87	289
General Decision Wages NC20200088 01/03/2020 NC88	294
General Decision Wages NC20200090 01/03/2020 NC90	299
General Decision Wages NC20200091 01/03/2020 NC91	304
Minimum Wages.....	309
Division One	310

PROPOSAL FORMS - ITEMIZED SHEET, ETC.

Itemized Proposal Sheet (TAN SHEET)

Listing of DBE Subcontractors

Execution of Bid, Non-Collusion Affidavit, Debarment Certification and Gift Ban
Certification

Signature Sheet

ITS SCOPE OF WORK

GENERAL

Design, furnish, and install new ITS Communications Fiber as described in this RFP. Integrate the new fiber with the existing ITS devices as well as any existing ITS fiber within the project limits. ITS devices include but are not limited to CCTV Cameras, Dynamic Message Signs and Traffic Signal Systems. Major items of work include, but are not limited to, the following:

- Approximately 600 Miles of ITS Trunk Line Fiber
- Approximately 600 Miles of ITS Device Line Fiber
- Drop Cables to Existing CCTV Cameras
- Drop Cables to Existing DMS
- Drop Cables to Existing Signal Systems
- Drop Cables to Weigh Stations
- Drop Cables to Rest Areas
- Drop Cable to Remote Weather Information System (RWIS)
- 35 ITS Fiber Hub Cabinets
- Cellular Connected Vehicle Site
- Junction boxes (Electrical and Oversized)
- Wood Poles
- Electrical service equipment

Furnish and install guardrail to protect ITS devices and ITS Fiber Hub Cabinets as required.

A pre-design meeting shall take place between the NCDOT ITS Section, the Design-Build Team, the Division 2, 3, 4, 5, 6, 8, 10, 12, 13 & 14 Traffic Engineers, the Regional ITS Engineers, Statewide Transportation Operations Center (STOC) Engineer and any other pertinent NCDOT personnel before ITS designs begins. The pre-design meeting shall, at a minimum, address equipment types, intended placement locations and scheduled installation and removal of devices. ITS Plan submittals shall only be reviewed and accepted by the NCDOT ITS Section after this pre-design meeting.

Acceptance of plans does not relieve the Design-Build Team of any obligation to design and build a complete system that meets the functional requirements of the RFP. The Design-Build Team is solely responsible for the correctness and constructability of the designs meeting all applicable standards.

The Design-Build Team shall coordinate with the Division Traffic Engineer, the Regional Traffic Engineer, the ITS Design Unit and the STOC throughout the project duration.

Prior to any underground work, locate existing utilities, communications cable, power cable, and adjust work activities to protect these facilities. Immediately cease work and notify the Engineer and the affected owners if damage to existing utilities occurs. Repair damages to existing utilities, communications cable, and / or power cable at no cost to the Department.

Furnish and install all equipment and perform all work in accordance with ITUT, IEEE and TIA standards as well as in accordance with the relevant ITS Project Special Provisions found elsewhere in this RFP, the 2018 NCDOT *Standard Specifications for Roads and Structures*, the 2018 NCDOT *Roadway Standard Drawings* and the *ITS & Signals Generic Project Special Provisions Version 18.3* or the latest version at the time of letting found at the following website:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

➤ **Communications**

Design, furnish and install the field-to-center communication network using Fiber-optic cable. For all equipment not specified herein, provide product specifications for the Department's review and approval prior to incorporation. Furnish and install all new field equipment within the project limits.

The Department will furnish all cellular modems used on the project. The Design Build Team shall request the modems through the Engineer at least eight (8) weeks prior to scheduled installation.

The MCAS property that lies between Holly Drive and Jackson Drive in Havelock must be avoided. The fiberoptic cable must be installed within NCDOT right-of-way in the grassy median between Mimosa Drive and US Highway 70 west, where there is an existing line of trees and power poles.

The conduit shall be placed at a location which will avoid conflicts with future roadway widening (8-lane typical) within Control-of-Access areas. All other conduit shall be placed within the existing right-of-way to the farthest, most outer edge of right-of-way, while being in compliance with all environmental permits and minimizing utility impacts to the greatest extent possible.

The Design-Build Team shall place the conduit and trunk lines at all interchanges, up and down interchange ramps to avoid future relocations. Boring underneath overpass structures at interchanges will not be allowed.

NCDOT 144-Fiber Trunk Line

Design, furnish and install a minimum 144-fiber trunk line that runs between ITS hub cabinets. This trunk line is to run expressed between hub cabinets and should not be cut or spliced unless necessary for fiber installation purposes. All 144 fibers are to be terminated in a fiber-optic interconnect center in each hub cabinet and jumpered through. Label this 144-fiber cable and its interconnect centers "NCDOT ITS TRUNK LINE" in all junction boxes and hub cabinets. Store 50 feet of spare Trunk cable in each junction box and hub cabinet.

ITS devices should NOT be spliced into this 144-fiber trunk line. See the ITS Device Line concept drawing included in this RFP for additional information.

NCDOT 144-Fiber ITS Device Line

Design, furnish and install a separate minimum 144-fiber ITS device line that runs between hub cabinets and connects all ITS devices between the hub cabinets. These devices are listed later in this RFP. All 144 fibers are to be terminated in a fiber-optic interconnect center in each hub cabinet and jumpered through. Label this 144-fiber cable and its interconnect centers “NCDOT ITS DEVICE LINE” in all junction boxes and hub cabinets. Store 50 feet of spare Trunk cable in each junction box and hub cabinet. See the ITS Device Line concept drawing included in this RFP for additional information. Device line buffer tubes should be assigned as follows:

- CCTV, DMS, Signal Systems and other NCDOT facilities starting in Blue Buffer Tube
- Rest Areas in the Aqua buffer tube
- Weigh Stations in the Rose buffer tube

NCDOT 12-Fiber Drop Cable

Design, furnish and install 12-fiber drop cables from the ITS Device Line fiber to each ITS device in the project limits. Drop cables should be spliced into the ITS Device Line with a splice enclosure and terminated in the ITS device cabinet with a fiber-optic interconnect center. Drop Cables for devices that are co-located with, or within 100 feet, of a hub cabinet may be terminated in a fiber optic interconnect center in the hub cabinet. Label these 12 fiber drop cables and their interconnect centers “<DEVICE ID> DROP CABLE” in all junction boxes and hub cabinets. Store 50 feet of spare Drop cable in each junction box and ITS device cabinet.

NCDOT ITS Fiber Hub Cabinet

Design, furnish and install ITS Fiber Hub Cabinets as specified in the project special provisions and detail drawings included with this RFP. Hub cabinets should be climate controlled NEMA 4, 340 ITS cabinets adequately sized to accommodate all electrical equipment and communications equipment including but not limited to four (4) minimum 144-fiber interconnect centers, one (1) Ethernet hub switch, one (1) UPS and the cabinet air conditioning system. Approximate hub cabinet locations are as follows:

- NC/VA state line – HUB 13
- I-95 exit 173 – HUB 12
- I-95 exit 160 - HUB 11
- I-95 exit 138 (US 64) – HUB 10
- I-95 exit 119 (US 265/I-795) – HUB 9
- I-95 south of exit 97 (US 70 BYP) – HUB 8
- I-95 exit 81 (I-40) – HUB 7
- I-95 exit 73 (US 421) – HUB 6
- I-95 exit 56 (Bus 95) – HUB 5
- I-95 exit 38 (Future I-295) – HUB 4
- I-95 exit 22 – HUB 3
- I-95 exit 13 (I-74) – HUB 2

- NC/SC state line – HUB 1
- US 70 Bypass at I-40 and NC 540 – HUB 14
- US 70 at I-795 (Goldsboro) – HUB 15
- US 70 at Harvey Parkway (Kinston) – HUB 16
- US 70 at Trenton Rd. (MM 400) – HUB 17
- US 70 at S. Glenburnie Rd. (New Bern) – HUB 18
- US 70 at Slocum Rd. (Havelock) – HUB 19
- US 70 at NC Port (Morehead City, North side of road just before the Newport River Bridge) – HUB 20
- US 74 at I-140 (Wilmington) – HUB 21
- US 74 at NC 211 (Bolton) – HUB 22
- US 74 at US 76 – HUB 23
- I-74 at US 501 (Laurinburg) – HUB 24
- US 74 at US 1 (Rockingham) – HUB 25
- US 74 at US 52 (Wadesboro) – HUB 26
- US 74 at US 74 BYP (Monroe Expy East) – HUB 27
- I-485 at I-77 (Existing Node 20*) – HUB 29
- I-485 3300' North of I-85 South Interchange (Existing NCDOT Hub 6) – HUB 30
- I-85 at US 74 Interchange – HUB 31
- US 74 at US 74 BYPASS (Shelby) – HUB 32
- US 74 at US 221 (Forest City) – HUB 33
- US 74 at I-26 Interchange – HUB 34
- I-26 at US 64 (Hendersonville) – HUB 35
- I-26 at I-40 Interchange (Existing NCDOT Splice Cabinet*) – HUB 36

* - Existing hub to be replaced per this Scope of Work.

HUB numbers are for the purposes of this project only. Do not mark the HUB cabinets with these numbers. HUB 28 was intentionally skipped in the numbering.

HUB 8 at I-95 exit 97 (US 70) will have 2 backup ISP circuits installed by DIT. The design build team shall coordinate with the engineer and DIT to facilitate the installation of these circuits during the installation of this hub cabinet.

HUBs 1, 13, 20, 21, 27, 29 & 36 will be the end points of the fiber at these ends of the project. The fiber trunk lines will terminate in these hub cabinets in fiber-optic interconnect centers. The design-build team shall loop all fibers of each trunk cable back with jumpers in these interconnect centers in a manner that creates a continuous loop. (Example: Blue buffer tube, loop fiber 1 back to fiber 3, fiber 2 back to fiber 4, etc.)

Existing ITS Integration Locations

US 70 Bypass at I-40

The ITS hub cabinet at US 70 Bypass and I-40 will connect to the 144-fiber ITS cables along I-40 (running north and south installed under I-5111) and to existing 144-fiber ITS cable along

NC-540 (running west, installed under R-2828). The design build team shall extend these 3 cables into the new hub cabinet along with the two new 144-fiber Trunk lines installed under this project and terminate all 144 fibers of each cable in a fiber-optic interconnect center. Jumper the two 144-fiber I-40 cables through and loop the two new 144-fiber cables back with jumpers.

U-5713/R-5777A&B

U-5713/R-5777A&B will install 4x two-inch conduits and 1x 144-fiber cable along US 70 in James City from Thurman Rd. to north of Elder St. The design-build team may use this existing conduit and fiber as the ITS Device Line. The design build team shall be responsible for ensuring conduit and fiber are usable and shall be responsible for any repairs needed to use this fiber. The design-build team shall resplice the existing cable as needed to follow the same configuration as the rest of the fiber installed under this project.

US 74 at I-140

The Design-Build team shall install new HUB 21 at the US 74 & I-140 interchange. Route the Existing 72-fiber cable running both directions along I-140 and the existing drop cables into the new hub cabinet and terminate all fibers of each cable in separate interconnect centers.

I-95

US 74 fiber will tie into the I-95 fiber at HUB 2.

HUB 29 (Existing Node 20)

The Design-Build team shall replace existing Node 20 at I-485 and I-77 with new INFRA HUB 29. Route the 144-fiber NCDOT cable from the east and the 12-fiber NCTA drop cable (both installed under I-5507) as well as the two new 144-fiber cables from the west into this hub cabinet. Terminate all fibers of each cable in separate interconnect centers and jumper them through.

HUB 30 (Existing HUB 6)

The Design-Build team shall route all four 144-fiber cables, two from I-85 to the west and two from I-485 to the south, into existing NCDOT HUB 6 roughly 3300 feet north of the I-85/I-485 interchange. Terminate all fibers of all four cables in separate interconnect centers in the existing racks and jumper them through.

Forest City HUB Cabinet

The Design-Build team shall run a 48-fiber cable in a separate conduit from new HUB 33 to the DIT Data Center at 1371 Old Caroleen Rd Forest City, NC 28043. Terminate all 48 fibers in an interconnect center in HUB 33 and in the existing racks in the Data Center. Coordinate with DIT to identify building entrance and existing rack location for the fiber.

HUB 36

The design-Build Team shall replace the existing splice cabinet located at the I-26 & I-40 interchange (installed under I-4700) with a new INFRA hub cabinet. The design build team shall maintain all existing communications equipment located in this cabinet.

Hub Ethernet Switch

Hub switches shall be installed in each hub cabinet according to the Project Special Provisions and detail drawings included with this RFP. Hub switches shall be procured, programmed and installed by the Department of Information Technology (DIT). Contact the Engineer to request the hub switches from DIT 4 weeks in advance of installation. Allow one week for DIT to install each hub switch and limit requests to no more than 3 hub switches at a time unless otherwise instructed by the engineer or DIT.

Field Ethernet Edge Switch

Ethernet edge switches will be furnished, installed, and programmed by the design build team. DIT will provide the edge switch programming information to the Design build team. Design build team will provide Ruggedcom model RS900G or Comnet model CNGE11FX3TX8MS edge switches with minimum 2 100/1000 Base X fiber-optic ports and 4 copper RJ45 ports.

Ensure that all fiber-optic ports operate at 1310 or 1550 nanometers in single mode. Design all SFP ranges according to the actual distance between devices in the field. Provide Type LC connectors for the optical ports. Do not use mechanical transfer registered jack (MTRJ) type connectors. Ensure that each optical port consists of a pair of fibers; one fiber will transmit (TX) data and one fiber will receive (RX) data. Ensure that the optical ports have an optical power budget of at least 15 dB. NCDOT utilizes a “2-fibers in 2-fibers out” network design from device to device.

Ensure all copper ports are RJ-45 and auto-negotiate speed (i.e., 10/100/1000 Base) and duplex (i.e., full or half). Ensure that all are compliant with the IEEE 802.3 standard pinouts.

➤ **CCTV Cameras**

Design, furnish and install fiber-optic drop cables, fiber-optic interconnect centers and field ethernet switches to the existing CCTV locations listed below.

- I-95 Exit or Mile Marker near:

180 (Analog)	73 (I-5986B)
173 (Analog)	Exit 72 (I-5986B) *
171 (Analog)	71 (Analog)
168 (Analog)	70 (I-5986B)
160 (Analog)	MM 68 on DMS (I-5986A)
154 (Analog)	65 (I-5986A)
150 (Analog) on DMS	MM 64 on DMS (I-5986A)
145 (Analog)	61 (I-5986A)
141 (Analog) Solar	MM 61 on DMS (I-5986A)
138 (Analog) Solar	MM 60 (I-5986A)
132 (Analog) Solar	MM 59 on DMS (I-5986A)

127 (Analog)	58 (I-5896A)
121 (Analog)	MM 58 on DMS (I-5986A)
119 (Analog) *	56 (I-5986A)
116 (Analog)	55 (I-5986B)
107 (Analog)	52 (Analog) -Critical-
102 (Analog)	49 (Analog)
97 (Analog)	46 (2 CCTV locations)
95 (Analog)	(Analog) *
90 (Analog)	41 (I-5987)
87 (Analog)	40 (I-5987)
81 (2 CCTV locations)(I-5986B)	MM 37 (I-5987)
* -Critical-	MM 34 (I-5987)
79 (I-5986B) *	33 (I-5987)
MM 78 (I-5986B)	31 (I-5987) (2 CCTV locations)
77 (I-5986B)	30 (I-5987)
MM 76 (I-5986B)	28 (I-5987)
75 (I-5986B)	25 (I-5987)
MM 74 (I-5986B)	MM 24 (I-5987)MM 23 (I-5987)
	22 (I-5987)
	21 on DMS (I-5987)
	20 (I-5987)
	19 (I-6064)
	17 (I-6064)
	13 (I-6064) (2 CCTV locations)

- US 70 Exit or Mile Marker:

MM 319(Analog)	70 Bypass exit 361(Digital)
MM 320(Analog)	70 Bypass exit 364(Digital)
MM 323(Analog)	70 Bypass exit 370(Digital) Solar
MM 326(Analog)	MM 416(Analog)
70 Bypass exit 350(Digital) Solar	US 70 at US 17(Analog) Solar
70 Bypass exit 351(Digital)	US 70 at Williams Rd.
70 Bypass exit 355(Digital) Solar	(Digital)(R-5777A&B)
70 Bypass exit 356(Digital) Solar	US 70 at Grantham Rd. (Digital)
70 Bypass exit 358(Digital)	(R-5777A&B)
	US 70 at Taberna Way. (Digital)
	(R-5777A&B)
	US 70 at Thurman Rd. (Digital)
	(R-5777A&B)
	US 70 at NC 24(Analog)
	US 70 at Atlantic Beach
	Bridge(Analog)

- US 74 Exit or Mile Marker

US 74 at I-140	US 74 at Exit 170
US 74 at US 701	I-26 at MM 64.5
US 74 West of MM 225 (R-5797)	

I-74 at Exit 213	I-26 at Exit 59 (Green River Bridge Project)
I-74 at Exit 210	I-26 West of Green River Bridge (Green River Bridge Project)
I-74 at Exit 203	I-26 at US 25 (Green River Bridge Project)
I-74 at Exit 200	I-26 at Exit 53 (I-4400)
I-74 at Exit 194	I-26 at Tracy Grove Rd. (I-4400)
I-74 at MM 192	I-26 at Exit 49 (I-4400)
I-485 at NC-49/Tryon St.	I-26 North of Clear Creek Rd. (I-4400)
I-485 at Exit 3	I-26 North of Brookside Camp Rd. (I-4400)
I-485 at Exit 4	I-26 near Naples Rd. (I-4400)
I-485 at Exit 6	I-26 at Exit 44 (I-4400)
I-485 at MM 6	I-26 at MM 41 (Weigh Station)(I-4400)
I-485 at MM 7	I-26 at Exit 40 (I-4700)
I-485 at Exit 9	I-26 at Glen Bridge Rd. (I-4700)
I-485 at Exit 10	I-26 at Exit 37 (I-4700)
I-85 Exit 29	I-26 at Blue Ridge Parkway (I-4700)
I-85 at MM 28	I-26 at MM 35 (I-4700)
I-85 at exit 27	I-26 at Ferry Rd. (I-4700)
I-85 at exit 26	I-26 at Exit 33 (I-4700)
I-85 at MM 24	I-26 at MM 32
I-85 at Exit 23	
I-85 at Exit 22	
I-85 at Exit 21	
I-85 at Exit 20	
I-85 at Exit 19	
I-85 at Exit 17	
I-85 at Exit 14	
I-85 at Exit 13	

Assume all US 74 corridor CCTVs not being installed by a current project are Analog.

Replace all existing analog cameras listed above with new digital cameras in accordance with the Project Special Provisions included with this RFP. Return all removed equipment to the engineer.

Camera locations with a project number denoted (I-5986A & B, I-5987A & B, I-6064) are to be installed or replaced as part of those projects. The design build team will be responsible for coordinating with those projects on installing fiber drops and ethernet edge switches once the devices are installed.

Install a field ethernet edge switch in all existing CCTV cabinets listed above. CCTVs that are mounted on a DMS structure may share a switch and cabinet with the DMS.

The list above is as accurate as possible as of the date of this RFP. Any CCTV upgrades, Drop Cables or Ethernet Edge Switches needed shall be provided at no additional cost for up to 10 additional CCTV cameras.

For the existing solar sites listed above replace the existing solar assembly with all new hardware in accordance with the Project special provisions included with this RFP. Return the existing solar assembly equipment to the engineer. Existing equipment cabinets, solar mounting brackets and battery cabinets may be reused with the approval of the engineer. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the 2018 NCDOT *Standard Specification for Roads and Structures*, the Project Special Provisions, and all local ordinances.

Design, furnish and install new CCTV camera assemblies, equipment cabinets, electrical services, solar power assemblies, wood poles, fiber-optic interconnect centers, Ethernet edge switches and fiber optic drop cables at the following locations:

- I-95 Exit:

176	38 (2 CCTV locations) Solar
106	22
105	10
101	7 Solar
98 Solar	2
97	1
44	

- US 70:

US 70 Bypass at I-795 - Solar	Exit 409
Exit 372	Exit 411 - Solar
US 70 at Washington St.	US 70 at S Glenburnie Rd.
US 70 at NC-148 - Solar	US 70 at Old Airport Rd.
US 70 at NC 58	

- US 74

US 74 at NC 87	US 74 at Williams/Harmon Rd.
US 74 at Exit 258 (NC 211)	US 74 Bypass at Exit 199 (NC 226)
US 74 at Exit 244 (BUS 74)	US 74 Bypass at Exit 197 (Washburn Switch Rd.)
US 74 at Exit 233 (NC 410)	US 74 at US 74 Bypass (West)
US 74 at Exit 228 (NC 242)	US 74 at Exit 193
I-74/US 74 at Exit 311 (US 1)	US 74 at US074 BUS (Mooresboro)
US 74 at Exit 306 (US 74 BUS)	US 74 West of Exit 163 (In Curve)
US 74 at Pee Dee River (East side)	US 74 at Exit 161
US 74 at Pee Dee River (West Side)	I-26 at MM 63.5
I-85 at MM 11.5 (Weigh Station)	I-26 at MM 62
I-85 at Exit 10A	I-26 at MM 60
I-85 at Exit 10B	

--	--

Determine the exact location of each CCTV camera, obtain the Engineer’s written approval of the locations, and install the cameras. All components required for the CCTV installations shall be new. Furnish site surveys, including but not limited to bucket truck surveys or drone surveys, to ensure camera coverage areas are acceptable.

Furnish and install new electrical service equipment at all new CCTV locations. Install solar power assembly equipment at the sites identified above as “solar”. New solar CCTV locations do not require a UPS in the cabinet. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the 2018 NCDOT *Standard Specification for Roads and Structures*, the Project Special Provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer.

For new CCTV camera sites listed as “2 CCTV locations” or existing CCTV camera sites where a second camera is being installed the design-build team shall install these new cameras on separate poles with separate cabinets in locations that give the greatest combined view of the interchange or location between all cameras at the site.

The Design-Build team shall maintain CCTV communications with existing cell modems (or replacement cell modems supplied by the department) until they are ready to be switched over to the fiber network and communicate with the STOC via fiber. If a replacement cell modem is needed allow 8 weeks lead time for the department to supply the modem.

➤ **Dynamic Message Signs (DMS)**

Design, furnish and install fiber-optic drop cables, fiber-optic interconnect centers and field ethernet switches to the existing DMS locations listed below.

I-95 DMS Locations:	US 70 DMS Locations:	US 74 DMS Locations:
<ul style="list-style-type: none"> • MM 177 • MM 175 • MM 174 • MM 172 • MM 157.5 • MM 150 • MM 142 • MM 134 • MM 124.5 • MM 114.5 • MM 102 • MM 101 • MM 92 -Critical- • MM 85 -Critical- 	<ul style="list-style-type: none"> • MM 319 • MM 322 -Critical- • MM 323 • MM 328 -Critical- • MM 349.5 • MM 352.5 • MM 358 • MM 372 • MM 416 • Front Street SB at US 17/US 70 • MM 418 -Critical- 	<ul style="list-style-type: none"> • US 74 West of Malmo Loop Rd. (dual DMS) • US 74 WB MM 365.5 • US 74 West of MM 225 (2 DMS locations) (R-5797) • I-74 WB MM 208 • I-74 WB MM 203 • I-74 EB MM 198 • I-74 EB MM 191 • US 74 East of Exit 273 • I-485 MM 2 • I-485 MM 7 • I-85 MM 28 • I-85 MM 27

<ul style="list-style-type: none"> • MM 78 (Dual DMS) (I-5986B) -Critical- • MM 71 • MM 68 (I-5986A) • MM 64 (I-5986A) • MM 61 (I-5986A) - Critical- • MM 59 (I-5986A) • MM 58 (I-5986A) • MM 53 • MM 49 • MM 44 • MM 38 • MM 34 • MM 31 • MM 27 • MM 21 (I-6064) (Dual DMS) • MM 16 (I-6064) • MM 9 Critical 		<ul style="list-style-type: none"> • I-85 MM 15 • I-26 MM 50 • I-26 at Brookside Camp Rd. (I-4400) • I-26 MM 41 (I-4400) • I-26 North of NC 280 (I-4700) • I-26 North of Glen Bridge Rd. (I-4700) • I-26 at Ferry Rd. (I-4700) • I-26 South of NC 191 (I-4700)
--	--	--

Install a field ethernet edge switch in all existing DMS cabinets listed above that do not already have one in accordance with the Project Special Provisions included with this RFP. Return all removed equipment to the engineer.

DMS locations with a project number denoted (I-5986A & B) are to be installed or replaced as part of those projects. The design build team will be responsible for coordinating with those projects on installing fiber drops and ethernet edge switches once the devices are installed.

The list above is as accurate as possible as of the date of this RFP. Any Drop Cables or Ethernet Edge Switches needed shall be provided at no additional cost for up to 4 additional DMS sites.

➤ Signal Systems

Design, furnish and install fiber-optic drop cables to the existing closed loop signal systems listed below. Terminate the drop cable in a fiber-optic interconnect center and install a field ethernet switch in the closest signal cabinet to the I-95, US 70 or US 74 trunk lines. Signal inventory numbers listed are potential closest cabinets. DO NOT connect the ethernet switch to the signal controller. Upon termination of the fiber-optic drop cable in the signal cabinet and installation of the edge switch, no further work will be required.

<p>I-95 Signal Systems:</p> <ul style="list-style-type: none"> • D06-18_Lumberton 06-0344, 06-0345 • D04-13_Roanoke Rapids 04-1176, 04-1177 • D04-19_Selma 04-0962, 04-0562 • D04-20_Benson 04-0209, 04-0218 • D04-07_Smithfield 04-0804 • D04-21_Kenly 04-0224 • D04-22_Roanoke Rapids 04-0364, 04-0365 • D06-02_Dunn 06-0762, 06-0766 • D06-17_Lumberton 06-0375, 06-0531 	<p>US 70 Signal Systems:</p> <ul style="list-style-type: none"> • D02-01_Havelock 02-0563 • D02-04_Newport 02-0305 • D02-08_James City 02-0197*, 02-0914* • D02-11_Morehead City 02-0252 • D02-12_Morehead City 02-0149 • D02-13_Morehead City 02-0491 • D02-14_New Bern 02-0428, 02-0625 • D02-15_New Bern 02-0356, 02-0775 • D02-22-TBS_New Bern 02-0767, 02-0766 	<p>US 74 Signal Systems:</p> <ul style="list-style-type: none"> • D03-34 Malmo 03-1070, 03-1076 • 03-0170 Isolated Signal • D06-06 Lumberton 06-1262, 06-1263 • D08-01 Laurinburg 08-0392 • 08-0867 Isolated Signal • 08-0216 Isolated Signal • D10-37 Wadesboro 10-0371 • D10-35 Marshville 10-1683 • D12-09 Belmont 12-0158, 12-0985 • D14-08_Flat Rock 14-0932 • D14-01_Hendersonville 14-0736 • D14-05_Fletcher 14-0901 • D13-06_Ashville 13-0814 • D13-02_Ashville 13-0646
--	--	---

* Installed under R-5777A&B projects, tie both signals into the device trunk line.

The list above is as accurate as possible as of the date of this RFP. Any Drop Cables or Ethernet Edge Switches needed shall be provided at no additional cost for up to 10 additional Signal locations.

➤ Cellular Connected Vehicle Site

Design, furnish and install a Cellular Connected Vehicle site at the locations listed below in accordance with the functional requirements listed below. Design, furnish and install a fiber-optic drop cable and field ethernet switch at this site for communications. DO NOT connect the CV system to the edge switch unless instructed to by the Engineer and DIT. The Design-build team shall provide four (4) training sessions for up to 15 people each on the setup, programming, and operation of the connected vehicle system.

- I-95 at I-795

- I-95 at US 70
- I-95 at I-40
- US 70 Bypass at I-40
- US 70 at I-795

The CV System shall have the following minimum requirements:

- a. The system shall provide CV applications to mobile phones via cellular communications.
- b. The system shall provide TIMs messages to mobile phones with the proper application open and running via a cloud-based system.
- c. The system shall support MAP files that determine the approaches and individual lanes and in turn provide TIMs Messages. An approaching vehicle should only receive the messages that relate to their approach or lane.
- d. The system shall use the GPS position of the vehicle/smart phone to determine when to provide the TIMs information.
- e. A web-based configuration utility for easy editing of the MAP information and programming of TIMS messages that is workable on any modern web browser.
- f. The CV system must be able to be accessed and programmed remotely.
- g. The CV TIMs messages shall be programmable, customizable and provide audible alerts for the end users.
- h. The CV system setup shall require username and password to log on.
- i. The CV system should have the latest authentication and protection measurements to secure public safety, privacy and the integrity of data/information.
- j. The CV system shall have policies for accessing and sharing data, measurements to protect Data Privacy, security and Intellectual Property.
- k. The CV System shall meet all current FCC requirements and licenses.
- l. The CV system shall meet all applicable requirements of USDOT RSU Standard 4.1 and NCTIP 1218 v01. The RSU shall be certified by OmniAir Consortium.
<https://omni-air.org/>
- m. The hardware must be field hardened and contained in a NEMA 4X cabinet properly sized for all CV, power and communications equipment (may be located in existing equipment cabinet as long as it does not affect the operation of the existing equipment).
- n. Hardware and cabinet should be mounted on a fifty-foot (50') wood pole. Pole and cabinet installation, power and grounding requirements shall follow the same NCDOT requirements as CCTV cameras.
- o. The hardware must be capable of being upgraded to support the future 5G cellular communications.
- p. Issue real time alerts via SMS and email to the appropriate response personnel immediately when a fault occurs.

- q. The field device must be capable of receiving software and security updates remotely without having to physically go to the field devices.
- r. Cellular connectivity for the system should be included with the hardware for a minimum of 5 years.
- s. The hardware shall be under warranty for the same period of time as the cellular connectivity mentioned above.
- t. The CV System should be easy to maintain, replace and have continued technical support.
- u. The “over the air” updates shall have the ability to add new connected vehicle functionality and keep the units up to date within SAE J2735 standards to support future connected vehicle communication protocols.
- v. The CV System shall support the following minimum applications:

Minimum Requirements:

1. RSU to Phone Applications
2. RSU to Vehicle Applications
3. Visual display and audible alerts to users through the mobile application
4. Virtual Wrong Way detection
5. DMS Annunciation
6. Congestion Alerts
7. Accident/Incident Alerts
8. Work Zone Alert

The Design-Build team **setup all of these applications at each CV location for all lanes of travel and** shall demonstrate each of these applications as part of the testing and acceptance of the CV system.

The CV system must be submitted to the Department for review and approval before it can be installed.

➤ **Remote Weather Information System**

- Design, furnish and install a fiber-optic drop cable to the existing Remote Weather Information System listed below. Terminate the drop cable in a fiber-optic interconnect center and install a field ethernet switch in the device equipment cabinet. DO NOT connect the field ethernet switch to any existing communications equipment in the cabinet. I-95 near MM 174.5 – Roanoke River Bridge.

➤ **Traffic Count Station**

Design, furnish and install a fiber-optic drop cable to the existing Traffic Count Station listed below. Terminate the drop cable in a fiber-optic interconnect center and install a field ethernet switch in the device equipment cabinet. DO NOT connect the field ethernet switch to any existing communications equipment in the cabinet.

- I-95 North near MM 86

➤ Weigh Stations & Rest Areas

Design, furnish and install fiber-optic drop cables to the Weigh Stations and Rest Areas listed below. Terminate the drop cable in a new fiber-optic patch panel in the existing network racks at each weigh station and install a new network rack at each Rest Area. DO NOT connect the patch panel to any existing communications equipment in the Weigh Station or Rest Area. For Rest Areas that do not have an existing network rack, work with the Authority having jurisdiction over those premises to identify a pathway into the facilities to terminate the fiber-optic drop cable. Termination of the fiber-cable drop cable shall be in fiber-optic interconnect center in an equipment rack or enclosure approved by the engineer. Upon terminating the drop cable in the appropriate location, no further work will be required.

All work associated with adding conduit and piping into the Weigh Stations and/or Rest Stop facilities shall adhere to NEC and NESC codes and all local jurisdictional work requirements and be subject to inspections by the Authority have jurisdictional control.

I-95 South Bound MM 181	Weigh Stations
I-95 North and South Bound MM 142	I-95 North and South Bound MM 151
I-95 North and South Bound MM 99	I-95 North and South Bound MM 24
I-95 North and South Bound MM 48	I-85 North and South Bound MM 28
I-95 North Bound MM 5	I-85 North Bound MM 12
I-26 East and West Bound MM 41.5	I-26 North and South Bound MM 41

MATERIALS & CONSTRUCTION

Furnish and install new materials and hardware unless stated otherwise elsewhere in this RFP. Adhere to the requirements of the ITUT, IEEE and TIA standards as well as the 2018 NCDOT *Standard Specifications for Roads and Structures*, the 2018 NCDOT *Roadway Standard Drawings*, the *ITS & Signals Generic Project Special Provisions Version 18.3* or latest version at time of letting and the project special provisions included with the RFP.

➤ CCTV Cameras

Install each stand-alone CCTV camera on a 60-foot Class 3 wood pole. Install CCTV equipment in a 336 equipment cabinet mounted on the pole. Install the following minimum equipment in each CCTV equipment cabinet:

- Power equipment including power supplies, circuit breakers, surge protectors, and other related materials.
- New solar assembly at existing and new CCTV locations identified above.
- Ethernet Edge Switch
- Fiber-optic Interconnect center with a 20' slack loop of spare drop cable.

Perform all work in accordance with the applicable Project Special Provision found elsewhere in this RFP, and other standards listed elsewhere in this RFP.

➤ **Conduit**

○ **Power Conduit**

Furnish and install conduit (for power) and all necessary hardware by trenching, plowing or directional drilling in accordance with Section 1715 of the 2018 NCDOT *Standard Specifications for Roads and Structures* for installing the power service to the ITS devices. Conduit shall not be placed in the median or under the roadway, except for lateral traverse crossings. (Reference the Electrical Service Section below)

○ **Communications Conduit**

Main Trunk Line Conduit – Furnish and install:

- Two (2) – 1.25-inch conduits for NCDOT communications trunk lines.
 - One Blue conduit for the minimum 144-fiber ITS Trunk Line
 - One Orange conduit for the minimum 144-fiber ITS Device Line
- Minimum One (1) – 1.25-inch conduit for possible future commercialization.
 - One Green conduit with pull tape.

*Note pull tape requirement does not apply if a commercialization track is selected. *

Drop Cable Conduit – Furnish and Install

- Two (2) 1.25-inch conduits for NCDOT drop cables passing under the roadway
 - One (1) 1.25-inch conduit for NCDOT drop cables not passing under the roadway
- Drop cable conduits shall be White.

Furnish and install conduit and all necessary hardware by trenching, plowing or directional drilling in accordance with the Project Special Provisions included with this RFP for installing fiber-optic conduit to the ITS devices. Conduit shall not be placed in the median or under the roadway, except for perpendicular crossings. Seal all conduits with mechanical sealing devices as described in the Project Special Provisions included with the RFP.

Bundled 1.25-inch conduits are allowed for NCDOT use as long as they meet all specifications and requirements stated in this RFP.

Split NCDOT 1.25” conduit and any spare/commercialization conduits into separate junction boxes at the top of interchange ramps on one side of the crossing street. All conduits may share junction boxes between interchanges.

The Design-Build Team shall be responsible for providing 811 services for newly constructed segments of infrastructure until NCDOT has accepted the infrastructure. The Track 1a Contractor shall notify the Track 1b Contractor one (1) month in advance of acceptance testing to enable the Track 1b Contractor one (1) month to prepare for NC811 work to be performed. The Track 1b Contractor will be responsible for providing NC 811

services for new construction infrastructure immediately following acceptance by NCDOT of Track 1a construction segments as identified in the Track 1a scope of work.

➤ **Junction Boxes**

○ **Electrical**

Furnish and install “Tier 22” junction boxes (pull boxes) for electrical services with all necessary hardware in accordance with Limited Access Junction Box specifications included with this RFP. Provide standard size junction boxes accordance with Limited Access Junction Box specifications for electrical service. Electrical junction boxes within 6 feet of the meter base or the ITS device with should be protected with a concrete collar/skirt of 8-inch depth, 12 inches wide all around, and flush with the top surface. Electrical junction boxes between the meter base and the ITS device should be buried 6”-8” below grade in accordance with the project special provisions included with this RFP. Install electrical junction boxes at maximum intervals of three hundred (300) feet or at locations where underground splicing is necessary. For concrete collar/skirt requirements reference the “Junction Box (Limited Access facilities)” Project Special Provisions and Junction Box detail drawings included with this RFP. Install locate balls and delineator markers at all electrical junction boxes in accordance with the special provisions included with this RFP.

DO NOT bury junction boxes until all appropriate inspections have been conducted.

Provide junction box covers with standard “Electric” logo, pull slots and stainless-steel pins.

○ **Communications**

Furnish and install junction boxes (pull boxes) with all necessary hardware in accordance with the Project Special Provisions included with this RFP. Provide Tier 22 load rated junction boxes accordance with Limited Access Junction Box specifications, with “mouse holes” to accommodate horizontal conduit entrances into the junction box for fiber installations.

For communications junction boxes installed at the top of exit ramps or within 6 feet of an ITS device, install a concrete collar/skirt of 8-inch depth, 12 inches wide all around, and flush with the top surface grade. For concrete collar/skirt requirements reference the Project Special Provisions and Junction Box detail drawings included with this RFP.

For communications junction boxes installed between interchanges and further than 6 feet from an ITS device bury the junction box 6”-8” below grade in accordance with the project special provisions included with the RFP. Install locate balls and delineator markers at all communications junction boxes in accordance with the special provisions included with this RFP.

DO NOT bury junction boxes until all appropriate inspections have been conducted.

Provide Tier 22 junction box covers with standard “NCDOT Fiber Optic” logo, pull slots and stainless-steel pins.

Space trunk line junction boxes roughly 1500 feet apart between interchanges.

Install communications junction boxes at the base of each ITS device pole/cabinet and at each hub cabinet within six feet.

Every junction box shall house 50 feet of spare cable for each NCDOT cable entering the junction box.

Every junction box with a splice enclosure shall house 50 feet of spare cable for each direction of the cables being spliced. (i.e. 50 feet of spare trunk line in each direction and 50 feet of spare of each drop cable)

Ground all tracer wires in junction boxes designated for communications fiber in accordance with the “Junction Boxes (Limited Access facilities)” PSP and details drawings included with this RFP.

Communications cables and power cables shall NOT share junction boxes.

➤ **Wood Poles**

Furnish and install wood poles, with all necessary grounding systems and hardware necessary in accordance with Section 1720 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Provide wood poles sized as necessary for the intended application.

- Use 60-foot CCTV Class 3 wood poles as defined in the ITS Project Special Provision.
- Use 40-foot Class 4 wood poles for approved applications.
- Use 6” x 6” x 8’ treated wood posts for underground electrical service structures.

Furnish and install related items of work including but not limited to risers with weatherhead or heat shrink tubing, Air terminals and all necessary hardware in accordance with Section 1720 of the 2018 NCDOT *Standard Specifications for Roads and Structures* and the Air Terminal and Lightning Protection System Project Special Provision included with this RFP.

➤ **Electrical Service**

Furnish and install new electrical services rated 100 Amps for overhead service or 200 Amps for underground service, 240/120 VAC service drops for the each new ITS device. Furnish and install related items of work, including, but not limited to service entrance equipment, service entrance conductors, feeder conductors, disconnects, junction boxes, risers, guy

assemblies, and wood poles with all necessary hardware in accordance with Section 1700 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

Electrical Services and Service Disconnects with regards to voltage drop calculations shall be rated to accommodate the following breaker sizes:

CCTV = 15 AMPS

DMS = 50 AMPS or 30 AMPS (dependent on the sign manufacturer)

Calculations using actual equipment load amperage will not be allowed.

➤ **Generator Hookups**

For devices listed above as “Critical” devices install an external generator connection port on the device cabinet exterior. Port should be designed and sized for the appropriate electrical requirements of the cabinet it is for. ALL hub cabinet locations are considered “Critical” other critical devices are noted in the lists earlier in this RFP. Supplying generators is not required as part of this project.

OTHER CODES AND STANDARDS

All ITS materials shall conform to the latest version of the applicable standards of the National Electrical Code (NEC), National Electric Manufacturer's Association (NEMA), the Underwriters' Laboratories, Inc. (UL), the Electronic Industries Association (EIA), the International Municipal Signal Association (IMSA), and the National Electrical Safety Code (NESC). All materials and workmanship must conform to the requirements of the NESC, standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI). Comply with all federal laws, state laws, and city codes in accordance with the 2018 NCDOT *Standard Specifications for Roads and Structures*.

SUBMITTALS

Submit a set of 60% preliminary plans by HUB to HUB segment, 90% unsealed set of project plans by HUB to HUB segment, including specifications for materials, catalog cuts, and installation and testing requirements for review. 60% and 90% submittals will have separate 10-day review periods by HUB to HUB segment submitted with no more than four (4) HUB to HUB segments submitted for review at once. The design build team shall submit one HUB to HUB segment for the initial 60% submittal so that common errors can be addressed to avoid repeating corrections across future submittals. Upon acceptance of the Department, provide a 100% set of sealed plans and specifications to the Department. No construction of the ITS devices and infrastructure shall begin until the Department has accepted the 100% sealed plans and specifications. Provide the Department a minimum of 10 working days for each review.

QUALIFIED PRODUCTS LIST

Submit a listing of items on the NCDOT 2018 Qualified Products List (QPL) to receive approval for use on the project. Catalog cuts will not be required for items on the QPL. The QPL website is:

<https://connect.ncdot.gov/resources/safety/Pages/default.aspx>

ADDITIONAL REQUIREMENTS

For all ITS devices and components within the entire project limits, the Design-Build Team shall comply with the following requirements:

➤ Maintenance and Repair

The Design-Build Team shall maintain and repair all ITS components within the track 1A scope, including but not limited to, ITS devices, ITS conduit system, and all related ITS components, from the beginning of construction until the final acceptance of the project by the NCDOT. The Design-Build Team shall be responsible for conducting 811 locates for newly constructed fiber until acceptance. After acceptance of the project, the Design-Build Team shall be responsible for repairing the system due to faulty materials or workmanship in accordance with the *Twelve Month Guarantee* Project Special Provision found elsewhere in this RFP, or longer if the Design-Build extends the aforementioned warranty period.

➤ Plan of Record Documentation

Prepare and submit to the Department Plan of Record (POR)/As-built documentation that depicts the conduit and ITS device locations. Submit final POR documentation in electronic and hard copy format for Department approval. Provide electronic plans in MicroStation (latest release in use by the Department) format on CD. Submit hard copy documentation on 11 x 17-inch plan sheets. POR documentation shall include the final location and depth of conduits, wiring external to the cabinets, locations of splice enclosures, junction box locations, and SMFO cable terminations. Include in the POR documentation real world coordinates for all ITS devices, splice enclosures, junction boxes, and equipment cabinets installed or utilized under this project. Provide the coordinates in feet units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83). Furnish coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used. **This plan of record documentation shall be provided to both the Engineer and the NCDOT ITS Section.**

➤ Systems Engineering Documentation

The Design-Build Team shall perform systems engineering to ensure consistency with the Statewide ITS Architecture and to ensure conformance with the requirements of 23 CFR 940.11. The Design-Build Team shall develop and submit to NCDOT the following systems engineering deliverables for review:

- a. A Systems Engineering Management Plan
- b. A Concept of Operations
- c. A requirement document that specifies system requirements, high level design, and detailed design requirements
- d. Development of test plans for unit/device testing, subsystem verification, system verification and validation.

Systems Engineering Documentation shall follow the same submittal review structure as detailed in the Submittals section above.

➤ **Integration**

Upon completion of the ITS device installations, coordinate with DIT to integrate all ITS devices with the NCDOT ITS network and verify accessibility of all devices at the STOC unless instructed otherwise by this RPF or by the Engineer.

Coordinate with DIT and the Engineer to modify, as necessary, the existing central hardware and software modules including but not limited to databases, to provide operators access to new devices through the operators' Graphical User Interface.

➤ **Testing**

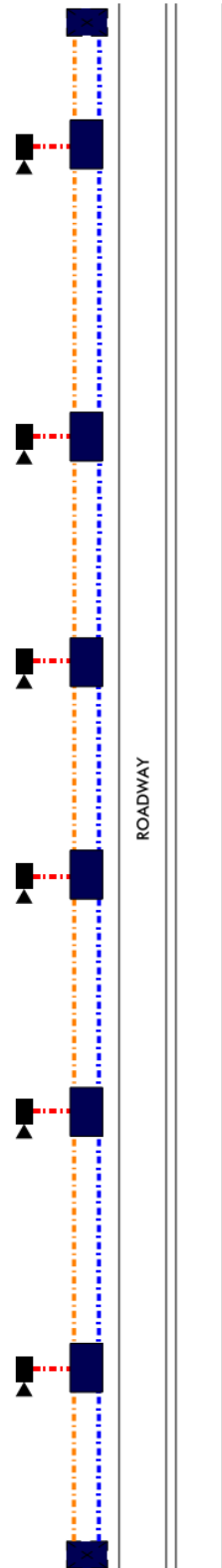
Develop unit and system test plans and procedures for each ITS device and all associated components, in accordance with the appropriate testing requirements found in the Project Special Provisions included with this RFP and submit to the Engineer for review and approval.

Upon completion of the ITS device installations, conduct unit and system tests according to the approved test plan and procedures. Provide all necessary test equipment.







In case of failures and substandard performance, the Design-Build Team shall identify the cause, repair or replace the faulty parts and components and repeat the test. If the problem persists, the entire unit causing the problem shall be replaced prior to retest.

After successful completion of all unit and system tests, submit the test reports along with the record of repairs and part replacements to the Engineer.

ITS DEVICE LINE CONCEPT DRAWINGS



LEGEND

	ITS HUB CABINET
	ITS DEVICE
	JUNCTION BOX
	144-FIBER TRUNK CABLE (BLUE CONDUIT)
	144-FIBER ITS DEVICE CABLE (ORANGE CONDUIT)
	12-FIBER DROP CABLE (RED CONDUIT)

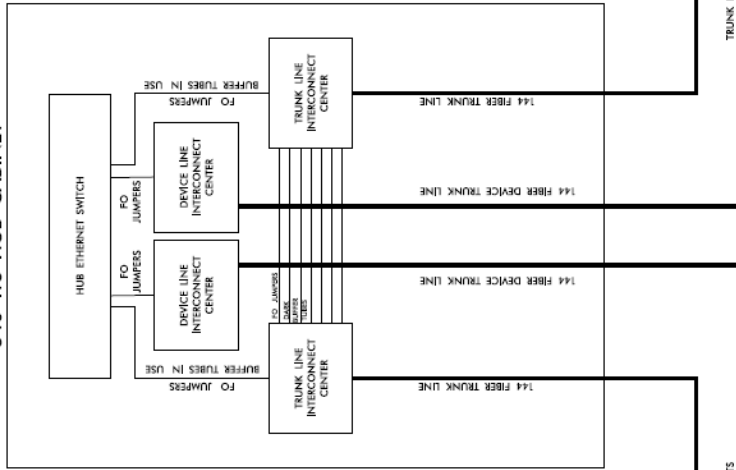
DEVICE LINE RUNS FULL DISTANCE BETWEEN 2 HUB CABINETS WITH DEVICES SPliced IN AND CONNECTS TO BOTH HUB CABINETS FOR DEVICE COMMUNICATION REDUNDANCY.

TRUNK LINE RUNS FULL DISTANCE BETWEEN 2 HUB CABINETS WITH NO SPICES AND CONNECTS TO BOTH HUB CABINETS FOR HUB TO HUB COMMUNICATIONS.

ITS HUB SPlice /REGENERATION CABINET CONCEPT BLOCK DIAGRAM

"DRAWING IS CONCEPTUAL"
SEE ITS SCOPE OF WORK FOR BUFFER TUBE SPlice ASSIGNMENTS
AND HUB CABINET PHYSICAL LAYOUT DETAIL

340 ITS HUB CABINET



TRUNK LINE TO NEXT HUB CABINET

TRUNK LINE TO ITS DEVICES BETWEEN HUB CABINETS

TRUNK LINE TO NEXT HUB CABINET

TRUNK LINE TO ITS DEVICES BETWEEN HUB CABINETS

machinery, equipment, tools, materials, supplies, transportation, and labor necessary for the design, prosecution and completion of the work.

Page 1-30, Article 104-3, replace “plans or details of construction” with “contract” in all instances within this Article.

Page 1-39, delete Article 104-10 and replace with the following:

104-10 MAINTENANCE OF THE PROJECT

The Design-Build Team shall maintain the project from the date of beginning construction on the project until the project is finally accepted. For sections of facilities impacted by utility construction / relocation performed by the Design-Build Team prior to beginning construction on the roadway project, maintenance of the impacted sections of facilities shall be performed by the Design-Build Team beginning concurrently with the impact. This maintenance shall be continuous and effective and shall be prosecuted with adequate equipment and forces to the end that all work covered by the contract is kept in satisfactory and acceptable conditions at all times.

All constructed guardrail / guiderail within the project limits shall be included in this maintenance. The Design-Build Team shall perform weekly inspections of all guardrail and guiderail construction in unaccepted HUB construction segments and shall report damages to the Engineer on the same day of the weekly inspection. Where damaged guardrail or guiderail is repaired or replaced as a result of maintaining the project in accordance with this Article, such repair or replacement shall be performed within seven consecutive calendar days of such inspection report.

The Design-Build Team shall maintain all existing drainage facilities, except where the work consists of resurfacing only, such that they are in the same condition upon acceptance of the project as they were when the project was made available to the Design-Build Team. In the event that the Design-Build Team's work is suspended for any reason, the Design-Build Team shall maintain the work covered by the contract, as provided herein. When a portion of the project is accepted as provided in Article 105-17, immediately after such acceptance, the Design-Build Team will not be required to maintain the accepted portion. Should latent defects be discovered or become evident in an accepted portion of the project, the Design-Build Team shall repair or replace the defective work at no cost to the Department.

Where an observation period(s) is required that extends beyond the final acceptance date, the Design-Build Team shall perform any work required by the observation period until satisfactory completion of the observation period.

With the exception of the maintenance of existing and constructed guardrail / guiderail, the Design-Build Team will not be directly compensated for any maintenance operations. The Design-Build Team will not be compensated for the performance of weekly inspections of guardrail / guiderail, and the damage reports required as described above. Authorized maintenance activities for existing and constructed guardrail / guiderail within the project limits